Detroit Property Tax Delinquency: Social Contract in Crisis

James Alm
Timothy R. Hodge
Gary Sands
Mark Skidmore

© 2014 Lincoln Institute of Land Policy

Lincoln Institute of Land Policy
Working Paper

The findings and conclusions of this Working Paper reflect the views of the author(s) and have not been subject to a detailed review by the staff of the Lincoln Institute of Land Policy.

Contact the Lincoln Institute with questions or requests for permission to reprint this paper. help@lincolninst.edu

Lincoln Institute Product Code: WP14JA3

Abstract

As the country reemerges from the real estate crisis, the City of Detroit, Michigan continues to struggle, and is currently in the midst of bankruptcy proceedings. Falling property values have led to significant reductions in property tax revenues. In addition, the rate of property tax delinquency in Detroit is 48 percent, resulting in uncollected tax revenues of about 20 percent. This high rate of tax delinquency results from a confluence of factors including limited tax enforcement, feelings of tax inequity, and failure to provide public services, all of which have contributed to a breakdown in the social contract between the City and its residents. In this paper, we develop a theoretical model of the individual decision to become delinquent on one's property tax payments. We then use detailed parcel-level data to evaluate the factors that affect both the probability that a property owner is tax delinquent and, conditional upon delinquency, the magnitude of the delinquency. Our estimates show that properties that have lower value, longer police response times, are non-homestead (non-owner occupied residential properties), have a higher statutory tax rate, have a higher assessed value relative to sales price, are owned by a financial institution or by a Detroit resident, are delinquent on water bills, and for which the probability of enforcement is low are more likely to be tax delinquent. These findings can be used to inform policies targeted at improving tax compliance within the City.

Key Words: Property Tax, Delinquency, Tax Compliance

About the Authors

James Alm is chair of the Department of Economics at Tulane University. His teaching and research are in the area of public economics, focusing particularly on tax compliance, the tax treatment of the family, income reporting, and tax reform. He has also worked extensively on fiscal and decentralization reforms overseas. Alm is currently editor of *Public Finance Review*.

Department of Economics
Tulane University
Tilton Hall 208
New Orleans, LA 70118
jalm@tulane.edu

Timothy Hodge is a visiting assistant professor of economics at Allegheny College. His research interests include property tax policy, urban/regional economics, and real estate economics.

Department of Economics
Allegheny College
Quigley Hall 219A
Meadville, PA 16335
thodge@allegheny.edu

Gary Sands is professor emeritus of urban planning at Wayne State University in Detroit. His research has focused on housing markets and housing policy.

1051 Hartsough Street
Plymouth, MI 48170
gary.sands@wayne.edu

Mark Skidmore is a visiting fellow at the Lincoln Institute of Land Policy, and is professor and Morris Chair in State and Local Government Finance and Policy at Michigan State University. His research focuses on public economics and urban/regional economics.

Justin S. Morrill Hall of Agriculture, Room 91
Michigan State University
East Lansing, MI 48824
mskidmor@anr.msu.edu

Acknowledgements

We thank the Lincoln Institute of Land Policy for financial support. We also thank Fred Morgan of the City of Detroit Assessment Division for providing detailed parcel-level data and Councilman Kenneth Cockrel for inviting us to evaluate Detroit's property tax base.

Table of Contents

Introduction 1
Economic and Fiscal Conditions in Detroit 3
Theoretical Framework and Hypotheses 5
Data and Empirical Methods 7
Estimation Results 9
  Determinants of the Probability of Delinquency 9
  Determinants of the Magnitude of Delinquency 11
Conclusions 12
References 14
Tables and Figures 17
Appendix 25

Detroit Property Tax Delinquency: Social Contract in Crisis

Introduction

The nationwide real estate crisis and ensuing decline in the property tax base have affected local government finances throughout the United States. The housing market in Detroit, Michigan was hit particularly hard. According to Hodge et al. (2013a), in 2010, the average "arms-length" selling price of a residential parcel with a structure was just $12,700. In 2013, the City's fiscal challenges came to a head when Governor Snyder appointed an emergency financial manager, who subsequently set in motion a filing for bankruptcy. Despite the near complete collapse of the real estate market within the city, the property tax is still an important revenue source and the quality of its administration can help or hinder economic and fiscal recovery. Currently, 48 percent of Detroit properties are tax delinquent. The extraordinarily high rate of tax delinquency results from a confluence of factors: City and county officials have failed to fully enforce property tax compliance, particularly for low value, low tax properties; many citizens perceive the tax to be unfair, partly because of the over-assessment of property; and many property owners seem frustrated by the lack of public service provision, so that citizens may not pay taxes because local authorities have failed to provide basic public services such as public safety.[1] In many respects, the basic social contract between the City and its residents seems to be broken.

Detroit is not the only city to experience property tax delinquency. A recent report by the Pew Charitable Trusts (2013) highlights emerging challenges with property tax delinquency across the nation, identifying the cities of Flint, Cleveland, and Detroit as localities that are estimated to have lost more than 20 percent of potential tax revenue to tax delinquency in 2011. All other cities cited in the report have lost below 10 percent of tax revenues, with most of the 30 cities in the study having lost below 5 percent. Detroit stands out for its high delinquency rate. Indeed, as discussed by Bahl and Martinez-Vazquez (2007), the collection rate in Detroit is comparable to that of cities in developing countries where the property tax is used as a local revenue source such as the Philippines (collection rate of 40-50 percent), Jamaica (collection rate of 40 percent) and Chile (collection rate of 26 percent).

Perhaps surprisingly, there is relatively little work on property tax delinquency, even though the related issue of noncompliance with taxes in general has attracted increased attention in recent years. Langsdorf (1973) offers an evaluation of property tax delinquency in the previously declining City of St. Louis, bemoaning a nine percent property tax delinquency rate that he attributed to the high rate of property abandonment. He describes a cycle by which the value of property becomes so low that the income generating potential is insufficient for the owner and so the property is abandoned. In such cases, local authorities have no effective means by which to enforce tax compliance.[2] By U.S. historical standards, a nine percent delinquency rate is high,

[1] See MacDonald (2013a, b, c) for media coverage on the issue.

[2] In the words of Langdorf (1973):

> The economics of property ownership become such that sufficient revenue cannot be generated, especially if the tenants of such property are at the bottom of the economic ladder. Tax payments are the area where the first delinquency occurs. Physical maintenance of property is consequently deferred and decay begins. With deferral

but it pales in comparison to the 48 percent delinquency rate in Detroit. More recently, Bradley (2013) considers tax delinquency in the much wealthier Michigan community of Ann Arbor, during the 2006-2009 period. In Ann Arbor, the delinquency rate was about eight percent during this period, which is high relative to historical standards. However, his focus was on assessing the role of "saliency" in tax delinquency. Bradley (2013) hypothesizes that new homeowners systematically underestimate the amount of taxes that they must pay and that this error contributed to the financial challenge of paying property taxes on time. Indeed, he finds a small but statistically significant effect of the difference between "anticipated tax payments" and actual taxes due on delinquency.

The Great Recession brought to light vulnerabilities across the globe; Detroit's challenges are a small part of a much larger context. Among industrialized countries, Greece could be called the "poster child" of tax evasion, where about a third of government revenue is lost to tax evasion. In writing about the Greek crisis, Surowiecki (2011) succinctly summarized the tax compliance challenge:

> It isn't just a matter of lax enforcement, though Greek citizens also have what social scientists call very low "tax morale." In most countries, tax-compliance rates are much higher than a calculation of risks would imply. We don't pay our taxes just because we're afraid of getting caught; we also feel a responsibility to contribute to the common good. But that sense of responsibility comes with conditions. We're generally what Swiss behavioral economist Benno Torgler calls "social taxpayers": we'll chip in as long as we have faith that our fellow-citizens are doing the same, and that our government is basically legitimate. Countries where people feel that they have some say in how government acts, and where there are high levels of trust, tend to have high rates of tax compliance.

As we show in our evaluation, Surowiecki's statement could have easily been written about Detroit. While Detroit is an outlier among U.S. cities, it offers important lessons for governments at the sub-national and national levels who must maintain the perception of legitimacy in order to foster high citizen tax morale and tax compliance.

To evaluate tax delinquency in Detroit, we develop a theoretical model of the individual decision to become delinquent on one's property tax payments. We then estimate this model using detailed parcel-level data from the City of Detroit to examine both the factors that determine the likelihood that a property owner will be tax delinquent and, conditional upon delinquency, the factors that determine how much back taxes are owed. We find important linkages between a number of property characteristics, and the likelihood and magnitude of tax delinquency. Properties that are of lower value, have longer police response times, are non-homestead (non-owner occupied residential properties), have a high statutory tax rate, have a high assessed value

---

of physical maintenance, tenants move out, and the cycle of urban decay is accelerated. When the property no longer generates sufficient income, the owner abandons the property. The cycle constantly repeats itself. Real estate tax collection, of course, depends a large measure upon the ability of the jurisdiction in which the property is located to impose effective sanctions upon the owner for non-payment. A city which has no workable enforcement mechanism can expect to have a geometrical rise in the stock of abandoned and tax delinquent property.

relative to sales price, are owned by a financial institution or by a Detroit resident, are delinquent on water bills, and for which the tax less likely to be enforced are more likely to be tax delinquent. These findings can be used by city and county officials to target property types in an effort to improve compliance.

In the next section, we provide an overview of economic and fiscal conditions in Detroit, including a description of property tax policies and guidelines in managing tax delinquent properties. We then develop a theoretical model of individual property tax delinquency, and we estimate this model in the following section. We conclude with a discussion of the implications of these findings for Detroit in the final section.

Economic and Fiscal Conditions in Detroit

Since the middle of the 20th Century, the City of Detroit has endured one of the longest and most severe declines of any American city. The causes of this decline range from broad macro-economic trends (e.g., globalization, de-industrialization) to idiosyncratic, local issues (e.g., corruption, mismanagement). A number of authors have chronicled Detroit's decline (e.g., Binelli, 2012; Ryan, 2012; Bomey and Gallagher, 2013). Here, we provide only a brief outline of the major factors.

For some time now, Detroit has been shrinking in every dimension except in its land area. Population, employment, resident jobs, businesses and housing units have all declined, often by staggering amounts (Figure 1). During the 1970s, Detroit's population fell by more than 310,000; the total population lost between 1970 and 2010 exceeds 888,000. The number of business establishments in Detroit fell by two-thirds, accompanying a drop of 53 percent in the number of jobs in Detroit. The number of Detroit residents with jobs fell by more than half.

Trends since 2000 have continued to be negative with population losses accelerating in the last decade, with a net loss of more than 237,000 persons between 2000 and 2010. Estimates from the American Community Survey indicate continued decline. Despite an active program of demolishing dilapidated buildings, the residential vacancy rate increased from 10.4 percent in 2000 to 28.3 percent in 2013 (Figure 2).

Both the number of jobs and of real earnings in the City have fallen dramatically. Despite attracting several thousand new white collar jobs to the downtown area, including those jobs generated by Compuware and Quicken Loans, Detroit has experienced a net loss of 74,000 jobs since 2000, including a decline of 10,000 jobs downtown (County Business Patterns, 2000-12). Average real earnings for Detroit residents have fallen from $27,900 in 1999 to $21,400 in 2010 (U.S. Census of Population, 2000; American Community Survey, 2012). The value of Detroit payrolls has declined by 35 percent, in current dollars, from $14.1 billion to $9.2 billion during the same period.

These employment and population declines, combined with the real estate crisis, have taken an enormous toll on the City's property tax base. State law requires that local jurisdictions track state equalized value (SEV) and taxable value (TV) for each parcel, where SEV is equal to one

half of market value. Taxable value, however, is equal to SEV at the time of purchase, but since 1994, its growth is constrained to the inflation rate or 5 percent, whichever is less, for as long as one owns a property. TV is reset to SEV upon sale of the property. Thus, for many long-time property owners, there is a gap between SEV and TV, and a corresponding jurisdiction-wide gap between SEV and TV. The aggregate value of real property as measured by SEV in Detroit peaked at $12.5 billion in 2007, before falling to $7.8 billion in 2012, a decline of more than 37 percent in just five years, though the work of Hodge et al. (2013a) suggests that SEV has not fallen enough. The aggregate taxable value (TV) of real property was as high as $8.6 billion in 2008, but had dropped to $6.9 billion by 2012.

Although Michigan falls well above the median in various measures of property tax burden, the property tax rate in the City of Detroit is more than twice the statewide average. Homestead property tax rates, at 3.257 percent of value, are the highest in the nation, about 2.4 times the average of the 50 largest cities in the United States (Minnesota Taxpayers Association, 2012).[3] This estimated tax rate includes the tax savings available to owner occupants of residential properties, but it does not include other forms of property tax relief that are available to specified households.

Tax advantages in Detroit come in several forms. Michigan provides "circuit breaker" protection for low income households through a state income tax credit, and the state allows local governments to offer property tax reductions based on hardship. Also, as noted above, since 1994, a cap on increases in taxable value has limited growth in tax bills to the rate of inflation or 5 percent, whichever is less (Feldman, Courant, and Drake, 2003). Because TV is reset to SEV when a property is sold, a homeowner's effective tax rate becomes a function of the length of tenure, growth property value, the inflation rate, and the statutory tax rate. Also, owners of homestead (or owner-occupied) property are exempt from paying local school taxes. Finally, Michigan municipalities may create Neighborhood Enterprise Zones, in which the property tax on qualified residential investments may be reduced by up to half (Hodge et al., 2013b).

The administration of the property tax in Detroit is problematic. On average, properties are over-assessed (Hodge et al., 2013a) by a factor of five or more. A lack of personnel at both the City and the County levels, as well as outdated data processing systems, are responsible for processing errors, including sending bills to the wrong address and failing to return properties to the tax rolls when they are sold by the City (MacDonald, 2013c).

The property tax foreclosure process in Michigan is also complex and lengthy, as illustrated in Figure 3. Delinquent property taxes are first subject to late charges. After one year of delinquency, the property is forfeited to the county and subject to even higher monthly interest charges. During this two-year period, the owner may redeem the property by paying all outstanding taxes and fees. When property taxes have been delinquent for more than two years, the County Treasurer (Wayne County for Detroit properties) initiates foreclosure proceedings. A show cause hearing is held in the Circuit Court; the judicial foreclosure process extinguishes the rights of former owners of interest, including the former property owner, banks, and mortgage companies. The property remains subject to liens filed by government agencies in relation to the Environmental Protection Act, as well as any recorded or visible easements (Michigan

[3] Because of Detroit's low property values, it ranks last among the 50 largest cities in terms of average tax payment.

Department of Treasury, 2010). The County Treasurer then holds a public auction of these foreclosed properties. At this auction, properties may be purchased for a minimum bid that equals the unpaid property taxes, plus interest and penalties, with the proceeds distributed proportionately to the taxing jurisdictions. If the property is not sold at the first auction, a second sale is held, with the minimum bid reduced to $500. Property not sold at either auction may be transferred to a public body (e.g., city or state), to a state or local land bank, or may be held for a subsequent auction.

There are a number of factors that can disrupt this process. Generally, if the property is involved in a law suit or a bankruptcy, then the county will delay the foreclosure action until these issues are resolved. Because of the large number of Detroit properties that have entered the property tax foreclosure process, the Wayne County Treasurer and the Circuit Court lack the personnel to pursue every foreclosure action. Wayne County offered 13,500 properties in the 2011 tax auction; the number rose to 21,350 in 2012 (Anglebrandt, 2013).[4] Because of the growing backlog of tax delinquent properties (currently about 200,000), the county does not foreclose on property owners who owe less than $1,600 in taxes and penalties (MacDonald, 2013b).

These policies, combined with a collapsing real estate market and poor economic conditions, have resulted in increasing numbers of properties for which property taxes are not being paid. For owners of low-valued, low-tax properties, payment of property taxes is effectively optional since a foreclosure action is unlikely. Even owners of higher valued properties with limited equity may elect to ignore their tax bills, with the expectation that they will be able to repurchase the property for $500 when it is auctioned. In addition, Wayne County records indicate that 80 percent of the properties sold at auction over the past two years are once again delinquent on taxes (Detroit News, 2013). It seems likely that purchasers of many of these properties are absentee owners who intend to reduce their operating expenses and increase their net rental income by never paying taxes. That is, tax delinquency, for Detroit property owners possesses the elements of a standard tax evasion decision. In the next section, we apply relevant aspects of the tax evasion literature to the specific property tax delinquency decision in order to develop a model for estimating the determinants of property tax delinquency.

Theoretical Framework and Hypotheses[5]

Consider a property owner who must choose whether to pay the legally due property tax obligations or to become delinquent. This "decision" is a complicated one, with multiple and intertemporal aspects. Recall from our earlier discussion of property tax delinquency in Detroit that the process begins with the owner deciding in the *current* period whether to pay or not, and the individual faces an uncertain prospect that the City will start the forfeiture/foreclosure process if he or she chooses to become delinquent. However, even if the owner chooses delinquency in the current period and the forfeiture and foreclosure process begins immediately, the owner may decide to pay taxes plus fines in a *future* period. As a result, for an owner to be

[4] In both years, less than half of these properties were sold.

[5] Much of this literature is based in some way upon the original work by Allingham and Sandmo (1972). For recent discussions of the tax compliance literature, see Slemrod (2007), Sandmo (2012), and Alm (2012).

delinquent, he or she must choose delinquency both in the *current* period and in the *future* period. Our theoretical model incorporates both of these decisions.

We begin with the current period. Assume that a property owner with income I_0 owns a parcel with an assessed taxable value of B and a true (market) value of H. The owner is legally obligated to pay property taxes at rate t on the assessed value. The owner derives net imputed rental income at rate r on the property's market value, and he or she also receives public services that are valued in the amount G. The owner must choose whether to pay property taxes tB in the current period, or risk facing forfeiture and foreclosure. However, there is uncertainty about whether the owner who decides not to pay property taxes will be subject to the forfeiture/foreclosure process, as represented by the probability p.[6] This probability is assumed to be a positive function of the taxable value, or $p(B)$, with $p'(B)>0$.

If the owner pays all property taxes in the current period, then his certain income is $[I_0-tB+rH+G]$, and the certain utility is simply $U(I)=U(I_0-tB+rH+G)$. If the owner decides to become delinquent in the current period, then his or her income depends upon whether the forfeiture/foreclosure process occurs. With forfeiture/foreclosure, the individual loses the house, the associated benefits from the house, and the public services; the individual is also assumed to bear some "guilt" from his or her failure to pay the legally due taxes. Denoting the monetary value of this guilt as γ, the individual's income becomes $[I_0-\gamma]$.[7] If forfeiture/foreclosure does not occur, then the individual's income is $[I_0+rH+G]$. The expected utility $EU(I)$ of this gamble is $EU(I)=p(B)U(I_0-\gamma)+(1-p(B))U(I_0+rH+G)$. The individual compares the certain utility from payment $U(I)$ with the expected utility from delinquency $EU(I)$, and chooses to pay or to become delinquent depending upon which is greater.[8]

It is straightforward to demonstrate that delinquency in the current period is more likely if: the probability of forfeiture/foreclosure is lower, the tax rate is higher, public services are lower, imputed rental income is lower, and guilt from delinquency is lower.

However, even if the owner chooses to become delinquent in the current period, and even if the forfeiture/foreclosure process starts in the current period, the individual has the option of paying (or not paying) taxes plus fines in the future. Denote the additional fine rate as f and the additional fines as ftB. Then the owner's income, if he or she pays the taxes plus fines, is $[I_0-ftB+rH+G]$, and his or her utility in this case is $U(I_0-ftB+rH+G)$; his or her income if the individual chooses to become delinquent (again) is $[I_0-\gamma]$, with associated utility of $U(I_0-\gamma)$. The owner compares these two certain utilities, and chooses to become delinquent in the future if the utility from delinquency is greater than the utility from payment.

[6] As indicated in our earlier discussion, delinquency starts with forfeiture proceedings, and then progresses to foreclosure proceedings, so that these are in fact separate processes with (likely) different probabilities. Without loss of generality, we combine these two processes into a single one.

[7] See Alm and Torgler (2011) for a detailed discussion of the role of ethics and morality in the tax compliance decision.

[8] The Michigan foreclosure process requires three decisions before the final step of judicial foreclosure and auction sale occurs. The model offers a simplified version of the tax foreclosure process while still capturing the essential features of the process.

Delinquency in the *future* period is more likely if: the additional fines are greater, the tax rate is higher, public services are lower, imputed rental income is lower, and guilt from delinquency is lower. These results largely parallel the analysis for the current period. Note that enforcement factors do not play a role in the future delinquency decision.

Of course, determining delinquency as the optimal behavior requires that the owner choose delinquency both in the *current* period and in the *future* period. Solving for this optimal behavior requires solving the entire intertemporal decision process for the owner. This problem can be solved via backward induction, starting with the future delinquency decision and then (conditional upon optimal future behavior) solving the current delinquency decision. It can be shown that the basic comparative statics results discussed above apply directly to the entire intertemporal decision process.

Overall, then, this analysis suggests several hypotheses about the factors that affect property tax delinquency, factors that relate to the roles of enforcement, public services and commitment to the community, tax rates, assessed versus market values, and notions of fairness (including the impact of guilt) in the delinquency decision:

- *H1*-Property owners for whom the tax is not enforced are more likely to be delinquent.
- *H2*-Property owners with lower taxable value are more likely to be delinquent due to lower enforcement for lower taxable values.
- *H3*-Property owners who receive lower services are more likely to be delinquent.
- *H4*-Non-homestead property owners are more likely to be delinquent.
- *H5*-Property owners facing higher statutory tax rates are more likely to be delinquent.
- *H6*-Property owners with higher assessment ratios are more likely to be delinquent.

In the next section we present our data and methods for testing these hypotheses.

Data and Empirical Methods

The City of Detroit's Assessment Division provided parcel-level data for this research. The raw data include information for 444,183 real and personal property parcels, of which we focus on residential properties. In total, there are 224,262 residential properties, both owner-occupied (homestead) and non-owner occupied. Unfortunately, there was missing information for thousands of properties. In most of these cases, state equalized value (SEV), taxable value (TV), or last sales price were recorded as zero. Omitting these properties results in 161,523 properties that we include in our analysis, of which 80,807 are residential owner-occupied and 80,716 are residential non-owner occupied properties.[9] Summary statistics for all of the variables we consider are provided in Table 1, and definitions for all variables are provided in the Appendix.

[9] Unfortunately, we do not have enough information about the omitted properties to evaluate potential sample selection bias. We note that roughly and equal amount of homestead and non-homestead properties were omitted from the sample, offering some assurance that omitted parcels are similar to those in the sample, at least in this dimension.

There are some significant differences between homestead and non-homestead properties. For example, the delinquency rate is substantially higher for non-homestead properties, and the average statutory tax rate for non-homestead properties is 19 millage points higher than for homestead properties. This difference is largely due to the homestead exemption, but other tax abatement programs create variability in the statutory rate across both homestead and non-homestead properties. The average length of ownership for homestead properties is 12 years, substantially more than the 8.5 average for non-homestead properties. With these exceptions, the summary statistics are similar across the two groups (e.g., crime response time, living area, lot size, and age). As shown in Figure 4, there is considerable variability in delinquency rates across the city.

We use these parcel-level data to estimate two models of delinquency. First, we examine the factors that affect the probability of being tax delinquent (*Delinquent*). Second, we also estimate the amount by which an owner is delinquent (*Delinquent Amount*) conditional upon delinquency. These two issues are related in the sense that a property owner first chooses whether or not to pay taxes, and, if not, then the owner chooses by how much. This joint process is estimated simultaneously in order to address the potential bias introduced by the property owners' self-selection into delinquency. We therefore use the procedure proposed by Heckman (1979).[10]In the first step we estimate the delinquency (yes/no) selection equation, represented by:

$$Delinquent_i = \{ \begin{array}{l} 1 \;\; if \;\; P_i\alpha + X_i\beta + u_i \geq 0 \\ 0 \;\; if \;\; P_i\alpha + X_i\beta + u_i < 0 \end{array}$$

where $Delinquent_i$ indicates whether the property owner is delinquent (yes=1, no=0), P_i is a vector of property characteristics (*Homestead Exemption*, *Statutory Tax Rate*, *Taxable Value*, *Years Owned*, *Assessment Ratio*, *Detroit Owner*[11], and *Size*), and X_i is a vector of variable(s) that are excluded from the second-stage outcome equation, as presented below. The variable(s) in X are our instruments; these instruments are a variable measuring precinct level police response times (*Police Response Time*) and indicators for whether the tax is enforced (*No Tax Enforcement*), the property is owned by a Detroit resident (*Detroit Resident*), and bank owned property (*Bank Owned Property*). [12]

The *No Tax Enforcement* indicator variable requires further description. In Wayne County, officials are overloaded and thus do not begin tax foreclosure proceedings until back taxes exceed about $1,500 or $2,000.[13] Further, state law requires that an owner cannot be removed from a tax delinquent property for two years. Thus, an astute property owner of a low tax property knows that he or she has at least two years before tax foreclosure proceedings take place and tax foreclosure forces him or her off the premises. In the estimates reported, the *No Tax Enforcement* indicator variable equals one for properties with less than a $1,000 tax payment (the

[10] See Achen (1986) and Sigelman and Zeng (1999) for theoretical and intuitive discussions on the Heckman procedure.
[11] All homestead property owners are "Detroit Owners". However, many landlords own property and have a Detroit address but do not live on the property of interest and thus do not receive a homestead exemption.
[12] *Detroit Resident* is excluded from the evaluation of homestead properties because all homestead properties are in principle owned by a person who lives in Detroit. Similarly, Bank Owned Properties is excluded from the evaluation of homestead properties.
[13] The critical point for enforcement varies from year to year. In 2010, the cut-off was $1,600.

owner could continue to live in the home for about two years before tax foreclosure), and zero otherwise.[14]

We are also interested in understanding the factors that determine the amount by which a delinquent property owner owes, given that he or she is delinquent. The Heckman (1979) second stage outcome equation is represented by:

$$\textit{Delinquency Amount}_i = P_i\alpha + \varepsilon_i$$

where *Delinquent Amount* is equal to the unpaid tax bill over the 2010 spring and winter 2010 billing cycles.[15] We estimate the selection and outcome equations jointly by maximum likelihood.

Estimation Results

Determinants of the Probability of Delinquency

Consider first the estimates from the first stage selection equation as reported in Table 2. In column 1, we present probit estimates of the delinquency decision using all residential properties. Because the factors that determine delinquency may differ across homestead and non-homestead properties, we also present separate estimates for these two sub-groups in columns 2 and 3. Note that there are some differences in specification across columns 1, 2, and 3. In column 1, we include a homestead property indicator variable, but this variable is excluded in the column 2 and 3 sub-group estimates because the sub-groups are defined by this variable. Also, in columns 1 and 3, indicator variables for whether the property owner lives in Detroit or is bank owned are included, but these are excluded in column 2 because the property must be the primary residence of the property owner in order to receive the homestead exemption.[16]

In column 1, all variables are statistically significant determinants of delinquency. Consider first the control variables.[17] Owners of smaller and older homes are more likely to be delinquent. Non-homestead property owners are 18 percent more likely to be delinquent than their homestead property owner counterparts. Property owners who purchased their home more recently are also more likely to be delinquent than long-time owners. Long-time property owners and homestead owners have lower rates of delinquency, perhaps because these property owners are more likely to have social connections as well as more assets at stake. In addition, we find that Detroit owners, bank owned properties, and owners who are delinquent on the water bill are more likely to be delinquent. These findings are generally consistent with our expectations.

Consider now the factors that are, to some degree, within the control of policymakers. Recall that our earlier discussion highlighted the fact that local officials are not enforcing tax payments for low valued properties. Our results show that many property owners of such properties recognize

[14] In addition, see below for a discussion of the robustness of this variable.
[15] In Michigan, property taxes are due twice a year, one in the spring and one in the winter.
[16] There are, however, a few hundred property owners who live outside the city who receive the homestead exemption. We have no explanation for why such properties were coded as such.
[17] All estimated effects discussed are based on marginal effects based on mean values of the independent variables.

this by choosing not to pay taxes. The coefficient on taxable value is negative and statistically significant, so that lower valued properties are more likely to be delinquent. Also, the *No Tax Enforcement* variable is statistically significant. That is, controlling for taxable value, properties with less than $1,000 in annual tax payments have a 4.7 percentage point higher probability of being delinquent than their higher tax payment counterparts.

This latter finding is quite robust. In Figure 5, we present alternative coefficients estimates for *No Tax Enforcement* cut-offs of $600, $800, $1,000, $1,200 and $1,400. Figure 5 provides evidence that property owners with tax payments below $1,000 are far less likely than property owners with more $1,000 tax payments, controlling for other factors. Figure 5 shows that the largest coefficient on the *No Tax Enforcement* indicator variable is when the enforcement cut-off is a $1,000 tax payment. When the cut-off diverges from $1,000, the coefficient estimate declines and becomes statistically insignificant. That is, when the cut-off diverges from $1,000 the differential in the probability of delinquency between properties above and below the cut-off diminishes. This result provides evidence that failure to enforce tax compliance of the lower valued properties exacerbates the delinquency issue. Note, however, that size of the coefficient is relatively small; that is, full enforcement would not achieve delinquency rates in Detroit comparable to those of other large cities. Our estimates show that full enforcement would reduce delinquency among property owners by about five percentage points, but the potential improvement would be insufficient to fully eliminate delinquency.

Our estimates also show that delinquency is higher in areas where police response times are longer. According to this estimate, if the City of Detroit were to reduce the police response time from 47 minute to 12 minutes (roughly the national average), tax delinquency would fall by about 3.5 percentage points. This finding provides evidence that an owner who receives lower quality public services is less likely to pay taxes. Note that we are not able to include simultaneously both neighborhood indicator variables and the police response time variable because the response times are reported by precinct, which overlaps with neighborhoods. One might think inclusion of neighborhood indicator variables would be important to capture neighborhood-specific unobservable factors. However, in other, unreported estimates, we found that inclusion of neighborhood effects does not significantly alter the coefficients on our other explanatory variables.[18]

Turning to tax fairness, the estimates show that properties with higher assessment ratios are more likely to be delinquent. If the average assessment ratio was adjusted downward from five to one (the target set by state law), the citywide delinquency rate would fall by about two percentage points. According to Hodge et al. (2013a), the City has systematically over assessed property by an average factor of nearly 5.[19] Currently, the State of Michigan Tax Commission is conducting sample reassessments in Detroit to determine whether a full reassessment of property is

[18] All alternative estimates are available upon request.

[19] In 2010, the average sales price of arm's length transactions was $12,700, and yet the average assessed value of these same properties for tax purposes was $56,100. State law requires the ratio of assessed value to sales price to be one; the current average ratio for recently sold properties is nearly five.

warranted. [20] A reassessment would result in a significant decline in property tax revenues, but it would also likely improve tax compliance.

We also find that properties with high statutory tax rates have higher delinquency rates; a reduction in the tax rate of 20 millage points (a reduction of this amount would bring tax rates in line with the regional average) would reduce delinquency by about 4 percentage points.

Our estimates suggest that any one policy change results in a relatively small impact on the overall delinquency rate, but a combination of policy changes (improved tax enforcement, reduced crime response times, improved assessment practices, lower statutory tax rates) could reduce delinquency by about 14 percentage points. Given the 48 percent delinquency rate, a 14 percentage reduction does not fully resolve the problem. However, a combination of policy changes could result in meaningful reductions in property tax delinquency.

Turning to a comparison of the homestead and non-homestead property results in columns 2 and 3, we see some differences across the two groups in determinants of delinquency. In particular, the size of a home is a positive determinant of delinquency among homestead property owners, but it is a negative determinant for non-homestead owners. The other variables have the same signs in both sets of estimates but note that there are some differences in the magnitudes of the coefficients.

Determinants of the Magnitude of Delinquency

It is also useful to consider the factors that determine the amount by which the property owner is delinquent, given that the owner has made the decision not to pay taxes. These estimates are presented in Table 3. The results in Table 3 largely mirror those presented in Table 2. Column 1 contains the estimates that use the full set of parcels; column 2 presents the estimates for the homestead properties; and the non-homestead estimates are found in column 3.

Consider column 1, which contain the estimates using all residential parcels. With the exception of the house size and age variables, all of the coefficients are statistically significant. Homestead properties have smaller delinquency amounts, whereas properties with higher taxable values, higher statutory tax rates, and properties owned for longer periods have greater delinquency amounts. Finally, property owners who are delinquent on water bills have higher delinquency amounts.

There is general consistency in estimates across homestead and non-homestead properties, as presented in columns 2 and 3, respectively, with some notable differences. First, in the non-homestead sample smaller and older homes have lower delinquency amounts, but among homestead properties, smaller and older homes have larger delinquency amounts. Second, the coefficient on water bill delinquency is positive and significant in both estimates, but the coefficient in the homestead sample is almost twice as large, and water bill delinquency contributes to more than half of the total delinquency amount for homestead properties. This

[20] The State Tax Commission is currently conducting an independent review of assessment practices, and in September 2013 city officials announced that over the next three to five years all properties within the city would be reassessed. For a detailed analysis of Detroit assessment practices, see Hodge, *et al*. (2013a).

result suggests that many delinquent homestead property owners are experiencing financial challenges and are using delinquency as a source of liquidity. The other results are generally similar.

Note, finally, that the coefficient on the Inverse Mill's Ratio is statistically significant in all three columns, indicating that selection bias is an issue in these estimates. The Heckman procedure is appropriate in this context.

Conclusions

Our estimation results are consistent with the important impact of various policy factors on property tax delinquency, such as enforcement, homestead versus non-homestead status, taxable value, statutory tax rate, the assessment ratio, and police response times. It must be acknowledged that our estimation results do not necessarily indicate causality between these policy variables and delinquency. We are also unable to include some potentially important individual-specific factors in our estimation. Even so, our results clearly indicate an important role for policy.

So what should the City of Detroit do now? Stronger enforcement of delinquency provisions could generate some additional revenues, as indicated by our estimation results. However, even full enforcement will not totally resolve delinquency problems. Property values need to recover. Basic public services must be provided. Assessments need downward adjustments. Statutory tax rates could be reduced to a range that is competitive within the region. More broadly, the social contract needs restoration. How can this be done? Currently, the City has accumulated thousands of parcels through abandonment and tax foreclosure. About 25 percent of the City's land area is owned by the City, county, land bank, or state, and this percentage is growing. Further, the prospects for returning these properties to tax paying private owners are low in the foreseeable future.

What options are there for increasing land value, thereby reducing delinquency? Consider how state and federal authorities intervened in the last episode of mass tax foreclosure. During the Great Depression, many homesteaders on marginal lands in Michigan, Minnesota, and Wisconsin were unable to pay their property taxes, and this resulted in a mass wave of foreclosure, abandonment, tax delinquency and eventual forfeiture. In these states, county governments frequently became the owners of thousands of acres of land, much of which was eventually sold to the state and federal governments. The six National Forests in Minnesota, Wisconsin, and Michigan, as well as the region's numerous state forests, all have origins in this mass land abandonment of the Depression Era as state and federal authorities pieced together a patchwork of adjacent lands purchased from counties eager to sell off their tax forfeited lands. Today, state and federal authorities have no taste for a Detroit "bailout". However, history suggests that they could help Detroit regain fiscal stability by purchasing a patchwork of unwanted parcels, making payments in lieu of taxes as is typical for other publicly owned lands, and using the land for the benefit of the general public. If applied to the City of Detroit, such actions could help stabilize the land market, generate a revenue stream and restore some measure of trust in the City.

Detroit's challenges have accumulated over decades. Leaders mistook long-term structural shifts in the regional economy for short-term challenges, putting off the required long-term adjustments in such areas as pension contributions and deficits by thinking that these challenges were short-term in nature. However, these leaders were mistaken, and now new leaders must deal with the consequences.

Though our evaluation suggests that full tax enforcement would reduce property tax delinquency, we emphasize that full enforcement will not fully resolve the severe tax delinquency problem. More importantly, the social contract between property owners and the City needs restoration; that can be accomplished over time with a dedicated and ongoing effort to improve a broad range of policies. Improvements in policies, in turn, will help to stabilize the economic and population base, and bring badly needed resources and jobs to the City. There are, however, no easy or quick fixes.

References

Achen, C. 1986. *The Statistical Analysis of Quasi-Experiments*. Berkeley, CA: University of California Press.

Allingham, M. G. and A. Sandmo. 1972. Income Tax Evasion: A Theoretical Analysis. *Journal of Public Economics* 1 (3-4), 323-338.

Alm, J. 2012. Measuring, Explaining, and Controlling Tax Evasion: Lessons from Theory, Field Studies, and Experiments. *International Tax and Public Finance* 19 (1), 54-77.

Alm, J., G. H. McClelland, and W. D. Schulze. 1999. Changing the Social Norm of Tax Compliance by Voting. *Kyklos* 52 (2), 141-171.

Alm, J. and B. Torgler. 2011. Do Ethics Matter? Tax Compliance and Morality. *Journal of Business Ethics* 101 (4), 635-651.

Angelbrandt, G. 2013. Deputy Treasurer: Wayne County "worst off" in country for tax foreclosures. *Crain's Detroit Business*. August 29.

Bahl, R. and J. Martinez-Vazquez. 2007. The Property Tax in Developing Countries: Current Practice and Prospects. Lincoln Institute of Land Policy Working Paper. Cambridge, MA.

Binelli, M. 2012. *Detroit City Is The Place To Be*. New York, NY: Metropolitan Books.

Bomey, N. and Gallagher, J. 2013. *How Detroit Went Broke*. Detroit Free Press. September 14, http://www.freep.com/article/20130915/NEWS01/130801004/Detroit-Bankruptcy-history-1950-debt-pension-revenue.

Bradley, Sebastien. 2013. Property Tax Salience and Payment Delinquency. Drexel University Working Paper. Philadelphia, PA.

Detroit News. 2013. *Most properties in Wayne foreclosure auctions repeat cycle of unpaid taxes*. http:/www.detroitnews.com/article/20130923/METRO01/309160111/Most-properties-Wayne-foreclosure-auctions-repeat-cycle-unpaid-taxes.

Feldman, N.F., P.N. Courant, P.N. and D.C. Drake. 2003. The Property Tax in Michigan. In *Michigan at the Millennium*, edited by C. Ballard, P. N. Courant, D. C. Drake, R. C. Fisher, and E. R. Gerber. East Lansing MI: Michigan State University Press.

Heckman, J. 1979. Sample Selection Bias as a Specification Error. *Econometrica* 47 (1), 153-161.

Hodge, T., M. Skidmore, G. Sands, and D. McMillen, 2013a. Assessment Inequity in a Declining Housing Market: The Case of Detroit. Michigan State University Working Paper. East Lansing, MI.

Hodge, T., M. Skidmore, G. Sands, and D. McMillan. 2013b. Tax Base Erosion and Inequity from Michigan's Assessment Growth Limit: The Case of Detroit. CESifo Working Paper No. 4098.

Kirchler, E. 2007. *The Economic Psychology of Tax Behavior*. Cambridge, UK: Cambridge University Press.

Kotlikoff, L. 2013. Assessing Fiscal Sustainability. Mercatus Center Report, George Mason University.

Landsdorf, K. 1973. Urban Decay, Property Tax Delinquency: A Solution in St. Louis. *The Urban Lawyer* 5, 729-748.

MacDonald, C. 2013a. Half of Detroit Property Owners Don't Pay Taxes. *The Detroit News*, February 12.

MacDonald, C. 2013b. Wayne County Overwhelmed by Foreclosures. *The Detroit News*, February 21, page 13A.

MacDonald, C. 2013c. Property Values, Taxes often in Error. *The Detroit News*. February 22, page 1A

Michigan Department of Treasury. 2010. Real Property Tax Forfeiture and Foreclosure. http://www.michigan.gov/taxes/0,4676,7-238-43535_55601---,00.html

Minnesota Taxpayers Association. 2011. 50-State Property Tax Comparison Study. Cambridge MA: Lincoln Institute of Land Policy.

Pew Charitable Trusts. 2013. Delinquent Property Tax in Philadelphia: Stark Challenges and Realistic Goals.

Ryan, B. 2012. *Design after Decline*. Philadelphia PA: University of Pennsylvania Press.

Sandmo, A. 2012. An Evasive Topic: Theorizing About the Hidden Economy. *International Tax and Public Finance* 19 (1), 5-24.

Slemrod, J. 2007. Cheating Ourselves: The Economics of Tax Evasion. *The Journal of Economic Perspectives* 21 (1), 25-48.

Sigelman, L. and Langche Z. 1999. Analyzing Censored and Sample-Selected Data with Tobit and Heckit Models. *Political Analysis* 8 (2), 167-82.

Surowiecki, J. 2011. Dogger Mania. *The New Yorker*, July.

Torgler, B. 2007. *Tax Compliance and Tax Morale: A Theoretical and Empirical Analysis*. Cheltenham, UK: Edward Elgar Publishing.

US Census Bureau. 2012. American Community Survey. Selected Characteristics: Detroit, Michigan, ACS One Year Estimates. http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?fpt=table

US Census Bureau. 2000. Census of Population and Housing. Detroit Michigan. Census Summary File 3. http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?fpt=table

US Census Bureau. 2000-12. County Business Patterns. ZIP Code Business Statistics, Michigan. http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?fpt=table

US Department of Housing and Urban Development. 2013. Metropolitan Area Quarterly Vacancy Report Detroit Michigan. http://www.huduser.org/portal/datasets/metro.html

Tables and Figures

Table 1: Summary Statistics

	Full Sample		Homestead		Non-homestead	
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Delinquent (yes=1, no=0)	0.536	0.498	0.350	0.477	0.623	0.484
Delinquent Amount	1,105	1,402	694.6	1,160	1,502	1,496
No Tax Enforcement (yes=1, no=0)	0.175	0.380	0.212	0.409	0.139	0.346
Police Response Time (minutes)	47.60	8.039	48.26	7.699	46.95	8.313
Homestead Property (yes=1, no=0)	0.500	0.500	--	--	--	--
Statutory Tax Rate (tax payment/SEV)	64.71	19.09	51.43	14.92	74.38	18.22
Taxable Value ($1,000s)	21.84	11.14	23.24	11.74	20.39	10.31
Years Owned	10.19	6.112	11.91	5.467	8.471	6.233
Assessment Ratio	5.252	12.35	2.909	7.045	6.579	14.89
Detroit Owner (yes=1, no=0)	0.783	0.412	--	--	0.592	0.491
Size (per 1,000 sq. ft.)	1.152	0.537	1.095	0.382	1.208	0.653
Age (Decades)	6.726	1.426	6.567	1.411	6.922	1.433
Bank Owned Property (yes=1, no=0)	0.043	0.202	--	--	0.074	0.262
Delinquent on Water (yes=1, no=0)	0.241	0.428	0.200	0.400	0.283	0.450
Number of Observations	161,590		80,852		80,738	

Table 2: Heckman First Stage Selection Estimate

Dependent Variable: Delinquent (yes=1, no=0)			
Independent Variable	All Properties	Homestead Properties	Non-Homestead Properties
No Tax Enforcement (yes=1, no=0)	0.047***	0.066***	0.061***
	(10.86)	(8.43)	(9.62)
Police Response Time (minutes)	0.001***	0.001***	0.0005***
	(4.92)	(4.91)	(2.21)
Homestead Property (yes=1, no=0)	-0.180***	--	--
	(-52.63)		
Statutory Tax Rate	0.002***	0.001***	0.003***
	(20.39)	(6.06)	(19.36)
Taxable Value (per $1,000)	-0.004***	-0.004***	-0.006***
	(-26.15)	(-17.80)	(-24.68)
Years Owned	-0.014***	-0.011***	-0.015***
	(-49.69)	(-30.53)	(-37.51)
Assessment Ratio	0.004***	0.005***	0.003***
	(31.15)	(24.61)	(21.16)
Detroit Owner (yes=1, no=0)	0.032***	--	0.028***
	(8.31)		(7.38)
Size (per 1,000 square feet)	-0.018***	0.023***	-0.028***
	(-6.13)	(4.15)	(-8.89)
Age (Decades)	0.011***	0.003**	0.016***
	(9.42)	(2.26)	(11.16)
Bank Owned Property (yes=1, no=0)	0.070***	--	0.122***
	(9.51)		(15.78)
Delinquent on Water (yes=1, no=0)	0.205***	0.246***	0.148***
	(66.27)	(58.66)	(37.20)
Number of Observations	161,523	80,807	80,716
Number of Censored Observations	75,232	48,288	26,944
Pseudo R^2	0.113	0.066	0.071

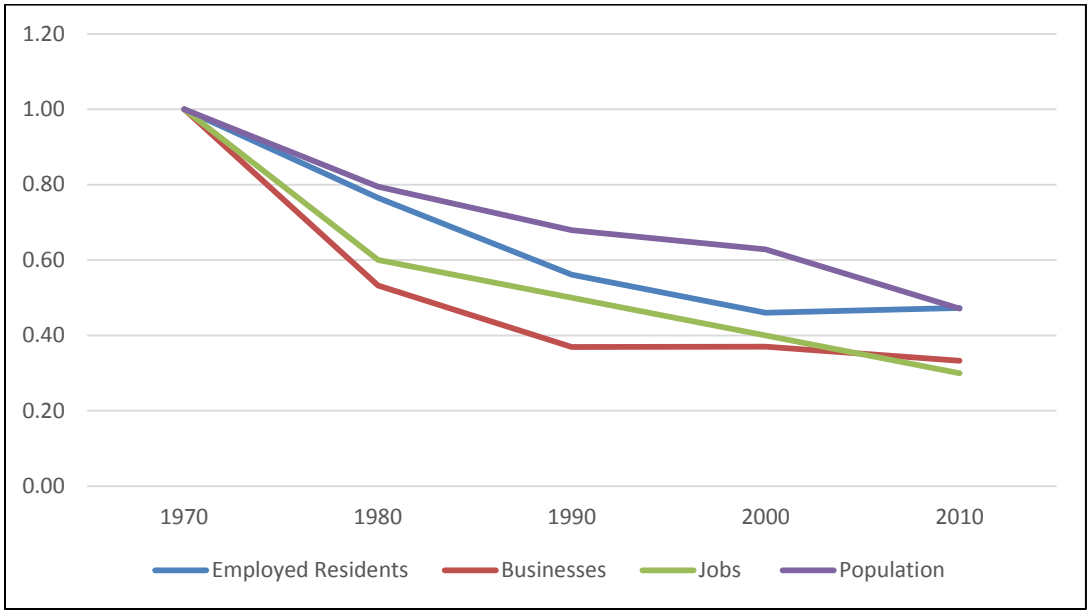
Notes: Coefficients represent marginal effects evaluated at mean values. Numbers in parentheses are z-values. * Indicates significant at the 90% confidence level. ** Indicates significant at the 95% confidence level. *** Indicates significant at the 99% confidence level.

Table 3: Heckman Second Stage Estimation

Dependent Variable: ln(Delinquent Amount)			
Independent Variable	All Properties	Homestead Properties	Non-Homestead Properties
Size (per 1,000 square feet)	0.007 (0.85)	-0.107*** (-4.83)	0.038*** (4.42)
Age (Decades)	0.005 (1.45)	0.016** (2.46)	-0.001 (-0.22)
Homestead Property (yes=1, no=0)	-0.175*** (-11.93)	--	--
Statutory Tax Rate	0.007*** (27.07)	0.008*** (16.19)	0.006*** (20.09)
Taxable Value (per $1,000)	0.039*** (68.46)	0.041*** (39.67)	0.039*** (55.53)
Years Owned	0.013*** (9.35)	0.011*** (5.23)	0.015*** (8.04)
Delinquent on Water (yes=1, no=0)	0.444*** (30.85)	0.631*** (21.88)	0.357*** (25.33)
Lambda (Invers Mill's Ratio)	-0.468*** (-10.07)	-0.287*** (-4.48)	-0.587*** (-9.59)
Wald Chi^2	22,082	8,320	14,035
Number of Observations	161,523	80,807	80,716

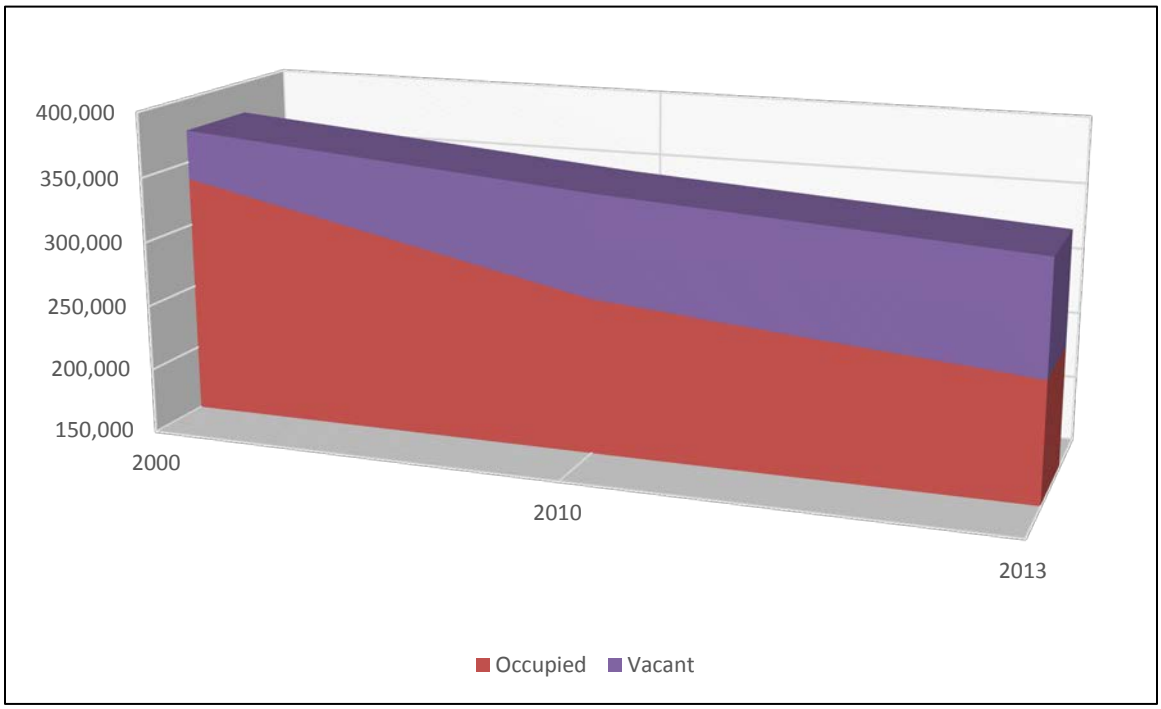
Notes: Estimations include a set of neighborhood indicator variables that are not reported here. Numbers in parentheses are z-values. * Indicates significant at the 90% confidence level. ** Indicates significant at the 95% confidence level. *** Indicates significant at the 99% confidence level.

Figure 1: Detroit's Decline Since 1970



Sources: US Census of Population, American Community Survey, County Business Patterns.

Figure 2: Detroit Housing Stock 2000-2013



Sources: US Census, USPS Postal Vacancy Survey.

Figure 3: Michigan Property Tax Foreclosure Process

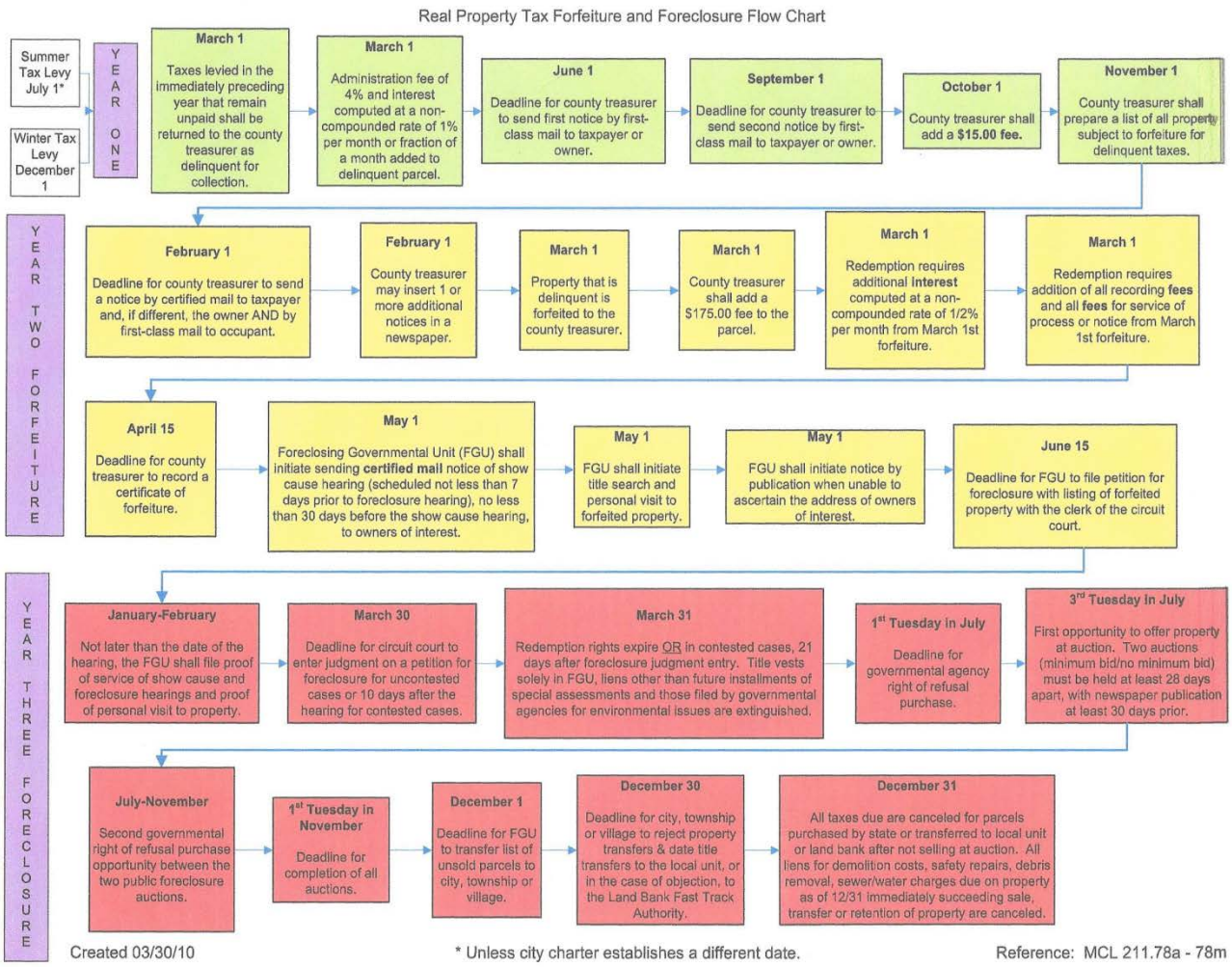


Figure 4: Detroit Delinquency Rate by Neighborhood

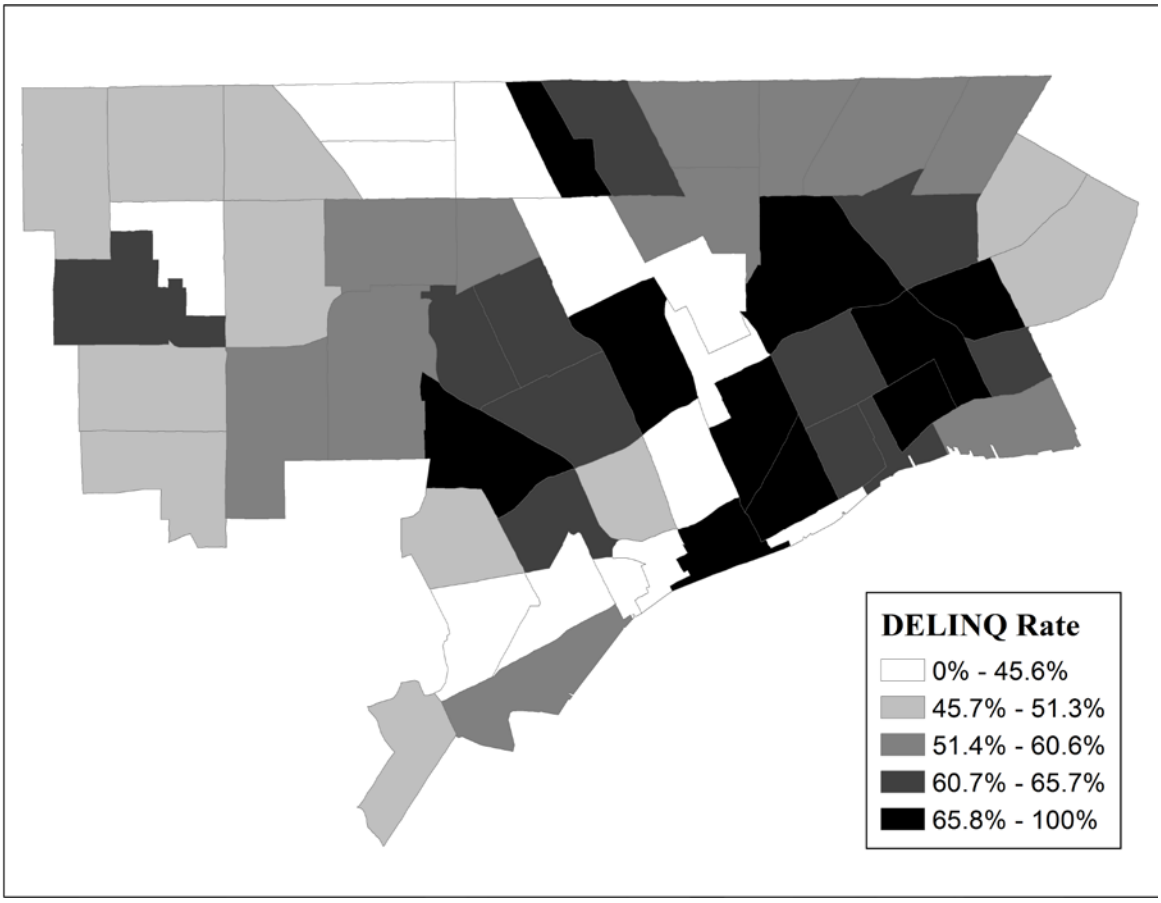
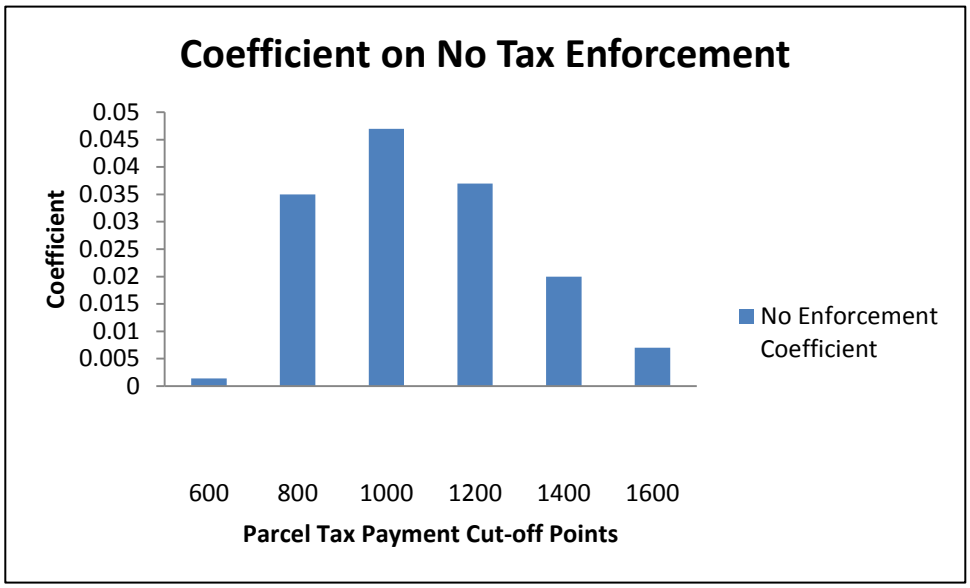


Figure 5: Coefficient on No Tax Enforcement Variable



Appendix

Variable Name	Variable Definition
Delinquent	Indicator variable equal to 1 if the owner is delinquent on at least two tax bills, and zero otherwise
Delinquent Amount	The total amount by which a property owner is delinquent over two billing cycles (spring and winter)
No Tax Enforcement	Indicator variable equal to 1 if the annual tax payment on the property is less than $1,000, and 0 otherwise
Police Response Time	The police response time in minutes for each of the 13 precincts in Detroit
Size	Size of residential structure in 1,000s of square feet
Age	Age of residential structure in ten-year intervals
Homestead Property	Indicator variable equal to 1 if the property owner receives the principal residence exemption, and 0 otherwise (also known and the homestead exemption)
Statutory Tax Rate	Statutory Tax Rate, which is applied to the taxable value of a property
Taxable Value	Taxable value, which grows at an annual rate of 5 percent or the rate of inflation, whichever is less, for as long as the owner retains ownership
Years Owned	Number of years owned by the current property owner
Assessment Ratio	(2*state equalized value)/(last sales price)
Detroit Owner	Indicator variable equal to 1 if the owner of the property resides within the City of Detroit, and 0 otherwise
Bank Owned Property	Indicator variable equal to 1 if the property has owned by a bank or other financial institution
Delinquent on Water Bill	Indicator variable equal to one if the property owner is delinquent on the water bill, and zero otherwise

Note: All data are provided by the City of Detroit Assessment Division and the City of Detroit.