THE ROLE OF REPRESENTATIVE AGENTS
IN THE PROPERTY TAX APPEALS PROCESS

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Property tax appeals provide property owners with a mechanism to challenge their assessments and reduce their property tax bill. Appeals are frequently filed not by the homeowner but by a tax representative who often works on their behalf for a contingency fee. Using appeals from Miami-Dade County, Florida, we find that representatives have a greater presence in higher-priced neighborhoods, which makes these homeowners more likely to appeal than those in lower-priced neighborhoods, and representatives increase the percentage reduction in assessed value, but only because they increase the likelihood that appellants show up for the appeal hearings.

Keywords: tax appeal, tax representative, property tax

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I. INTRODUCTION

The property tax has been one of the most researched of all taxes. Nonetheless, one important element of the property tax — namely the appeals process — has been largely overlooked by economists. In fact, rigorous empirical studies have only emerged in the past few years.

The property tax appeals process gives owners who believe their property is overassessed an opportunity to have a local value adjustment board take a "second look" at the assessed value. Because the system of government assessments inherently introduces some randomness in tax burdens, having the right to appeal holds the promise of improving horizontal equity.[1] Weber and McMillen (WM, 2010) were the first to study appeals. They used Chicago data to estimate the probability of appeal and given an appeal the probability that the appellant's assessed value was lowered. We build upon their work in three respects. First, we use data on single-family homes located in Miami-Dade County, Florida, to estimate the probability of appeal using WM's explanatory variables as well as a number of additional determinants that are shown to be important.[2] Second, for those homeowners filing an appeal, in lieu of estimating the probability of an assessment reduction, we estimate the percentage reduction in their assessed value, again using an augmented set of explanatory variables.[3] Third, and most importantly, our focus differs from that of WM. Their primary interest was on how the probability of appeal and the probability of obtaining an assessment reduction are affected by thin markets (i.e., few

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[1] The alternative approach to improving horizontal equity is to invest more resources toward getting assessed values closer to market values, although achieving perfect assessments may be difficult and an inefficient use of resources.

[2] One difference between our variables and WM's is that for reasons outlined below we define the neighborhood as the block group while they define the neighborhood as the census tract. A second difference is that our analysis is limited to single-family homes, while they include residential units containing from one to six units.

[3] WM's data did not allow them to estimate the magnitude of the assessment reduction, only whether a reduction was granted.

comparable sales).[4] Our interest is in the role played by tax representatives in the appeals process, who according to our data from Miami-Dade County, Florida, are used by an overwhelming majority of property owners. These representatives commonly work on a contingency fee basis, asking for as much as half of the first year's tax savings brought about by a successful appeal.[5] Anecdotal evidence from the media suggests that representatives target affluent neighborhoods in making their solicitations.[6] This is plausible because a given percentage reduction in assessed value generates more income for the representative when a property has a higher value.[7] Why might this pose an important local public finance and social issue? If representatives avoid lower-priced neighborhoods in their search for clients and are successful in that they increase the percentage reduction in assessed value for their clients, then their involvement in the appeals process will result in the expected percentage reduction in assessed value being larger than it otherwise would be for homeowners living in higher-priced neighborhoods. This would make the property tax more regressive.[8] The purpose of this paper is to provide evidence on the role played by tax representatives in high-priced and low-priced neighborhoods in affecting the probability of appeal and the probability of winning an appeal.

Our analysis is based on an exceedingly rich database of roughly 20,000 property tax appeals filed by single-family homeowners in Miami-Dade County in response to January 1,

[4] Because our variables overlap WM's, we also provide evidence on their thin markets hypothesis.
[5] To gauge the magnitudes of the fees we called property tax agencies as well as private appeals companies within Florida and throughout the nation. Although flat fees are sometimes used, it was far more common to hear about contingency fees, which were reported to be between 25 and 50 percent of the first year's tax savings and are paid only upon a successful appeal. We were unable to find any harder data on contingency fees.
[6] Such opinions have been voiced repeatedly by major news sources (Kestin, Maines and Powers, 2010; Tugend, 2010; Nakamura and Stewart, 2009) but the stories rely on hypothetical or singular examples instead of broad evidence that might describe what is happening across an entire city, county, or state.
[7] As reported below, our results show that the percentage reduction in assessed value rises with the assessed value of the petitioner's home, making more expensive homes a particularly attractive target for the tax representative.
[8] This statement assumes that the burden of the property tax is gross of any income tax savings. If the burden is net of these savings, the statement may not be true. This is a complicated issue that will depend on the interplay of a host of factors, including the income elasticity of the demand for housing, the magnitude of the rise in the expected percentage reduction in assessed value with neighborhood home value, the property tax rate, and homeowners' utilization of the federal income tax deductibility of the property tax.

2007 and January 1, 2008 initial assessed values. According to the Federal Housing Finance Agency's House Price Index for the Miami MSA, our first assessment date is right before the market crashed and our second assessment date is one year into the housing market downturn. We estimate our two models with a number of alternative estimators, including as a subset instrumental variable models that treat the involvement of tax representatives in the appeals process as endogenously determined. Our results are robust across years and estimators and point to the possible need for policy intervention.

In the next section we review WM and a number of other papers on appeals that have been published since their pioneering effort. Section III describes the property tax system in place in Florida. Our Miami-Dade County data are described in Section IV. The models we estimate using these data are described in Section V. Results are provided in Section VI and our conclusions are stated in Section VII.

II. LITERATURE REVIEW

WM hypothesize that both the homeowner's decision to appeal and the adjudicator's decision to grant or deny the appeal depend on access to information on market values. Better information is viewed as tempering the perception of individual mistreatment and improving the quality of assessor decision making. Hence, WM expect that more accurate information will reduce both the probability that the homeowner appeals and the probability that he receives an assessment reduction.

Comparable sales can provide an important source of information on market value. More information is available in "thicker markets" where there are a larger number of comparable sales within the immediate neighborhood. Another method to establish market value is to use the recent transaction price for an individual property (assuming it was an arms-length sale). Hence, to test their hypothesis, WM include both the number of sales that occurred within the homeowner's neighborhood over the past three years and whether the home was purchased in the last three years. Both variables are negative and significant in their 2000 and 2003 probability of appeal models, which lends support to their hypothesis. The variables are also negative and significant in their probability of success model for 2003, but neither variable is significant in their 2000 model. WM's other key finding is that property owners in higher-value neighborhoods stand a better chance of receiving an assessment reduction. Therefore, they conclude that appeals are associated with regressive property tax distributions.

A result from one of WM's control variables has a direct bearing on the current study. While they do not explore the role played by tax representatives in affecting the probability of appeal, they do include a dummy variable for whether an attorney was used in estimating the probability of an assessment reduction. They find for both 2000 and 2003 that homeowners who appeal on their own are more likely to receive an assessment reduction than those who use an attorney. To explain this result, they suggest that tax representatives "go fishing" for clients, many of whom do not have strong cases for reassessments. Hence, WM view the tax representative as representing a less success-prone clientele than the universe of individual property owners appealing on their own.

To our knowledge, since WM three papers have been published dealing with property tax appeals. None of the papers provide any evidence on the role played by tax representatives in the appeals process. However, they do provide evidence on other aspects of the process.

Hissong and Hawley (2012) limit their analysis to assessing the degree to which market predictors (such as prices and housing types) contribute to inter-city differences in rates of appeal and outcomes of appeals using 2001–2009 data on 40 municipalities found within Tarrant

County, Texas. Their findings show that higher market values increase the probability of appeal and the likelihood of filing a formal in comparison to an informal appeal. An informal appeal is a meeting between the petitioner and a member of the tax assessor's office. In a formal appeal both the petitioner and the assessor's representative present their case in front of a value adjustment board.

McMillen (2013) uses data for single-family homes in Chicago for 2006 and a variety of nonparametric estimation techniques to study the distribution of assessment ratios before and after appeals had been decided. He finds that appeals lead to a modest reduction in assessment variability, but the density of extremely high assessment ratios is higher among homes without appeals. His results also show that much of the apparent regressivity in assessments is attributable to the number of extremely high assessment ratios at low sales prices.

Plummer (2013) uses data on single-family homes in Harris County, Texas, for 2006–2008 to investigate whether appeals increase assessment uniformity. Her methodology involves estimating hedonic price models before and after appeals adjustments. Like McMillen (2013), she finds that the appeals process increases assessment uniformity. She addresses possible sample selection bias using Heckman's two–step approach—which involves as the first step estimating the probability of appeal. While her list of explanatory variables is limited in comparison to WM, like WM she finds that owners in higher-valued neighborhoods are more likely to appeal and owners who purchased their property in the past three years are less likely to appeal.

III. BACKGROUND INFORMATION ON THE PROPERTY TAX APPEALS PROCESS IN FLORIDA

In Florida, county property tax assessors are required to assess all properties at fair market value on January 1 for each annual tax roll. Miami-Dade County uses a Computer-Assisted Mass Appraisal System to produce its assessed values, which has now become common practice throughout Florida and other states. Property owners receive notice of their assessment by mail during the month of August. At this point they have two options if they believe their property has been overassessed—they can schedule an informal meeting with a member of the tax assessor's office or they can file a formal appeal with the value adjustment board (VAB). Property owners have 25 days after receiving their notice to file a formal appeal. At informal meetings, an explanation is provided to the property owner on how the tax assessor arrived at the assessed value. A tax representative is not, typically, part of such meetings. Generally, these informal appeals only result in a reduction in assessed value if there is a change or error in the physical description of the property. At the formal appeal hearing the homeowner (or his representative) and a staff member from the tax assessor's office present evidence favorable to their positions. A magistrate, under the auspices of the VAB, decides whether or not to grant the homeowner's appeal and lower the assessed value.[9]

Table 1 provides statistics describing the 2007 and 2008 property tax appeals of single-family homeowners living in Miami-Dade County, Florida. Statistics are reported for all homeowners and for homeowners divided into those living in low home value and high home

[9] Regardless of whether there is an informal appeal and regardless of the outcome from this appeal, all homeowners have a right to appeal their property tax assessment using the formal appeals process. With our data there was no way to track how many homeowners appealed formally after an unsuccessful informal appeal. The VAB does not record an appeal when a homeowner has an informal meeting but does not request a formal appeal and we take the same approach. Property owners dissatisfied with the outcome of their appeal also have the option to appeal the VAB decision in Circuit or Appellate Court, but this right is seldom exercised.

value neighborhoods. A low (high) home value neighborhood is a block group with a median assessed value in the bottom (top) half of the distribution. Because the statistics are similar between the years, we focus our discussion on 2008. Also, because our interest is on the differential effects that tax representatives have in low-value and high-value neighborhoods, comparisons are made between these two types of neighborhoods.

[Table 1 about here.]

The prevalence of homeowners who appeal is 4.5 percent in high-value neighborhoods, but only 2.3 percent in low-value neighborhoods. The percentage of petitioners using a tax representative is 62 percent in low-value neighborhoods, but 69 percent in high-value neighborhoods. These differences are consistent with the idea that tax representatives target and raise the probability of appeal within high-value neighborhoods. The percentage of petitioners winning their appeal (about 50 percent) and the mean percentage reduction in assessed value of winners (about 12 percent) are essentially the same between the two types of neighborhoods. The breakdown of homeowners by neighborhood type is further broken down into those appealing with and without a tax representative. The percentage of petitioners winning their appeal is roughly twice as large in both types of neighborhoods if a tax representative is used.

IV. DATA

The variables we use to estimate the probability of appeal and the percent reduction in assessed value models for single-family homes are listed in Table 2, along with their means and standard deviations. Three sources of data are used to construct these variables — the American Community Survey (ACS), the standardized property tax rolls that the county must submit annually to the Florida Department of Revenue (FDOR), and the appeals registered with the county's VAB for the years 2005–2008.[10] These data are used to define variables measured at three levels — the jurisdiction, the neighborhood, and the home. Each of these sets of variables is described in turn below.

[Table 2 about here.]

One of the new variables we add to those used by WM is the millage rate of the home's taxing jurisdiction. Miami-Dade County is one of Florida's largest counties, accounting for the highest fraction (nine percent) of properties statewide. Within Miami-Dade County there are 35 different taxing jurisdictions for the more than 300,000 single-family residences.[11] The property tax owed on a home equals the assessed value times the millage rate. Hence, a given reduction in assessed value yields greater tax savings when coupled with a higher millage rate. This suggests that the probability of appeal is higher in jurisdictions having higher millage rates.

The neighborhood variables are constructed using all three sources of data. We define the neighborhood as the home's census block group. We choose the block group rather than the census tract because low population density in the western portion of Miami-Dade County (toward the Everglades) results in census tracts that are too large to be thought of as the home's neighborhood. The variables listed in Table 2 that describe the demographics of the block group match the neighborhood variables used by WM and come from the ACS 5-year estimates for

[10] There are several reasons why the dataset was not extended past 2008. Appeals have risen dramatically over the past several years and the completion time extends well beyond a single year. In addition, major institutional changes happened after 2008. First, homestead exemptions increased by $25,000 and it became possible to transfer portable tax savings between properties. Second, Miami-Dade County went from being the only county with an appointed property assessor to holding elections for the office. Third, the burden of proof in an appeal lessened from providing evidence beyond "every reasonable hypothesis" to a "preponderance of evidence." By using a year before the crash and one year into the crash we compare two similar environments which differed only by the fall in property values caused by the crash. Nearly 250,000 appeals were filed from 2005 through 2008.

[11] The tax jurisdictions are uniquely identified by a tax authority code, which is listed on the tax rolls for each property. In Florida, school districts are contiguous with county borders so the school and county millage rates may differ but every property is charged the same rate. There is an exception where several cities have opted out of the portion of the millage rate financing fire services and related debt. Otherwise, any variation in the total millage rate is entirely driven by differences in city millage rates.

2005–2009.[12] The FDOR data are used to obtain the block group median assessed value and the number of arms-length sales that occurred within the block group over the past three years. These variables also match those of WM. The final set of neighborhood variables describes appeal activity within the neighborhood. WM used the percent of homeowners appealing, while we use the percent of homeowners who appeal on their own and the percent of homeowners appealing with a tax representative.

Our home level variables match those of WM describing the structural features of the home, its assessed value, the change in its assessed value over the past three years, and whether the home was recently purchased. We add to this list two variables — a variable for the improvement quality of the home and another variable capturing the effects of a 1992 limitation under the Florida property tax. Improvement quality refers to the overall quality of the home and is based on the judgment of the tax assessor. It takes on six values of minimum/low cost, below average, average, above average, excellent and superior quality. The property tax limitation is a cap on increases in taxable value that resulted from the passage of the Save Our Homes (SOH) Act in 1992. This law limits the growth of a homesteaded property's taxable value to three percent per year or the rate of inflation, whichever is lower. For homesteads who are recent movers and all non-homesteads, taxable value equals assessed value.[13] For homesteads that have recently moved, taxable value and assessed value may no longer be equal after the first year of tenure depending on the inflation rate. If assessed value increases by more than the cap limit, then assessed value rises faster than taxable value and a wedge develops between the two values.

[12] While the ACS also provides 1-year and 3-year estimates, only the 5-year estimates are available for small geographic areas, such as census tracts and block groups.

[13] As noted above, Florida requires that all properties be assessed by the county property tax assessor every year as of January 1. Assessed values are the tax assessor's estimate of what the home could sell for on this date. Hence, there is no assessment lag as is common in other states and assessed values are not a fraction of market value, which is also common in other states.

A large enough wedge can render a reduction in assessed value moot because a homeowner's property tax bill will not change if the reduced assessed value still lies above taxable value.[14] We add the taxable value to assessed value ratio to the set of home variables. The expectation is that a larger ratio will increase the probability of appeal.

V. ESTIMATED MODELS

We estimate the homeowner's probability of filing an appeal with the VAB and the percentage reduction in assessed value resulting from an appeal. These models are described in turn below in Subsections A and B. In Subsection C we describe our approach to empirically addressing two questions central to our analysis.

A. The Probability of Appeal

Our probability of appeal model includes the same explanatory variables as WM with the following exceptions: 1) we replace their neighborhood appeals variable with the percent of homeowners in the block group who file an appeal on their own and the percent of homeowners in the block group who file an appeal with the aid of a tax representative, and 2) we add the millage rate, the improvement quality of the home, and the SOH wedge as explanatory variables. The percentage of neighborhood homeowners who have a tax representative file an appeal on their behalf measures the presence of tax representatives in the neighborhood. A greater presence may reflect more advertising in the neighborhood by representatives and/or a higher percentage of homeowners deciding without solicitation they want to file an appeal using a representative.

We estimate the probability of appeal using four alternative estimators: OLS, 2SLS, probit, and instrumental variables probit. Only the models that treat the presence of the tax

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[14] There is little or no reason to appeal when a property has been purchased and, after a few years, a sizeable wedge has developed between the assessed value and taxable value. Appeals are based on assessed value (not taxable value) and the taxable value will not decrease until the assessed value falls back to the level of the taxable value, or when there is no wedge. A homeowner will be more likely to appeal when the wedge decreases, or the ratio of taxable value to assessed value becomes larger.

representatives in the neighborhood as endogenously determined require explanation. Endogeneity may arise if there are factors that affect both the individual homeowner's probability of appeal and the neighborhood presence of tax representatives, whose influence is not fully captured by our set of control variables. For example, differences between assessed and market values can arise in a neighborhood as the result of a land use emitting a negative externality. Homeowners and tax representatives are aware of the neighborhood's overassessment, which results from the Computer-Assisted Mass Appraisal System not registering the negative externality effect. Tax representatives target their solicitations to the neighborhood based on expectations of obtaining winning appeals and homeowners appeal regardless of the presence of the tax representatives. When an excluded variable, in this case the negative externality, is correlated with both the dependent and an independent variable, the independent variable and the error term are correlated resulting in an inconsistent estimate. To obtain a consistent estimate, the independent variable requires instrumentation.[15]

The equations we estimate can be expressed as

(1) $$A_{i,t} = \alpha R_{i,t} + \beta J'_{i,t} + \gamma N'_{i,t} + \delta H'_{i,t} + u_{i,t}$$

and

(2) $$R_{i,t} = \pi_1 J'_{i,t} + \pi_2 N'_{i,t} + \pi_3 H'_{i,t} + \pi_4 R_{i,t-1} + \pi_5 R_{i,t-2} + v_{i,t} \ ,$$

where *i* represents the homeowner and *t* the year; *A* equals 1 if an appeal is filed and 0 otherwise; *R* is the percentage of homeowners residing in the neighborhood who file an appeal using a tax representative; and J', N', and H' are the vectors of jurisdictional, neighborhood, and home level

[15] There are many sources of externalities that may affect the behavior of both the homeowner and the tax representatives that may be unaccounted for by the tax assessor. Some examples include a half-finished construction project, a foreclosure, a coastline that has disappeared from tidal changes, and a park that has deteriorated. The point is that neighborhood externalities abound and because they may result in the neighborhood presence of the tax representatives being endogenous, we choose to test for this and if necessary correct for it using 2SLS. As discussed below, we are able to reject the null hypothesis that *R* is exogenous.

variables. Our two instrumental variables, R_{t-1} and R_{t-2}, are excluded from (1) under the assumptions that they do not directly affect A_t and do directly affect R_t.[16] The idea underlying the latter assumption is that there is persistence in the solicitations of the tax representatives. The representatives are viewed as soliciting where expected contingency fees are large relative to the costs of filing an appeal. In part, these costs reflect the value of time required in preparing for the appeal hearing. These costs are expected to be lower in neighborhoods the tax representative is more familiar with, as evidenced by prior participation in the neighborhood's appeals.

As a robustness check, we adopted a second identification approach that used variables describing the land use mix within the neighborhood as instrumental variables. Specifically, the three instruments are the proportions of total properties within the neighborhood that are residential, commercial, and industrial. The logic underlying this alternative identification strategy is that the land use mix of the neighborhood captures to some degree the time costs incurred by the tax representative in filing the appeal. As an illustration, in comparison to commercial areas, industrial areas are generally not conveniently located with respect to the offices of the tax representative. Assuming information declines with distance, being farther away from a client's location may reduce the representative's knowledge of the area and require the representative to do more research. Distance can also make solicitations and site inspections more costly further reducing the neighborhood's attractiveness to the representative.[17]

In estimating dichotomous dependent variables where all of the regressors are exogenous, probit is generally preferred over a linear regression model. Where one or more of the regressors

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[16] R_{t-1} and R_{t-2} may not be exogenous to A_t if whatever causes the tax representatives to target the neighborhood in year t persists from year to year. We argued above representatives target neighborhoods where assessed values exceed market values because a negative externality has shocked the neighborhood. Appeals coming from the neighborhood are expected to alert the tax assessor to the neighborhood's overassessment, causing assessments to be lowered in the following year.

[17] Our conversations with tax representatives indicated that site inspections occur, but we are not able to say, with any degree of confidence, how frequently they occur.

is endogenous this may not be the case. In the instrumental variables probit model (IV-probit) consistent estimation requires both normality and homoskedasticity of the errors $u_{i,t}$ and $v_{i,t}$. An alternative approach is the 2SLS linear regression model, which offers a number of advantages over IV-probit. First, in the case of 2SLS, fewer distributional assumptions are required — $u_{i,t}$ and $v_{i,t}$ need not be multivariate normal and homoskedastic. Second, with 2SLS there is the ability to test for weak instruments. Aligned against these advantages, there is a possible drawback of using 2SLS to estimate the probability of appeal in that the binary nature of the dependent variable $A_{i,t}$ is being ignored. As a result, $u_{i,t}$ is heteroskedastic. However, 2SLS is still consistent and correct inference can be obtained as long as estimated standard errors are robust to heteroskedasticity (and clustering).

B. The Percentage Reduction in Assessed Value

Conditional on filing an appeal, we estimate the percentage reduction in assessed value. The model is estimated by OLS, Tobit, and 2SLS. Tobit is used to address possible inconsistency resulting from observations censored at zero. 2SLS is used because the involvement of a tax representative may be endogenous. As noted above, tax representatives may be aware of differences between assessed and market values and target homeowners with larger differences in the expectation of winning appeals with large percentage reductions in assessed value. Only the 2SLS model requires further comment. The equations we estimate can be expressed as

(3) $$L_{i,t} = \alpha T_{i,t} + \beta J'_{i,t} + \gamma N'_{i,t} + \delta H'_{i,t} + u_{i,t}$$

and

(4) $$T_{i,t} = \pi_1 J'_{i,t} + \pi_2 N'_{i,t} + \pi_3 H'_{i,t} + \pi_4 T_{i,t-1} + \pi_5 T_{i,t-2} + v_{i,t} \ ,$$

where L equals the percentage by which the assessed value is lowered; T equals 1 if a tax representative is used in filing the appeal; J', N' and H' are defined as before. Our instrumental variables, $T_{t–1}$ and $T_{t–2}$, are again based on the idea that there is persistence in the solicitations of the tax representatives. T_t and $T_{t–1}$ ($T_{t–2}$) may also be correlated because homeowners who have filed with a tax representative in the past may be more comfortable in using a representative to file their current appeal.[18]

C. Two Central Questions

One question of interest is whether the probability of appeal is higher in neighborhoods with more expensive homes because of a greater presence of tax representatives within those neighborhoods.[19] Our approach to this question can be shown by rewriting (1) to show the functional dependency between *R* and neighborhood home value (*V*) and by dropping the subscripts and control variables for clarity, or

(5) $$A = \alpha R(V) + \gamma V + u$$

such that (5) can be differentiated with respect to *V* to obtain

[18] We also tried the land use composition variables as instruments; however, we found that the highly aggregated land use categories (i.e., residential, commercial, and industrial) that we used as instruments in the probability of appeal models yielded low first-stage *F*-statistics in the percent reduction in assessed value models. However, when more disaggregated categories were used as IVs we found that the proportion of properties in the neighborhood that are financial institutions yielded a first-stage *F*-statistic of 7 in the 2007 percentage of reduction 2SLS model. The proportion of neighborhood properties that are single-family yielded a first-stage *F*-statistic of 11 in the 2008 2SLS model. Adding additional property types as IVs reduced these first-stage *F*-values. Hence, both the 2007 and 2008 models are just identified. Tests of the endogeneity of *T* confirmed those reported below, indicating that *T* is an exogenous variable.

[19] An editor noted that studies (e.g., McMillen, 2013) have found that more expensive homes are systematically underassessed relative to less expensive homes and that this may attract tax representatives to low- rather than high-value neighborhoods, because the probability of winning may be greater where homes are comparatively overassessed. However, what should matter to tax representatives is the expected dollar amount of tax savings from a successful appeal, because their contingency fee is a percentage of these savings. The expected dollar amount of tax savings for a neighborhood equals the average probability of winning appeals times the expected average tax savings conditional upon winning. We investigated differences in expected tax savings between low- and high-value neighborhoods by first computing the median assessed value of each neighborhood. We then divided neighborhoods into low-value (lower 50 percent of neighborhoods) and high-value (top 50 percent of neighborhoods). As expected, the probability of winning is higher in low-value (.54) in comparison to high-value (.50) neighborhoods. Using the average millage rate in 2007 (20 mills), the average tax savings from a successful appeal equaled \$639 and \$2544 in low- and high-value neighborhoods, respectively. When multiplied by the probability of winning, the expected tax savings equaled \$345 and \$1272. Hence, while the probability of winning an appeal is higher in low-value neighborhoods (perhaps because of relative overassessment), average tax savings are so much larger in high-value neighborhoods that expected tax savings are more than 3.5 times greater there. Tax representatives, therefore, are expected to target high-value neighborhoods, despite the lower probability of winning appeals within these neighborhoods.

(6) $$\frac{\partial A}{\partial V} = \gamma + \alpha \frac{\partial R}{\partial V},$$

where γ is the effect that V has on A apart from the presence of the tax representatives, and $\alpha(\partial R/\partial V)$ registers whether the probability of appeal is higher in neighborhoods with higher home values because of a greater presence of tax representatives within the neighborhood. There are two approaches toward estimating the tax representative's effect. One approach is to estimate α from (1) and obtain an estimate of $\partial R/\partial V$ from an auxiliary regression of R on V, along with the control variables. The product of these two estimates gives the tax representative's effect. The second approach is to estimate (1) with and without R included as an explanatory variable. With R included we obtain an estimate of $\gamma(\hat{\gamma})$. Without R, the estimated value of $\gamma(\tilde{\gamma})$ registers both the direct effect of V on A, as well as the indirect effect of V on A working through the effect that V has on the presence of tax representatives in the neighborhood, or

(7) $$E[\widetilde{\gamma}] = \gamma + \alpha * corr(V, R).$$

The difference between $\hat{\gamma}$ and $\tilde{\gamma}$ equals the tax representative's effect. Because these two approaches yield identical results, we report only those obtained with the second approach.[20, 21] We expect that a tax representative will increase the percentage reduction in assessed value.

A second question of interest is whether an assessed value reduction happens because the representative increases 1) the probability that the petitioning homeowner or his representative

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[20] We find the second approach more intuitive. Estimating (1) with *R* reveals the difference in the probability of appeal that would exist between low- and high-value neighborhoods in a world without tax representatives, while estimating (1) excluding *R* reveals the difference in the probability of appeal between low- and high-value neighborhoods in a world with tax representatives.

[21] Note that in addition to *median_av* we include from the ACS the median homeowner's estimate of market value, *median_hv*, in our models. This follows WM. In taking the second approach, we base our comparisons on *median_av* rather than *median_hv* because the former more accurately reflects the value of homes in the neighborhood at a given point in time and it is the assessed value that the tax representative targets in making his solicitations. Recall from above that in Florida assessed value is the tax assessor's estimate of what the home would sell for on January 1 of the tax roll year.

shows up at the VAB hearing, and/or 2) the percentage reduction in assessed value given the homeowner attends the hearing. If a homeowner appeals but neither he nor his representative attends the hearing, his appeal is denied and his assessed value is not changed. No-shows are common at appeals hearings, but only if the petitioner chooses not to use a tax representative.[22] To address our second question, we estimate our percentage reduction in assessed value model separately for all petitioners and for just those that show up for the hearing.

VI. RESULTS

In this section we first report the results from estimating the probability of appeal (Subsection A) and then report those obtained from estimating the percentage reduction in assessed value conditional on appeal (Subsection B). Subsection C describes our methodology for exploring the tax representative's effect on the expected percentage reduction in assessed value (i.e., the probability of appeal times the percentage reduction in assessed value) for homeowners living in low- versus high-priced neighborhoods, as well as the results from implementing this methodology.

All of the tables in Subsections B and C report three values for each explanatory variable — the marginal effect, the estimated standard error robust to heteroskedasticity and clustering at the block group level (in parentheses), and the change in probability (or percent reduction in assessed value) from moving the value of a continuous variable from the 25th to the 75th percentile of its distribution, holding all the other variables at their mean values (in brackets).[23] In the case of a binary variable the change reported in brackets is from moving the value from

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[22] In 2007 (2008) no-shows equaled 34 (44) percent of petitioners without a tax representative, but only 2 (3) percent of those using a tax representative.

[23] For the OLS, 2SLS, and Tobit models the marginal effect is the estimated coefficient. For the probit models the marginal effects are calculated at the means of the explanatory variables.

zero to one, again holding all other variables at their means. The bracketed numbers offer a convenient way for comparing the magnitudes of the effects of the explanatory variables.

A. The Probability of Appeal Results

Tables 3 and 4 report the results from estimating the probability that the homeowner appealed his 2007 and 2008 assessment, respectively. OLS and probit models are estimated for the specification excluding *R*. OLS, 2SLS, and IV-probit are used to estimate the model including *R*.

Recall that we use two alternative sets of instrumental variables to estimate the 2SLS and IV-probit models — lags of the endogenous variable (R_{t-1} and R_{t-2}) and current values of the neighborhood's land use mix (the proportion of properties that are residential, proportion commercial, and proportion industrial). The results are robust to our two alternative identification strategies. Because the two sets of IVs yielded almost identical results, we report in Tables 3 and 4 only those obtained with the first set of IVs.[24] At the bottom of Column 3 in each table are the first-stage *F*-statistics, which are well above Stock and Yogo's (2005) weak ID test critical values. Also reported at the bottom of the tables are test statistics (endog test for 2SLS and a Wald test for IV-probit) for whether *R* can be treated as an exogenous variable.[25] Regardless of estimator, the results indicate that the null hypothesis that *R* is exogenous can be rejected at the one percent level. Instrumenting *R* increases its estimated marginal effect, especially in the probit model.

[Tables 3 and 4 about here.]

In every equation including *R*, the estimated coefficient for *R* is positive and statistically significant at the one percent level, indicating that the probability of appeal is higher in

[24] By "almost identical" we mean that both sets of IVs are valid based upon Stock and Yogo's (2005) weak ID test and both yielded similar estimated *R* coefficients and standard errors.
[25] The endog test is part of ivreg2 for Stata. See Baum, Schaffer, and Stillman (2007).

neighborhoods where there is a larger percentage of the total number of homeowners appealing with the aid of a tax representative. This result may reflect an increased likelihood of the homeowner being solicited by a tax representative in neighborhoods where the representatives are more active. Alternatively, it may be that the homeowner tends to follow other homeowners in the neighborhood in his decision to appeal. In contrast, the percentage of neighborhood homeowners who appeal on their own is either not significant or is negative and significant. These results may reflect the knowledge obtained by the homeowner of the effort required to file an appeal on his own. As the number of homeowners who appeal on their own rises, the probability that one of these neighbors shares his experience with the homeowner also rises. Upon learning of the effort required to file an appeal on his own from the neighbor, the homeowner may decide not to initiate the process.[26]

To address the question of whether tax representatives are more present in higher-priced neighborhoods and thereby increase the probability of appeal within these neighborhoods, we compare the estimated coefficient on *median_av* between equations excluding and including *R*. Consider first the 2007 estimates reported in Table 3. In the linear models the estimated coefficient on *median_av* changes from positive and marginally significant in the equation excluding *R* (see Column 1, row 3) to negative and significant at the one percent level in the equations including *R* (Columns 2 (OLS) and 3 (2SLS)). In the probit models the estimated coefficient on *median_av* also changes from positive to negative after including *R* and in this case both coefficients are significant at the one percent level. The switch from a positive to a negative estimated coefficient on *median_av*, with both coefficients highly significant, is also found in the probit results reported for 2008 in Table 4. The linear model comparisons for 2008

[26] As we report below, many petitioners who appeal on their own fail to show up at the VAB hearing. Hence, the effort required to appeal on your own may reduce both this type of appeal as well as the likelihood of completing the appeal process.

also show a sign reversal, but *median_av*'s estimated coefficient is not significant when *R* is excluded. However, as in all other cases, the coefficient is negative and significant at the one percent level when *R* is included.

The above comparisons provide strong and remarkably robust (across years and estimators) support in favor of the hypothesis that tax representatives increase the probability of appeal in higher-priced in comparison to lower-priced neighborhoods. In the absence of the representatives, the probability of appeal would be lower in higher-priced neighborhoods.[27] When the representatives are included, the results show that the probability of appeal is higher in higher-priced neighborhoods (especially for the probit models). These results suggest that the necessary but not sufficient condition for the tax representatives making the property tax more regressive is satisfied. However, there remains the issue of whether the tax representatives are able to lower the assessed values of their clients by more than the homeowners could appealing on their own. We take up this issue in the following section, but before doing so we describe the results obtained with the control variables that enter the probability of appeal models.

The estimated coefficients on the WM variables are generally consistent with their own findings. Regarding their market value information variables — whether the property was purchased in the past three years (*recent_sale*) and the number of sales in the past three years within the property owner's neighborhood (*sales*), our results match those they obtained on whether the home was recently purchased. *Recent_sale* is negative and significant at the one percent level in both 2007 and 2008, regardless of estimator. In all cases, *sales* is also found to

[27] An explanation for this result is provided by McMillen (2013), who finds that higher-valued homes are systematically underassessed relative to lower-valued homes. So in the absence of tax representatives, the expectation of winning an appeal may be lower in high-value neighborhoods, possibly discouraging homeowners from appealing.

reduce the probability of appeal. It is statistically significant in all of the models, except for the 2SLS models that include *R* in both years and the OLS model that includes *R* in 2007.

Next, we compare the results from our control variables with WM. The probit model we estimate including *R* comes the closest to the model they estimate (Column 4 of Tables 3 and 4). We both find that the proportion black in the neighborhood (−) and the interior space of the property (+) are relatively strong predictors of the probability of appeal.[28] They also find that the number of appeals in the neighborhood is a strong predictor. When we replace the percentages of homeowners appealing with and without a tax representative with the total percentage who appeal, our results are consistent with those of WM. In contrast to WM, we also find that the proportion of adults in the neighborhood with at least a B.A. degree (+) and the age of the property (+) are strong predictors. The variables that only they find are relatively strong predictors are median neighborhood income (+) and the neighborhood proportion of Hispanics (−).

Finally, we turn to the results obtained on the variables (besides *R*) that are unique to our models. As hypothesized, *tax_rate* and *SOH_wedge* are positive and significant. The improvement quality of the home is not found to affect the probability of appeal much in either 2007 or 2008.

B. The Percentage Reduction in Assessed Value Results

The percentage reduction in assessed value model is estimated separately for all petitioners and for just those petitioners (or in their absence their representative) who show up at

[28] Strength of predictor is judged by significance level and the change in probability from moving the variable from the 25th to the 75th percentile of its distribution, which is the method WM and the current study adopt to compare the relative magnitudes of the effects of the explanatory variables.

the VAB hearing.[29] The results for 2007 and 2008 are reported in Tables 5 and 6, respectively. The first-stage F-statistics for the 2SLS models are reported at the bottom of Column 3 for the full sample of petitioners and at the bottom of Column 4 for the petitioners who show up at the hearing. In both cases and for both years, the hypothesis of weak instruments is strongly rejected. For each sample and each year, the endogeneity test indicates that the null hypothesis that T is exogenous cannot be rejected. Hence, we focus on the results obtained from the OLS and Tobit models.

[Tables 5 and 6 about here.]

No-shows embody a growing group of appellants that should not be ignored.[30] In 2007 there were 545 petitioners (six percent of the total) who failed to show up at the VAB hearing. By 2008 no-shows were more common, with 1547 of the petitioners (17 percent of the total) failing to attend the hearing. As noted above, for those who appeal on their own, the absenteeism is probably driven by a later realization that it is time consuming and not costless to gather evidence to present at the appeals hearing that would win an appeal. Tax representatives alleviate these costs that deter petitioners, in exchange for the fees described above.

For the samples of all petitioners, T is positive and highly significant regardless of estimator or year, indicating that the use of a tax representative raises the percent reduction in assessed value. However, when the sample is restricted to only those petitioners who attend the VAB hearing the results are just the opposite: for both years T is negative and highly significant regardless of estimator. These results indicate that tax representatives increase the percentage

[29] A number of the percentage reductions were so large that they were clearly outliers. Presumably these are properties whose market values were lowered by an unusual major event that the county assessor's Computer-Assisted Mass Appraisal System failed to register. Approximately one percent of the properties in each year we judged as outliers and were dropped from our samples.

[30] The VAB does not ignore no-shows; they are counted as denied appeals. If they do not wish to attend, homeowners can still send in a written appeal, which will be treated as an appeal where a homeowner offers no further testimony and will not be classified as a no-show.

reduction in assessed value only because they increase the probability that the petitioner's case will be presented at the hearing.[31] At the hearing, petitioners using a tax representative obtain less of a reduction in assessed value than petitioners appealing on their own. The latter result matches the result obtained by WM. Recall, they suggest that tax representatives "go fishing" for clients, many of whom do not have strong cases for reassessments. Nevertheless, the positive effect that the representative has on the petitioner's case being presented at the hearing more than offsets their relatively poor performance at the hearing, resulting in a positive net effect on the percentage reduction in assessed value.

The results WM obtain from estimating their probability of success models are not directly comparable to those we obtain from estimating our percentage reduction in assessed value models. Moreover, for reasons unspecified they choose to include in their success models only a subset of the neighborhood variables that were included in their appeals models. They dropped the variables describing the racial composition, educational attainment, and tenure of neighborhood residents. We, however, retain these variables in our percent reduction in assessed value models because they are found to have significant effects. The following variables have a significant effect on the percent reduction in assessed value for both years regardless of sample (all petitioners versus those attending the hearing) and estimator (OLS versus Tobit): *% appeal with a tax representative* (+), *Hispanic* (–), *age* (+), *living area* (–), *lotsize* (+), and *SOH_wedge* (+). Variables that have differing effects depending on year, sample, or estimator are *median_av* (negative and significant in all cases in 2008, insignificant in all cases in 2007), *median_hv* (positive and significant only for the attend hearing 2007 sample), *black* (negative and significant in all cases for 2007 but in no cases for 2008), *bachelors* (negative and significant in all 2007

[31] This is confirmed from estimating the probability that the petitioning homeowner or his representative attended the VAB hearing. In this model, which included the same explanatory variables entering the percentage of assessment reduction models, the strongest predictor is whether a tax representative is used to file the appeal.

cases only), *tax_rate* (positive and significant in all cases, except for the attend hearing sample in 2008), and ΔAV (positive and significant in all cases in 2008 but not in any 2007 cases).

The strong positive effects found for *SOH_wedge* in both 2007 and 2008 are especially noteworthy. A higher taxable value to assessed value ratio raises the percentage reduction in assessed value. Recall that the higher this ratio, the more likely a reduction in assessed value will also lower taxable value, resulting in a smaller property tax bill. Hence, an explanation for the *SOH_wedge* results is that homeowners and representatives work harder to prepare a stronger appeal when the expected reward is larger. The findings that homeowners from neighborhoods containing a larger proportion of minorities receive a smaller reduction in assessed value merit additional study beyond the current inquiry. Future research should explore whether these results are due to racial prejudice on the part of VAB magistrates or if these homeowners have weaker cases supporting their appeal.

C. The Economic Significance of the Tax Representative

To compare the effects of using a tax representative on homeowners living in low- and high-priced neighborhoods, we estimated the impacts of the tax representative on the expected reduction in assessed value for homeowners residing within two neighborhoods — one at the 25th and the other at the 75th percentile of the *median_av* distribution. Our methodology involved the following steps:

1. Calculate the correlation between house values and the presence of tax representatives at the neighborhood level. We use the block group as the unit of observation to regress *R* on *median_av*. The results show that *median_av* strongly affects *R*.

2. Take the estimated results from the prior step. Predict R at the 25th (R_L) and 75th (R_H) percentiles of the *median_av* distribution while holding the other neighborhood variables at their mean values.
3. Based upon the 2SLS probability of appeal model results, the probability of appeal is predicted at R_L (A_L) and R_H (A_H), holding other variables at their means.
4. The OLS percent reduction in assessed value results are used to predict L at R_L (L_L) and R_H (L_H), holding other variables at their means.
5. Finally, the expected reduction in assessed value is obtained for the low-priced and high-priced neighborhood by multiplying A_L by L_L and A_H by L_H, respectively.

The results are presented in Table 7. For both years the tax representative is shown to favor the high-priced neighborhood. The representative creates a probability of appeal difference between the low- and high-priced neighborhood of .009 in both 2007 and 2008. In both years the tax representative also creates a differential, albeit small, in the percentage reduction in assessed value in favor of the high-priced neighborhood. In 2007 (2008) the expected percentage reduction in assessed value is .2066 (.2211) within low-priced neighborhoods. In high-priced neighborhoods the corresponding number is .2536 (.2663). Hence, in 2007 (2008) the expected percentage reduction in assessed value is 23 percent (20 percent) higher for the high-priced neighborhood as the result of the representative's greater presence there.[32] It should be kept in mind that this annual advantage magnifies over time, as long as the representative continues his greater presence in the high-priced neighborhood. Clearly, tax representatives play an important role in generating greater assessment reductions for homeowners living in more affluent neighborhoods. As a result, they make the property tax more regressive. However, as noted

[32] The percent reduction is the difference between .2536 and .2066 divided by .2066 and multiplied by 100.

above, it is difficult to conjecture on the increase in regressivity, because it depends on multiple factors, which will vary across local communities.[33]

[Table 7 about here.]

VII. CONCLUSIONS

Tax representatives offer to file an appeal on a homeowner's behalf in exchange for a percentage of any tax savings resulting from a reduction in assessed value. The representatives' expected returns are higher in higher-priced neighborhoods, which suggests that they will target their solicitations toward these neighborhoods. Because we find that a larger percentage of homeowners file a representative-assisted appeal in higher-priced neighborhoods, our results are consistent with the idea that representatives discriminate in favor of these neighborhoods. Our data, however, do not enable us to rule out the possibility that the greater presence of tax representatives in higher-priced neighborhoods is the result of homeowners in these neighborhoods choosing, without solicitation, to use a tax representative in filing their appeal.

Because representatives have a greater presence within higher-priced neighborhoods, individual homeowners living in these neighborhoods are more likely to appeal. This fact remains true regardless of whether the representative seeks out the homeowner or the homeowner seeks out the representative. Moreover, the greater presence of these representatives increases the likelihood that a homeowner will file his appeal with the aid of a representative, who positively affects the likelihood that the homeowner's case will appear and be heard at the VAB hearing and helps secure a higher percentage reduction in assessed value. Stated succinctly, our results suggest that tax representatives encourage homeowners to appeal and to follow all the way through the appeals process. As a result, representatives raise the expected reduction in

[33] The increase in regressivity will be less in those communities where the increase in the expected percentage reduction in assessed value, the percentage of homeowners who deduct their property taxes from their federal income tax liability, and the property tax rate are all smaller within higher-priced neighborhoods.

assessed value by as much as 23 percent in higher-priced in comparison to lower-priced neighborhoods.[34]

As noted above, both WM (2010) and Plummer (2013) found that the probability of appeal is greater in higher-priced neighborhoods and from this they both conclude that the appeals process contributes to property tax regressivity. However, no explanation is provided in either paper for why the appeal probability is found to be higher in higher-priced neighborhoods. We find that homeowners in higher-priced neighborhoods are more likely to appeal because of the greater presence there of the tax representatives. In a world without representatives, our findings indicate that the probability of appeal would be lower in higher-priced in comparison to lower-priced neighborhoods. We view this as an encouraging result for it implies that if we raise the presence of tax representatives in lower-priced neighborhoods to match that in higher-priced neighborhoods, the regressivity of the current appeals process may disappear.[35, 36]

One approach toward the neighborhood equalization of tax representatives might be to outlaw contingency fees. We spoke informally to multiple county tax assessors and they firmly supported this proposal.[37] We, however, do not subscribe to this approach. Even if a flat-fee

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[34] As brought to our attention by Bill Gentry, one way to view the tax representatives is that they are the counterparts in the context of the property tax to expensive accountants in the context of the income tax. Both help higher income households avoid paying taxes.

[35] The effects of increasing the presence of tax representatives within lower-priced neighborhoods go beyond enhancing the equity of the property tax. Reductions in assessed values may result in reduced total monthly mortgage payments, which may result in lower propensities of default, better cure rates for delinquent loans, and avoidance of lengthy foreclosure processes.

[36] The impact tax representatives have on the horizontal equity of the property tax is also worth noting. The property tax appeals process allows homeowners who believe their assessed value is out of line with the market value of their home an opportunity to plead their case in front of local value adjustment boards. Roughly half the time, the VAB agrees with the homeowner and lowers the homeowner's assessed value, presumably getting it closer to market value. Therefore, an important social benefit of the appeals process is that it improves the horizontal equity of the property tax. However, our results suggest that appeals may improve horizontal equity more in high-value in comparison to low-value neighborhoods as the result of the greater presence of tax representatives within the former neighborhoods.

[37] California tried to take this step in its 2011–2012 legislative session. As proposed in Senate Bill 342, no person would be allowed to charge a contingent fee in a matter before any assessment appeal board. The punishment is the greater of $5,000 or 100 percent of the contingent fee charged (regardless if it was actually paid or received). At the time of this paper, the bill passed a legislative committee and was returned to the Secretary of the Senate.

system were to replace contingency fees, higher-priced neighborhoods would still have a greater presence of representatives because homeowners in these neighborhoods are more able to afford the fee.[38] Our suggestion is to take a cue from the criminal justice system and encourage tax representatives to undertake pro bono work in lower-priced neighborhoods. Where private goodwill is not sufficient, public tax representatives could be appointed who would assist homeowners from lower-priced neighborhoods in filing their appeals. That is, extend the right to appeal to include filings by an amicus curiae or a public tax representative.[39]

Property tax representatives could provide a helpful check-and-balance against inequities in property assessment and equal access to the appeals process. While our findings are based on analyzing the appeals process within a single Florida county, the process is the same in every county throughout the entire state. Moreover, the main features of the Florida system — a VAB that rules on formal appeals and tax representatives that work on a contingency fee basis — are common to other states. We strongly encourage further investigations of the role played by tax representatives in the property tax appeals processes of other states. The techniques outlined in this paper might prove useful as a guide to conducting these further explorations.

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[38] Also, as noted by an editor, a flat fee would result in more appeals in high-value in comparison to low-value neighborhoods, because in the former neighborhoods more homeowners would find that the expected benefit from appealing exceeded the fee.

[39] We called every state's regulatory agency that oversees property taxation to ask about the use of tax representatives, who they are, and how much they charge. No agency mentioned the use of public tax representatives. We recognize that it is unlikely that local governments would willingly take on this responsibility. It is more conceivable that this service would be provided by the state agency that oversees the administration of the property tax or by local governments under a state mandate. The idea, though, is not novel. The Internal Revenue Service operates a Volunteer Income Tax Assistance (VITA) program. VITA provides free basic income tax assistance to low income earners, persons with disabilities, the elderly, and limited English speakers. The federal program was established with the Tax Reform Act of 1969 and began receiving congressionally appropriated funds for a matching grant program in 2007.

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Table 1
Descriptive Statistics

	2007	2008
All Homeowners		
% who appeal	3.27	3.42
% of petitioners using tax representative	86.60	66.57
% of petitioners winning appeal	50.84	49.99
Mean % reduction in assessed value (AV) of winners	11.03	11.76
Appeal with tax representative		
Winning %	52.51	57.60
Mean % reduction in AV of winners	10.45	10.95
Appeal without tax representative		
Winning %	40.08	34.68
Mean % reduction in AV of winners	15.94	14.43
Homeowners in Low Home Value Neighborhood [a]		
% who appeal	1.77	2.29
% of petitioners using tax representative	82.45	61.47
% of petitioners winning appeal	54.62	49.73
Mean % reduction in AV of winners	12.25	12.75
Appeal with tax representative		
Winning %	58.40	61.89
Mean % reduction in AV of winners	11.22	12.75
Appeal without tax representative		
Winning %	37.07	30.32
Mean % reduction in AV of winners	19.88	14.86
Homeowners in High Home Value Neighborhood [b]		
% who appeal	4.76	4.54
% of petitioners using tax representative	88.14	69.15
% of petitioners winning appeal	49.43	50.04
Mean % reduction in AV of winners	10.54	11.27
Appeal with tax representative		
Winning %	50.46	55.67
Mean % reduction in AV of winners	10.15	10.38
Appeal without tax representative		
Winning %	41.73	37.43
Mean % reduction in AV of winners	14.03	14.22

[a] A low home value neighborhood is a block group with a median assessed value in the bottom half of the distribution.
[b] A high home value neighborhood is a block group with a median assessed value in the upper half of the distribution.

Table 2

Variables

Variable	Description	Mean Values 2007	Mean Values 2008	Source [a]
R	percent of other homeowners in the block group (BG) who appeal with a tax representative	2.786 (4.183)	2.275 (2.664)	VAB, FDOR
T [b]	percent of other petitioners who use a tax representative	79.160 (24.821)	60.305 (22.612)	VAB
%no_tax_rep	percent of other homeowners in the BG who appeal on their own	0.436 (0.680)	1.132 (0.977)	VAB, FDOR
median_av	median assessed value in BG (10,000)	19.563 (22.691)	20.765 (20.980)	FDOR
median_hv	median owner–estimate of value in BG (10,000)	33.593 (19.252)	33.580 (19.190)	ACS
median_income	median household income in BG (10,000)	6.105 (3.318)	6.092 (3.299)	ACS
black	proportion BG population black	0.192 (0.291)	0.184 (0.282)	ACS
Hispanic	proportion BG population Hispanic	0.523 (0.326)	0.529 (0.325)	ACS
bachelors	proportion BG population > age 25 with at least B.A.	0.281 (0.185)	0.280 (0.184)	ACS
no_highschool	proportion BG population > age 25 without high school degree	0.208 (0.143)	0.209 (0.143)	ACS
owner_occup	proportion BG homeowners	0.744 (0.199)	0.743 (0.199)	ACS
sales	number of sales in BG in prior 3 years	0.936 (1.264)	0.714 (0.918)	FDOR
tax_rate	millage rate of home's jurisdiction	7.903 (3.276)	7.835 (3.290)	FDOR
av	assessed value of home (10,000)	25.578 (44.327)	25.750 (40.707)	FDOR
Δ*av*	change (absolute) in assessed value of home in prior 3 years	0.560 (5.263)	0.426 (2.658)	FDOR
age	age of home	37.474 (18.772)	42.444 (19.086)	FDOR
living_area	square feet of home interior space (1,000)	1.950 (1.010)	1.959 (1.003)	FDOR

lotsize	square feet of home's lot (10,000,000)	0.001	0.001	FDOR
		(0.072)	(0.073)	
quality	improvement quality of home			FDOR
below_ave		0.300	0.301	
		(0.458)	(0.459)	
average		0.385	0.387	
		(0.487)	(0.487)	
above_ave		0.008	0.007	
		(0.086)	(0.086)	
excellent		0.003	0.003	
		(0.059)	(0.058)	
superior		0.006	0.006	
		(0.077)	(0.074)	
SOH_wedge	taxable value to assessed value ratio	0.590	0.619	FDOR
		(0.277)	(0.276)	
recent_sale	home purchased within past 3 years	0.290	0.256	FDOR
		(0.454)	(0.436)	

Note: Numbers in parentheses are standard deviations.

[a] VAB = Valuation Adjustment Board of Miami-Dade County
FDOR = Florida Department of Revenue Property Tax Roll for Miami-Dade County
ACS = American Community Survey

[b] The sample used for the mean of *T* is those homeowners who file an appeal.

Table 3
2007 Estimates of the Probability of Appeal

	OLS		2SLS	Probit		IV-Probit
	(1)	(2)	(3)	(4)	(5)	(6)
R(%tax_rep)		0.0086***	0.0102***		0.0012***	0.0562***
		(0.0003)	(0.0003)		(0.0001)	(0.0016)
		[0.0235]	[0.0277]		[0.0030]	[0.0031]
%no_tax_rep	-0.0043	-0.0099**	-0.0110***	-0.0008	-0.0014*	-0.0651***
	(0.0034)	(0.0039)	(0.0040)	(0.0007)	(0.0008)	(0.0066)
	[-0.0024]	[-0.0056]	[-0.0062]	[-0.0005]	[-0.0008]	[-0.0009]
median_av	0.0003*	-0.0007***	-0.0009***	0.0001***	-0.0001***	-0.0025***
	(0.0002)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0003)
	[0.0031]	[-0.0066]	[-0.0083]	[0.0008]	[-0.0005]	[-0.0006]
median_hv	0.0001	0.0000	-0.0000	0.0000	0.0000	0.0009**
	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0005)
	[0.0023]	[0.0003]	[-0.0000]	[0.0007]	[0.0004]	[0.0003]
median_income	-0.0013**	-0.0006	-0.0005	-0.0003*	-0.0003**	-0.0110***
	(0.0006)	(0.0004)	(0.0004)	(0.0002)	(0.0001)	(0.0025)
	[-0.0050]	[-0.0024]	[-0.0019]	[-0.0011]	[-0.0010]	[-0.0010]
black	-0.0132***	-0.0093***	-0.0086***	-0.0077***	-0.0063***	-0.2745***
	(0.0040)	(0.0028)	(0.0028)	(0.0018)	(0.0015)	(0.0325)
	[-0.0031]	[-0.0022]	[-0.0020]	[-0.0019]	[-0.0015]	[-0.0015]
Hispanic	-0.0079*	-0.0055*	-0.0050*	-0.0014	-0.0006	-0.0278
	(0.0041)	(0.0028)	(0.0028)	(0.0016)	(0.0013)	(0.0274)
	[-0.0047]	[-0.0033]	[-0.0030]	[-0.0009]	[-0.0004]	[-0.0004]
bachelors	0.0399***	0.0139**	0.0091*	0.0170***	0.0125***	0.5466***
	(0.0101)	(0.0054)	(0.0053)	(0.0035)	(0.0025)	(0.0584)
	[0.0096]	[0.0033]	[0.0022]	[0.0039]	[0.0029]	[0.0029]
no_highschool	-0.0001	-0.0004	-0.0004	-0.0029	-0.0014	-0.0619
	(0.0076)	(0.0044)	(0.0043)	(0.0035)	(0.0027)	(0.0695)
	[-0.0000]	[-0.0001]	[-0.0001]	[-0.0006]	[-0.0003]	[-0.0003]
owner_occup	-0.0208***	-0.0002	0.0036	-0.0088***	-0.0027*	-0.1165***
	(0.0055)	(0.0030)	(0.0031)	(0.0020)	(0.0015)	(0.0350)
	[-0.0053]	[-0.0000]	[0.0009]	[-0.0022]	[-0.0007]	[-0.0007]
sales	-0.0009**	-0.0003	-0.0002	-0.0010**	-0.0007**	-0.0323***
	(0.0005)	(0.0003)	(0.0003)	(0.0004)	(0.0003)	(0.0072)
	[-0.0006]	[-0.0002]	[-0.0001]	[-0.0006]	[-0.0005]	[-0.0005]
tax_rate	0.0024***	0.0009***	0.0007***	0.0011***	0.0007***	0.0294***
	(0.0003)	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0021)
	[0.0159]	[0.0061]	[0.0043]	[0.0074]	[0.0046]	[0.0045]
av	0.0008***	0.0008***	0.0008***	0.0000	0.0000	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0001)
	[0.0137]	[0.0131]	[0.0130]	[0.0002]	[0.0000]	[0.0000]
Δ*av*	0.0003	0.0002	0.0002	0.0000**	0.0000**	0.0015***
	(0.0002)	(0.0002)	(0.0002)	(0.0000)	(0.0000)	(0.0005)
	[0.0002]	[0.0001]	[0.0001]	[0.0000]	[0.0000]	[0.0000]
age	0.0003***	0.0002***	0.0002***	0.0001***	0.0001***	0.0032***
	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0004)
	[0.0110]	[0.0077]	[0.0071]	[0.0032]	[0.0024]	[0.0024]

living_area	-0.0048**	-0.0031*	-0.0028*	0.0030***	0.0031***	0.1343***
	(0.0019)	(0.0016)	(0.0016)	(0.0004)	(0.0004)	(0.0064)
	[-0.0044]	[-0.0028]	[-0.0026]	[0.0026]	[0.0026]	[0.0027]
lotsize	0.0008	-0.0008	-0.0011	0.0007**	0.0004	0.0188
	(0.0007)	(0.0007)	(0.0007)	(0.0003)	(0.0003)	(0.0687)
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
quality						
below_ave	0.0019	0.0022*	0.0022*	0.0010	0.0008	0.0362**
	(0.0019)	(0.0013)	(0.0013)	(0.0008)	(0.0007)	(0.0150)
	[0.0019]	[0.0022]	[0.0022]	[0.0011]	[0.0008]	[0.0008]
average	-0.0001	0.0023*	0.0027**	0.0004	0.0005	0.0225
	(0.0018)	(0.0013)	(0.0014)	(0.0008)	(0.0006)	(0.0146)
	[-0.0001]	[0.0023]	[0.0027]	[0.0004]	[0.0005]	[0.0005]
above_ave	-0.0062	-0.0083	-0.0086	0.0013	0.0013	0.0558
	(0.0110)	(0.0106)	(0.0106)	(0.0020)	(0.0018)	(0.0429)
	[-0.0062]	[-0.0083]	[-0.0086]	[0.0014]	[0.0014]	[0.0014]
excellent	-0.0147	-0.0205	-0.0216	-0.0023	-0.0031	-0.1395**
	(0.0156)	(0.0163)	(0.0165)	(0.0021)	(0.0020)	(0.0553)
	[-0.0147]	[-0.0205]	[-0.0216]	[-0.0021]	[-0.0027]	[-0.0027]
superior	-0.0159	-0.0161	-0.0162	-0.0023	-0.0025	-0.1084**
	(0.0229)	(0.0208)	(0.0206)	(0.0024)	(0.0020)	(0.0437)
	[-0.0159]	[-0.0161]	[-0.0162]	[-0.0021]	[-0.0022]	[-0.0022]
SOH_wedge	0.1330***	0.1318***	0.1316***	0.0616***	0.0589***	2.5850***
	(0.0081)	(0.0080)	(0.0079)	(0.0023)	(0.0019)	(0.0284)
	[0.0849]	[0.0841]	[0.0840]	[0.0930]	[0.0900]	[0.0900]
recent_sale	-0.0384***	-0.0377***	-0.0376***	-0.0101***	-0.0094***	-0.4141***
	(0.0021)	(0.0020)	(0.0020)	(0.0006)	(0.0005)	(0.0122)
	[-0.0384]	[-0.0377]	[-0.0375]	[-0.0085]	[-0.0079]	[-0.0079]
R-squared	0.1099	0.1251	0.1246	0.2722	0.2913	
Observations	281950	281950	281946	281950	281950	281946
First-stage *F*			252			
Endog Test						
Statistic			65			
p-value			0.000			
Wald Test						
Statistic						7
p-value						0.010

Notes: Numbers in parentheses are estimated standard errors robust to heteroskedasticity and clustering at the block group level. Numbers in brackets are changes in probability from moving a continuous variable from the 25th to the 75th percentile of its distribution, holding all other variables at their mean values. In the case of a binary variable changes reported are from moving the value from 0 to 1, again holding all other variables at their means. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels.

Table 4
2008 Estimates of the Probability of Appeal

	OLS		2SLS	Probit		IV-Probit
	(1)	(2)	(3)	(4)	(5)	(6)
R(%tax_rep)		0.0075***	0.0122***		0.0017***	0.0793***
		(0.0004)	(0.0006)		(0.0001)	(0.0029)
		[0.0141]	[0.0229]		[0.0030]	[0.0042]
%no_tax_rep	0.0001	-0.0021	-0.0034*	0.0001	-0.0003	-0.0196***
	(0.0015)	(0.0017)	(0.0019)	(0.0004)	(0.0005)	(0.0048)
	[0.0001]	[-0.0019]	[-0.0032]	[0.0001]	[-0.0003]	[-0.0006]
median_av	0.0001	-0.0005***	-0.0008***	0.0001***	-0.0000***	-0.0035***
	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0004)
	[0.0005]	[-0.0050]	[-0.0084]	[0.0006]	[-0.0005]	[-0.0011]
median_hv	0.0001*	0.0001	0.0000	0.0001**	0.0000*	0.0010**
	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0005)
	[0.0022]	[0.0012]	[0.0005]	[0.0009]	[0.0006]	[0.0005]
median_income	-0.0015***	-0.0009**	-0.0005	-0.0005***	-0.0004***	-0.0092***
	(0.0005)	(0.0004)	(0.0004)	(0.0002)	(0.0001)	(0.0026)
	[-0.0057]	[-0.0034]	[-0.0019]	[-0.0018]	[-0.0014]	[-0.0011]
black	-0.0068**	-0.0043*	-0.0028	-0.0059***	-0.0047***	-0.1453***
	(0.0031)	(0.0022)	(0.0022)	(0.0017)	(0.0014)	(0.0311)
	[-0.0014]	[-0.0009]	[-0.0006]	[-0.0013]	[-0.0010]	[-0.0010]
Hispanic	0.0057*	0.0055**	0.0054**	0.0041***	0.0046***	0.1472***
	(0.0032)	(0.0022)	(0.0021)	(0.0016)	(0.0012)	(0.0259)
	[0.0034]	[0.0033]	[0.0032]	[0.0024]	[0.0028]	[0.0027]
bachelors	0.0278***	0.0100**	-0.0011	0.0125***	0.0076***	0.2064***
	(0.0076)	(0.0049)	(0.0047)	(0.0032)	(0.0025)	(0.0567)
	[0.0067]	[0.0024]	[-0.0003]	[0.0029]	[0.0018]	[0.0015]
no_highschool	-0.0145**	-0.0101**	-0.0073	-0.0081**	-0.0067**	-0.1906***
	(0.0064)	(0.0049)	(0.0049)	(0.0034)	(0.0028)	(0.0647)
	[-0.0031]	[-0.0022]	[-0.0016]	[-0.0017]	[-0.0015]	[-0.0013]
owner_occup	-0.0111**	0.0001	0.0072**	-0.0062***	-0.0017	-0.0121
	(0.0044)	(0.0029)	(0.0029)	(0.0020)	(0.0015)	(0.0339)
	[-0.0028]	[0.0000]	[0.0018]	[-0.0016]	[-0.0004]	[-0.0001]
sales	-0.0022**	-0.0011*	-0.0005	-0.0015***	-0.0011***	-0.0332***
	(0.0009)	(0.0006)	(0.0005)	(0.0005)	(0.0004)	(0.0081)
	[-0.0011]	[-0.0006]	[-0.0002]	[-0.0008]	[-0.0006]	[-0.0005]
tax_rate	0.0017***	0.0009***	0.0004***	0.0008***	0.0006***	0.0158***
	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0020)
	[0.0111]	[0.0061]	[0.0029]	[0.0057]	[0.0038]	[0.0032]
av	0.0006***	0.0006***	0.0006***	0.0000*	0.0000	0.0003**
	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0001)
	[0.0107]	[0.0104]	[0.0101]	[0.0003]	[0.0002]	[0.0002]
Δ*av*	0.0008**	0.0007*	0.0007*	0.0001***	0.0001***	0.0039***
	(0.0004)	(0.0004)	(0.0004)	(0.0000)	(0.0000)	(0.0011)
	[0.0002]	[0.0002]	[0.0002]	[0.0000]	[0.0000]	[0.0000]
age	0.0003***	0.0002***	0.0001***	0.0001***	0.0001***	0.0020***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0003)
	[0.0071]	[0.0050]	[0.0037]	[0.0024]	[0.0021]	[0.0018]

living_area	-0.0019	-0.0011	-0.0006	0.0033***	0.0034***	0.1116***
	(0.0014)	(0.0012)	(0.0012)	(0.0004)	(0.0003)	(0.0067)
	[-0.0017]	[-0.0010]	[-0.0005]	[0.0029]	[0.0030]	[0.0030]
lotsize	-0.0013	-0.0018	-0.0021*	-0.2168	-0.1595	-5.2520**
	(0.0015)	(0.0013)	(0.0012)	(0.1331)	(0.1166)	(2.1118)
	[0.0000]	[0.0000]	[0.0000]	[-0.0001]	[-0.0001]	[-0.0001]
quality						
below_ave	0.0020	0.0023**	0.0025**	0.0012*	0.0012**	0.0375***
	(0.0014)	(0.0011)	(0.0011)	(0.0007)	(0.0006)	(0.0142)
	[0.0020]	[0.0023]	[0.0025]	[0.0012]	[0.0012]	[0.0012]
average	0.0006	0.0022*	0.0032***	0.0006	0.0008	0.0303**
	(0.0013)	(0.0011)	(0.0012)	(0.0007)	(0.0006)	(0.0138)
	[0.0006]	[0.0022]	[0.0032]	[0.0006]	[0.0008]	[0.0009]
above_ave	-0.0034	-0.0037	-0.0039	0.0004	0.0004	0.0130
	(0.0081)	(0.0077)	(0.0076)	(0.0018)	(0.0016)	(0.0459)
	[-0.0034]	[-0.0037]	[-0.0039]	[0.0004]	[0.0004]	[0.0004]
excellent	0.0021	-0.0005	-0.0022	-0.0010	-0.0017	-0.0648
	(0.0166)	(0.0161)	(0.0159)	(0.0029)	(0.0027)	(0.0584)
	[0.0021]	[-0.0005]	[-0.0022]	[-0.0010]	[-0.0016]	[-0.0019]
superior	-0.0045	-0.0080	-0.0099	-0.0009	-0.0019	-0.0651
	(0.0141)	(0.0141)	(0.0148)	(0.0024)	(0.0023)	(0.0477)
	[-0.0045]	[-0.0080]	[-0.0099]	[-0.0009]	[-0.0017]	[-0.0019]
SOH_wedge	0.1229***	0.1231***	0.1232***	0.0763***	0.0750***	2.4204***
	(0.0059)	(0.0059)	(0.0059)	(0.0019)	(0.0016)	(0.0288)
	[0.0760]	[0.0762]	[0.0762]	[0.0892]	[0.0882]	[0.0878]
recent_sale	-0.0127***	-0.0126***	-0.0126***	-0.0048***	-0.0047***	-0.1483***
	(0.0014)	(0.0014)	(0.0014)	(0.0005)	(0.0004)	(0.0117)
	[-0.0127]	[-0.0126]	[-0.0126]	[-0.0044]	[-0.0043]	[-0.0042]
R-squared	0.0700	0.0746	0.0728	0.2060	0.2135	
Observations	272710	272710	272699	272710	272710	272699
First-stage *F*			188			
Endog Test						
Statistic			65			
p-value			0.000			
Wald Test						
Statistic						200
p-value						0.000

Notes: Numbers in parentheses are estimated standard errors robust to heteroskedasticity and clustering at the block group level. Numbers in brackets are changes in probability from moving a continuous variable from the 25th to the 75th percentile of its distribution, holding all other variables at their mean values. In the case of a binary variable changes reported are from moving the value from 0 to 1, again holding all other variables at their means. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels.

Table 5
2007 Estimates of the Percentage Reduction in Assessed Value

	OLS		2SLS		Tobit	
	(1)	(2)	(3)	(4)	(5)	(6)
	All	At Hearing	All	At Hearing	All	At Hearing
T(tax_rep)	0.6793**	-1.5094***	0.4079	-1.9676**	1.9721***	-2.5683***
	(0.2724)	(0.3748)	(0.6990)	(0.9806)	(0.5553)	(0.6184)
	[0.6793]	[-1.5094]	[0.4079]	[-1.9676]	[1.9721]	[-2.5682]
R(%tax_rep)	0.0656***	0.0641***	0.0670***	0.0657***	0.0885***	0.0853***
	(0.0226)	(0.0226)	(0.0233)	(0.0234)	(0.0317)	(0.0307)
	[0.5300]	[0.5216]	[0.5411]	[0.5354]	[0.7154]	[0.6948]
%no_tax_rep	-0.0923	-0.1282	-0.1110	-0.1552	-0.1562	-0.2368
	(0.1529)	(0.1737)	(0.1543)	(0.1771)	(0.3010)	(0.3282)
	[-0.0795]	[-0.1080]	[-0.0957]	[-0.1308]	[-0.1346]	[-0.1996]
median_av	-0.0039	-0.0033	-0.0040	-0.0034	-0.0019	-0.0010
	(0.0032)	(0.0033)	(0.0032)	(0.0034)	(0.0053)	(0.0055)
	[-0.1274]	[-0.1106]	[-0.1294]	[-0.1140]	[-0.0608]	[-0.0338]
median_hv	0.0123	0.0169*	0.0123	0.0172*	0.0259	0.0344**
	(0.0085)	(0.0089)	(0.0085)	(0.0089)	(0.0161)	(0.0162)
	[0.4909]	[0.6785]	[0.4936]	[0.6893]	[1.0360]	[1.3773]
median_inc.	0.0546	0.0500	0.0544	0.0492	0.0926	0.0734
	(0.0423)	(0.0443)	(0.0422)	(0.0440)	(0.0889)	(0.0887)
	[0.3124]	[0.2931]	[0.3115]	[0.2885]	[0.5298]	[0.4306]
black	-2.3734***	-2.6841***	-2.3692***	-2.6799***	-3.7907***	-4.1272***
	(0.7197)	(0.7559)	(0.7190)	(0.7545)	(1.3122)	(1.3040)
	[-0.2461]	[-0.2784]	[-0.2457]	[-0.2779]	[-0.3931]	[-0.4280]
Hispanic	-2.1163***	-2.3809***	-2.1084***	-2.3729***	-3.4259***	-3.7272***
	(0.6087)	(0.6428)	(0.6070)	(0.6406)	(1.1022)	(1.1085)
	[-1.0070]	[-1.1329]	[-1.0032]	[-1.1291]	[-1.6301]	[-1.7735]
bachelors	-3.4971***	-4.2550***	-3.4736***	-4.2449***	-5.5631***	-6.7755***
	(1.1649)	(1.2035)	(1.1597)	(1.2004)	(2.1557)	(2.1123)
	[-1.5035]	[-1.8325]	[-1.4934]	[-1.8281]	[-2.3918]	[-2.9179]
no_highschool	0.2871	0.1627	0.2738	0.1419	-0.1289	-0.4389
	(1.4819)	(1.5647)	(1.4798)	(1.5627)	(2.6986)	(2.7072)
	[0.0627]	[0.0357]	[0.0598]	[0.0311]	[-0.0282]	[-0.0962]
owner_occup	-1.5302*	-1.5170*	-1.5402*	-1.5220*	-2.9804**	-2.7389**
	(0.8025)	(0.8350)	(0.8048)	(0.8353)	(1.3761)	(1.3700)
	[-0.4554]	[-0.4539]	[-0.4584]	[-0.4554]	[-0.8869]	[-0.8195]
sales	-0.0453	-0.0325	-0.0431	-0.0289	-0.1197	-0.0717
	(0.1357)	(0.1545)	(0.1356)	(0.1546)	(0.3054)	(0.3257)
	[-0.0217]	[-0.0153]	[-0.0207]	[-0.0136]	[-0.0575]	[-0.0337]
tax_rate	0.1007**	0.0988**	0.1014**	0.0989**	0.1868**	0.1667**
	(0.0422)	(0.0444)	(0.0419)	(0.0443)	(0.0780)	(0.0780)
	[0.7532]	[0.7389]	[0.7583]	[0.7397]	[1.3974]	[1.2467]
av	0.0038**	0.0036**	0.0038**	0.0037**	0.0074**	0.0072**
	(0.0017)	(0.0018)	(0.0017)	(0.0018)	(0.0031)	(0.0031)
	[0.2355]	[0.2369]	[0.2360]	[0.2387]	[0.4584]	[0.4688]
Δav	0.0155	0.0248	0.0150	0.0239	0.0234	0.0333
	(0.0156)	(0.0210)	(0.0154)	(0.0207)	(0.0209)	(0.0263)

	[0.0114]	[0.0175]	[0.0110]	[0.0169]	[0.0171]	[0.0235]
age	0.0230***	0.0224***	0.0230***	0.0222***	0.0352***	0.0315**
	(0.0073)	(0.0076)	(0.0073)	(0.0077)	(0.0130)	(0.0129)
	[0.7833]	[0.7606]	[0.7820]	[0.7556]	[1.1958]	[1.0707]
living_area	-0.5245***	-0.5451***	-0.5224***	-0.5439***	-0.9557***	-0.9858***
	(0.1097)	(0.1134)	(0.1086)	(0.1128)	(0.2280)	(0.2276)
	[-0.9756]	[-1.0292]	[-0.9717]	[-1.0268]	[-1.7776]	[-1.8612]
lotsize	206.067***	219.8514***	205.9171***	219.4467***	330.7450***	337.0110***
	(55.5284)	(56.6309)	(55.6016)	(56.8291)	(77.4174)	(76.7323)
	[0.1649]	[0.1759]	[0.1647]	[0.1756]	[0.2646]	[0.2696]
quality						
below_ave	0.0974	0.1157	0.0987	0.1161	-0.1596	-0.1411
	(0.3148)	(0.3318)	(0.3144)	(0.3311)	(0.5953)	(0.5939)
	[0.0974]	[0.1157]	[0.0987]	[0.1161]	[-0.1596]	[-0.1411]
average	0.0513	0.0703	0.0505	0.0692	0.0207	0.0678
	(0.2718)	(0.2863)	(0.2710)	(0.2855)	(0.5176)	(0.5160)
	[0.0513]	[0.0703]	[0.0505]	[0.0692]	[0.0207]	[0.0678]
above_ave	0.0159	0.0279	0.0224	0.0341	-0.4233	-0.4133
	(0.6304)	(0.6530)	(0.6298)	(0.6520)	(1.4105)	(1.4015)
	[0.0159]	[0.0279]	[0.0224]	[0.0342]	[-0.4233]	[-0.4133]
excellent	-0.0105	0.0751	-0.0121	0.0725	-0.6812	-0.4613
	(0.7360)	(0.7609)	(0.7339)	(0.7585)	(1.8420)	(1.8103)
	[-0.0105]	[0.0751]	[-0.0121]	[0.0725]	[-0.6812]	[-0.4613]
superior	0.1268	0.1541	0.1265	0.1541	0.0286	0.0578
	(0.6725)	(0.6888)	(0.6702)	(0.6854)	(1.4858)	(1.4625)
	[0.1268]	[0.1541]	[0.1265]	[0.1541]	[0.0286]	[0.0578]
SOH_wedge	9.5777***	10.0551***	9.5900***	10.0456***	47.4678***	47.2656***
	(0.4283)	(0.4690)	(0.4202)	(0.4736)	(3.2943)	(3.3124)
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
recent_sale	-0.3316	-0.2158	-0.3480*	-0.2329	-0.5839	-0.3296
	(0.2034)	(0.2137)	(0.1991)	(0.2095)	(0.3718)	(0.3720)
	[-0.3316]	[-0.2158]	[-0.3480]	[-0.2329]	[-0.5839]	[-0.3296]
R-squared	0.1556	0.1675	0.1554	0.1672	0.0640	0.0657
Observations	9088	8543	9088	8543	9088	8543
First-stage *F*			54	53		
Endog Test						
Statistic			0.087	0.131		
p-value			0.768	0.717		

Notes: Numbers in parentheses are estimated standard errors robust to heteroskedasticity and clustering at the block group level. Numbers in brackets are changes in probability from moving a continuous variable from the 25th to the 75th percentile of its distribution, holding all other variables at their mean values. In the case of a binary variable changes reported are from moving the value from 0 to 1, again holding all other variables at their means. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels.

Table 6

2008 Estimates of the Percentage Reduction in Assessed Value

	OLS		2SLS		Tobit	
	(1)	(2)	(3)	(4)	(5)	(6)
	All	At Hearing	All	At Hearing	All	At Hearing
T(tax_rep)	1.4318***	-1.3017***	1.9137***	-0.9361	3.9979***	-1.9686***
	(0.1820)	(0.2369)	(0.4246)	(0.5911)	(0.3888)	(0.3771)
	[1.4318]	[-1.3017]	[1.9137]	[-0.9361]	[3.9979]	[-1.9686]
R(%tax_rep)	0.1042**	0.0909*	0.0979**	0.0877*	0.1494**	0.1264**
	(0.0488)	(0.0476)	(0.0473)	(0.0466)	(0.0637)	(0.0578)
	[0.4169]	[0.3867]	[0.3917]	[0.3731]	[0.5980]	[0.5380]
%no_tax_rep	0.3282***	0.2963**	0.3602***	0.3171**	0.5311***	0.3852**
	(0.1151)	(0.1322)	(0.1199)	(0.1367)	(0.1897)	(0.1839)
	[0.3938]	[0.3649]	[0.4321]	[0.3905]	[0.6372]	[0.4744]
median_av	-0.0115**	-0.0117**	-0.0116**	-0.0117**	-0.0156**	-0.0161**
	(0.0051)	(0.0051)	(0.0051)	(0.0051)	(0.0075)	(0.0072)
	[-0.2474]	[-0.2832]	[-0.2495]	[-0.2840]	[-0.3367]	[-0.3899]
median_hv	0.0001	0.0021	-0.0001	0.0020	0.0057	0.0085
	(0.0086)	(0.0095)	(0.0086)	(0.0094)	(0.0159)	(0.0151)
	[0.0023]	[0.0645]	[-0.0039]	[0.0624]	[0.1587]	[0.2595]
median_inc.	-0.0246	-0.0232	-0.0243	-0.0235	-0.1013	-0.0860
	(0.0415)	(0.0444)	(0.0414)	(0.0442)	(0.0791)	(0.0727)
	[-0.1029]	[-0.1052]	[-0.1016]	[-0.1066]	[-0.4233]	[-0.3896]
black	-0.0418	0.0605	-0.0253	0.0674	-0.3568	-0.1928
	(0.6300)	(0.7329)	(0.6299)	(0.7329)	(1.1296)	(1.0945)
	[-0.0045]	[0.0064]	[-0.0027]	[0.0072]	[-0.0386]	[-0.0205]
Hispanic	-1.7438***	-1.9481***	-1.7562***	-1.9594***	-3.0563***	-2.8576***
	(0.5758)	(0.6620)	(0.5743)	(0.6619)	(1.0398)	(1.0263)
	[-0.9533]	[-1.0417]	[-0.9600]	[-1.0478]	[-1.6707]	[-1.5281]
bachelors	0.6305	-0.1631	0.5677	-0.1798	1.8598	0.0126
	(1.0300)	(1.1509)	(1.0283)	(1.1489)	(1.9644)	(1.8625)
	[0.2288]	[-0.0639]	[0.2060]	[-0.0705]	[0.6748]	[0.0049]
no_highschool	-0.0301	-0.0781	0.0221	-0.0473	-0.8137	-0.9742
	(1.3919)	(1.6232)	(1.3925)	(1.6266)	(2.5146)	(2.4459)
	[-0.0065]	[-0.0167]	[0.0048]	[-0.0101]	[-0.1761]	[-0.2087]
owner_occup	-1.3250*	-1.3255	-1.2851*	-1.3151	-2.2470*	-1.8531
	(0.7162)	(0.8211)	(0.7069)	(0.8151)	(1.2773)	(1.2702)
	[-0.3784]	[-0.3833]	[-0.3670]	[-0.3803]	[-0.6418]	[-0.5358]
sales	-0.0898	-0.0935	-0.0755	-0.0887	-0.4262	-0.2395
	(0.1221)	(0.1676)	(0.1227)	(0.1687)	(0.3434)	(0.3643)
	[-0.0332]	[-0.0337]	[-0.0279]	[-0.0319]	[-0.1577]	[-0.0862]
tax_rate	0.0712*	0.0460	0.0686*	0.0463	0.1622**	0.0779
	(0.0364)	(0.0421)	(0.0362)	(0.0420)	(0.0686)	(0.0675)
	[0.4938]	[0.3190]	[0.4757]	[0.3209]	[1.1246]	[0.5404]
av	0.0053***	0.0056***	0.0053***	0.0055***	0.0088***	0.0094***
	(0.0015)	(0.0016)	(0.0015)	(0.0016)	(0.0026)	(0.0027)
	[0.2036]	[0.2440]	[0.2048]	[0.2431]	[0.3399]	[0.4129]
Δav	0.0137*	0.0112*	0.0134*	0.0112*	0.0314***	0.0229***
	(0.0071)	(0.0062)	(0.0071)	(0.0062)	(0.0102)	(0.0082)

	[0.0099]	[0.0081]	[0.0097]	[0.0080]	[0.0227]	[0.0165]
age	0.0183**	0.0205**	0.0181**	0.0205**	0.0321**	0.0304**
	(0.0079)	(0.0087)	(0.0079)	(0.0087)	(0.0141)	(0.0140)
	[0.5668]	[0.6144]	[0.5612]	[0.6135]	[0.9961]	[0.9116]
living_area	-0.5148***	-0.5462***	-0.5230***	-0.5486***	-0.8651***	-0.8978***
	(0.0899)	(0.0999)	(0.0911)	(0.1004)	(0.1997)	(0.1914)
	[-0.7403]	[-0.8365]	[-0.7521]	[-0.8401]	[-1.2441]	[-1.3749]
lotsize	124.7052***	122.5802***	122.7575***	121.9064***	196.3337**	173.8870**
	(41.0530)	(41.8093)	(40.4142)	(41.5544)	(77.9914)	(69.1827)
	[0.0809]	[0.0828]	[0.0797]	[0.0824]	[0.1274]	[0.1175]
quality						
below_ave	-0.0305	-0.0780	-0.0236	-0.0727	0.0038	-0.0574
	(0.2652)	(0.3045)	(0.2637)	(0.3029)	(0.4949)	(0.4850)
	[-0.0305]	[-0.0780]	[-0.0236]	[-0.0727]	[0.0038]	[-0.0574]
average	-0.1969	-0.2028	-0.1904	-0.2030	-0.3156	-0.2536
	(0.2389)	(0.2728)	(0.2379)	(0.2727)	(0.4523)	(0.4383)
	[-0.1969]	[-0.2028]	[-0.1904]	[-0.2030]	[-0.3156]	[-0.2536]
above_ave	0.2554	0.2272	0.2447	0.2267	0.4154	0.1367
	(0.5185)	(0.5196)	(0.5196)	(0.5190)	(1.0427)	(0.9318)
	[0.2554]	[0.2272]	[0.2447]	[0.2267]	[0.4154]	[0.1367]
excellent	1.6807**	1.5371**	1.7114***	1.5683**	3.0316**	2.4475**
	(0.6572)	(0.6601)	(0.6555)	(0.6568)	(1.2714)	(1.1643)
	[1.6807]	[1.5371]	[1.7114]	[1.5683]	[3.0316]	[2.4475]
superior	-0.4480	-0.2086	-0.4401	-0.2093	-0.7886	-0.4179
	(0.5426)	(0.5680)	(0.5453)	(0.5703)	(1.2230)	(1.1593)
	[-0.4480]	[-0.2086]	[-0.4401]	[-0.2093]	[-0.7886]	[-0.4179]
SOH_wedge	8.1421***	9.4386***	8.0229***	9.4162***	31.9637***	30.1851***
	(0.3532)	(0.4103)	(0.3721)	(0.4136)	(1.9041)	(1.8182)
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
recent_sale	0.1696	0.2341	0.2175	0.2655	0.1125	0.1736
	(0.1665)	(0.1860)	(0.1776)	(0.2010)	(0.3090)	(0.2926)
	[0.1697]	[0.2342]	[0.2175]	[0.2655]	[0.1125]	[0.1735]
R-squared	0.1213	0.1224	0.1203	0.1219	0.0434	0.0364
Observations	9163	7616	9163	7616	9163	7616
First-stage *F*			45	44		
Endog Test						
Statistic			1.177	0.213		
p-value			0.278	0.645		

Notes: Numbers in parentheses are estimated standard errors robust to heteroskedasticity and clustering at the block group level. Numbers in brackets are changes in probability from moving a continuous variable from the 25th to the 75th percentile of its distribution, holding all other variables at their mean values. In the case of a binary variable changes reported are from moving the value from 0 to 1, again holding all other variables at their means. Asterisks denote significance at the 1% (***), 5% (**), and 10% (*) levels.

Table 7
The Differential in the Expected Percentage Reduction in Assessed Value Between Low- and High-Priced Neighborhoods Attributable to the Tax Representative

	Predicted Probability of Appeal (A)	Predicted Percent Reduction in Assessed Value (L)	Expected Percent Reduction in Assessed Value (A*L)
2007			
Low-Priced Neighborhood	0.0406	5.0884	0.2066
High-Priced Neighborhood	0.0498	5.0919	0.2536
2008			
Low-Priced Neighborhood	0.0425	5.2033	0.2211
High-Priced Neighborhood	0.0511	5.2119	0.2663

Note: A and L predictions are based on the differential presence of tax representatives in low-priced and high-priced neighborhoods.