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Are Property Taxes Forcing the Elderly Out of their Homes?

"*I'm being taxed out of my home.*"[1]

"*Many people have put their houses on the market because they fear losing their homes. The old-timers are afraid they won't be able to pay property taxes that have doubled or tripled.*"[2]

Introduction

Most Americans over the age of 65 are homeowners; in fact, in 2008 the highest rate of homeownership (82 percent) was among those between the ages of 70 and 74 (U.S. Census Bureau, 2009c). Census data show that the elderly move less frequently than younger households, and repeated surveys affirm a strong preference of most elderly homeowners to remain in their homes as long as they are able to. [3] Given this strong preference among most elderly homeowners to "age in place," it is not surprising that politicians have been responsive to complaints by elderly homeowners that high, and rapidly increasing, property taxes are forcing them to leave their homes.

Across the country state legislatures have enacted policies designed to limit both the level and the rate of growth of property taxes. Circuit breaker programs, which are designed to reduce the property taxes paid by those facing high property tax bills relative to their incomes, currently operate in 33 states and the District of Columbia (Bowman, et al., 2009). In 21 states these programs are limited to the elderly. Twenty states have adopted limits on annual increases in the assessed value of property, and 29 states have imposed limits on annual increases in property tax levies (Haveman and Sexton, 2008). Both these policies are designed to limit the rate of growth of property taxes levied by local governments and school districts.[4]

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[1] Mariam Butler as quoted in the *Jackson Hole News and Guide*, October 1, 2008.
[2] Sharon Culbreth as quoted in *USA Today*, August 24, 2006.
[3] Sabia (2008) summarizes the results of several of these surveys.
[4] Dye, McMillan, and Merriman (2006) demonstrate that assessment limits can have the unintended effect of actually increasing property tax liabilities of some taxpayers.

Although the genesis of these property tax relief measures varies by state, the argument that property taxes are forcing homeowners, and especially the elderly, to sell their homes is a recurring argument used in support of the adoption of policies to reduce or limit property taxes. It is thus perhaps surprising that there has been very little research on the impact of property taxes on residential mobility. In this paper, we draw on a rich data set to explicitly test the hypothesis that homeowners' decisions to move are directly influenced by increases in the property taxes on their homes and to explore whether changes in property taxes have a greater impact on the mobility of elderly households compared to younger households.

The public finance literature on taxation and residential location is dominated by the Tiebout hypothesis. Tiebout (1956) argued that in choosing a place to live, households would move to the local jurisdictions that provide them with the best mix of taxes and public services. If a number of assumptions, such as costless mobility and the absence of inter-jurisdictional externalities, hold, this process of "voting with their feet" will generate an efficient level of the provision of local public goods. The original Tiebout article has generated a very large body of research. The literature has addressed both the efficiency properties of the model and the empirical validity of "Tiebout sorting."[5] As emphasized by Farnham and Sevak (2006), the empirical evidence that households do in fact choose residential locations on the basis of tax and public service packages, is decidedly mixed.

A starting point in any discussion of the impact of fiscal factors (taxes and public service provision) on the mobility decisions of the elderly is the fact that mobility among the elderly is very low. In 2008 the one-year mobility rate among households headed by someone age 65 or older was only 6.7 percent (U.S. Census Bureau, 2009a). Scholars who study the mobility deci-

[5] For a comprehensive assessment of the empirical and theoretical implications of the Tiebout hypothesis see Fischel (2006).

sions of the elderly have tried to determine both the reasons for elderly mobility and the reasons why the elderly appear to have a strong preference to “age in place.” In his pioneering work on residential mobility, Peter Rossi (1955) argues that households decide to move only when dissatisfaction with their current residential location rises to a high level. The subsequent literature emphasized how changes in economic and social/familial circumstances can motivate households to move. Sharp increases in the costs associated with the current location, such as property taxes, could also motivate homeowners to move.

One way of bringing the mobility and the Tiebout-sorting literature together is to posit (following Rossi) that an observed move is the result of a two-stage decision making process. First, a household makes a *mobility* decision, namely whether it will move or remain in its current home. Once the decision to move has been made, the household makes a *residential choice* decision by comparing the attributes of alternative locations, and then choosing a new residential location. Most of the Tiebout-sorting literature addresses the second decision. This research generally uses data on inter-jurisdictional migration to determine whether spatial differences in taxes and public service provision influence the destination location of households who have decided to move.

In this paper, we explicitly address the initial mobility decision faced by homeowners. We attempt to determine whether the widely-held view that increases in property taxes lead to an increase in the probability that homeowners, especially elderly homeowners, will decide to move. In the next section, we review the small literature on the impact of property taxation on mobility decisions. One reason why so little research has been conducted is undoubtedly related to the difficulty in finding appropriate data. What is required is longitudinal data that not only provides information on household mobility decisions, but also includes accurate data on the annual changes in property tax liabilities facing each household.

In conducting our analysis, we draw upon a unique data set that allows us to overcome many of the data-related shortcomings of past research. The source of our data is a data warehouse established by the Wisconsin Department of Revenue in 2000 to compile all state income tax returns filed in the state of Wisconsin. As income tax returns obviously include taxpayers' addresses, by comparing addresses over time, we can determine whether taxpayers moved. We are able to use Wisconsin income tax data to explore the impacts of property taxes on mobility because Wisconsin taxpayers are required to include on their tax return each year the amount of property tax they paid on their principal residence during the tax year. Property tax information is required because the Wisconsin income tax includes two property tax credits. One of the credits is refundable and is available only to low-income taxpayers.

In the next section, we discuss in more detail the relevant literature on property taxation and locational choice. We then discuss the construction of the data we use to explore the relationship between changes in property taxation and residential mobility. In the following section, we present some descriptive statistics related to property taxation, housing values, and locational decisions in Wisconsin. Then we develop and estimate a probit model of the mobility decisions of Wisconsin homeowners, and use the model to explore the role that property taxation plays in those decisions.

Literature Review

The implicit assumption behind the argument that high property taxes or rapid increases in property tax bills are forcing elderly homeowners to move is that these homeowners have inadequate income or liquid assets to meet the expenses associated with owning their home. Because the majority of elderly homeowners with modest incomes have fully paid off their mortgages, property taxes are likely to be the largest single component of the "user cost" of homeownership.[6]

The standard way in which most economists have approached the analysis of household mobility decisions is to assume that for any given household residing in location i, the consumption of housing at that location generates a level of utility. The household will move if the utility generated by living in an alternative location j, exceeds the utility of living at i by an amount greater than the transactions cost of moving. Transactions cost are defined broadly to include the loss of utility from leaving a familiar house and neighborhood, in addition to the direct costs associated with moving and with buying and selling a house.[7] In this context, a change in employment, the decision to retire, the loss of a spouse, the birth of a child, or the increase in the user cost of the current housing unit due to an increase in property taxes, could generate a decision by the household to move. What all these changes have in common is that they serve to reduce the utility associated with the current residential location, thereby increasing the probability that the advantages of moving outweigh the costs.

For elderly homeowners, especially those with relatively low incomes, an increase in property taxes may force reductions in non-housing consumption. For these homeowners, a decision to move might allow them to readjust their mix of housing and non-housing consumption. Although the frequently heard characterization of elderly homeowners as being "housing rich, but income poor" suggests that the payment of property taxes is creating economic hardships for some elderly homeowners by forcing them to skimp on non housing-related consumption. This

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[6] Census data indicate that 54 percent of U.S. homeowners with income under $25,000 are over 65, and two-thirds of those over the age of 65 have no mortgage.
[7] See papers by Venti and Wise (1990), Harmon and Potepan (1988), Weinberg, Friedman and Mayo (1981), and Reschovsky (1990).

assumption is not supported by several studies that have found no compelling evidence that elderly homeowners face liquidity constraints. These studies conclude that in general elderly homeowners are unlikely to move in order to increase their non-housing related expenditures (Venti and Wise, 1989; Reschovsky,1990). In a second paper Venti and Wise (1990) found that when elderly households do move, they do not in general reduce their housing equity. This suggests that for most elderly homeowners, liquidity constraints are not leading to decisions to move.

There also exists an empirical literature on "Tiebout sorting" that focuses on the influence of fiscal factors on locational choices made by households. A number of problems with this literature help explain why it provides few insights into the impact of property taxes on residential location. One problem is that a number of studies use data on gross migration flows between locations (Cebula, 1974, 2002; Conway and Houtenville, 2001, 2003; Duncombe, Robbins, and Wolf, 2003). These population aggregates not only prevent identification of individual household characteristics that may influence mobility decisions, but can hide large differences in public service provision and tax payments among households living in the same jurisdiction. Another problem is that in many studies the destination of moves is the state, or at best, the county (Cebula, 1990; Dresher, 1994; Conway and Houtenville, 2001, 2003). These levels of geography are clearly too high to be useful for studying the impact of the local property tax on residential choice.

A recent paper by Farnham and Sevak (2006) uses household-level data from four waves of the Health and Retirement Study in an attempt to overcome these problems. The authors were able to identify the census tract and ZIP code of survey respondents, and thus match each household to local-level fiscal data. Rather than seeking a causal relationship between property taxes and a decision to move, they explore whether households whose youngest child reached the age of 18 since the last survey move to locations with lower property taxes and lower spending on public education. They find weak evidence of Tiebout sorting for movers that remain in the same state but greater evidence of sorting for cross-state movers. However, their limited set of non-fiscal variables describing each location casts some doubt on the cross-state results.

With the exception of recent papers by Hui Shan and Joseph Sabia, to the best of our knowledge, there is no research that directly addresses the question of whether property taxes play an important role in influencing the decisions of elderly homeowners to move from their current home. Using a sample of elderly homeowners, Shan attempts to explain a decision to move in the current year as a function of property tax payments in the previous year. She finds that the level of property taxes are statistically insignificant in a probit model of the mobility decision, but argues that this result does not take account of the possible endogeneity of property taxes to the mobility decision. She argues that if elderly homeowners value high quality public services they are likely to live in high property tax communities. Property taxes will thus be endogenous if unobserved tastes for local public goods are correlated with both property tax payments and mobility decisions.

Shan uses information on state government property tax relief programs to develop an instrument that is exogenous to any underlying household characteristic that could influence the move decision. Using her instrument, she finds evidence that higher property tax payments increase the probability that a homeowner over the age of 50 relocates. She estimates that a $100 increase in property taxes causes the two-year mobility rate to increase by 0.76 percentage points, an amount that is equivalent to about an 8 percent increase in the mobility rate. Shan then provides some weak evidence that property taxes are contributing to liquidity constraints among elderly households, who are then motivated to move to lower cost locations.

There are several reasons to be skeptical about Shan's results. First, the argument that property taxes are endogenous to the mobility decision is predicated on the assumption that there exists a close linkage between property taxes and the level of public services. William Fischel (1992) has argued that when locational choices are motivated by the quality of local public services and local tax rates, the property tax functions like a benefits tax. While this view may be credible in small suburban jurisdictions, there is little evidence that the property tax operates like a benefits tax in urban and rural settings. Furthermore, the importance in many states of property value equalizing education aid, suggests that the correlation between property taxes and public education spending is likely to be quite weak. Rhode and Strumpf (2001) test the strength of Tiebout sorting from 1870 to 1990 and posit that decreased mobility costs should give rise to greater community sorting. They find little evidence of increased heterogeneity across municipalities and conclude that Tiebout motives are not primary factors in long-run location decisions.

Second, as pointed out by Dye, Merriman, and Nobrega (2009), the magnitude of Shan's estimated effect of the property tax on mobility is implausibly large. Shan argues that elderly homeowners who face high property tax bills are likely to move because they are liquidity constrained at their original location. If this finding is true, then other large changes in costs of living should also generate moves by liquidity-constrained elderly homeowners to lower cost-of-living locations or to cheaper housing units. In 2008, the average price of home heating oil and propane increased by 27 percent relative to the average price between 2005 and 2007.[8] If a considerable number of elderly households faced serious liquidity constraints, Shan's results suggest that mo-

[8] The percentage price increases were calculated using price data from the Energy Information Administration of the U.S. Department of Energy (2009).

bility rates among households headed by someone over the age of 50 would have substantially increased in 2008. However, Census data from the American Community Survey indicates that the 2005 to 2007 average mobility rate among households over 50 was actually higher--7.9 percent, than the rate in 2008—7.3 percent (U.S. Bureau of the Census, 2009a).

Using changes to property assessments as a proxy for changes in property taxes Dye, Merriman and Nobrega (2008) test whether rapid appreciation in home values in Cook County, Illinois during the 2000 to 2005 period was associated with increased mobility. They find no evidence that increased assessments resulted in increased mobility thereby calling into question Shan's notion that liquidity constraints may result in higher mobility. However, their data do not allow them to measure actual property tax changes or to control for household characteristics. In particular, their data do not include household income data that allow a more refined test of the liquidity constraint hypothesis. Thus, their conclusions rest on the untested assumptions that high income individuals live in high-valued homes and that growth in assessments is a proxy for growth in property taxes.

Using longitudinal data from 1972 to 1992 Panel Study of Income Dynamics, Sabia (2008) develops a hazard model to estimate the effect of family composition changes, health and housing conditions, and housing costs on elderly households' decision to remain in their home. Although Sabia argues that changes in many of these variables affect mobility decisions, in his analysis he includes the level variables in the year of the move. He finds that the most significant determinants of mobility include the presence of physical limitations and changes in family composition. With regard to housing costs, his results indicate that utility costs have a greater influence on mobility decisions than property taxes.

One shortcoming of nearly all research on property taxation and homeowner mobility is the difficulty of obtaining accurate and consistent data on property tax payments. The handful of U.S. studies that explore household decisions to move rely on longitudinal household survey data from either the Retirement History Survey (RHS) or the Panel Study of Income Dynamics (PSID). These studies generally utilize flawed measures of homeowner property tax payments. For example, Ai, Feinstein, McFadden, and Pollakoski (1990) utilize the average property tax rate per state and Dye, Merriman, and Nobrega (2008) use changes in assessed values. Sabia (2008) and Farnham and Sevak (2006) both rely on homeowners' self-reported annual property tax payments. These data provide an unreliable basis for analysis if some survey respondents report net property tax payments after the receipt of exemptions, credits, or abatements that many states utilize to distribute selective property tax relief, while other survey respondents report property tax payments prior to the receipt of any property tax relief. Shan (2009) attempts to address this problem of data inconsistency by excluding from her analysis all survey respondents living in states that provide property tax relief in the form of state income tax credits or deductions. She does however assume that survey respondents in states where households receive property tax relief checks "soon after paying property taxes" (p. 11) all report their after-relief property tax payments. Unfortunately there is no way to ascertain the accuracy of this assumption.

Data

In this paper, we are able to overcome many of the data shortcomings faced by other studies. First, our analysis is based on a large administrative dataset collected over a period of years rather than on data from a sample survey. The core of our dataset is information from the income tax returns filed annually by nearly all Wisconsin residents. Because all Wisconsin homeowners are eligible for property tax relief paid in the form of an income tax credit, the income tax returns include information on the gross amount of property tax paid by Wisconsin homeowners each year and the amount of property tax net of credits.[9] Our data set also includes information about Wisconsin filers from federal income tax returns and other information reports filed with the Internal Revenue Service. As each year's tax return includes the current home address of each filer, we are able to accurately trace residential mobility by noting changes in addresses. [10] Because each tax filer record includes municipal government and school district codes, we are also able to append property tax rate data to each record.

One advantage of using Wisconsin data to study the impact of the property tax on mobility is that Wisconsin is a high property tax state. Based on the most recently available data (fiscal year 2007), the ratio of property taxes to personal income in Wisconsin is 26 percent above the national average. In only eight other states are property taxes a higher share of personal income.[11] If property taxes do influence household mobility decisions, that influence is most likely to be identifiable in a state, like Wisconsin, with high property taxes.

In addition to information on annual property tax payments and on household income by source, our data set includes quite detailed data on household characteristics, including information on the age of the tax filer, and on family size and family composition.[12] These data allow us to investigate whether mobility decisions of the elderly are fundamentally different than mobility

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[9] A refundable property tax credit is also available to low-income individuals who may not otherwise meet the Wisconsin filing threshold.
[10] Several methodological challenges had to be overcome in the data construction, including issues related to household composition changes, the timing of property tax payments and matching addresses across time, often with differences in the alphanumeric field for the same address. For a full description of how we construct our dataset, see the appendix of Boldt, Caruth, and Reschovsky (2009).
[11] For the U.S. as a whole, property taxes were 3.5 percent of personal income in fiscal year 2007. Property tax revenue data are from U.S. Census Bureau (2009b) and personal income from the U.S. Bureau of Economic Analysis (2009).
[12] Age is not reported by taxpayers on their tax return; however, IRS extract data include the birthdates of the primary taxpayer and spouse.

decisions of the non-elderly. Moreover, we are able to explore fiscal and mobility differences among the elderly, in particular, differences between the "young old" and the "old old."

In the next section of the paper, we develop a formal model of households' decisions to move. In the context of that model, we demonstrate that decisions to move are due in large part to *changes* that have occurred in a household's characteristics, its preferences, or in the user costs of its current home. For example, important life events such as marriage, the birth of a child, the loss of a spouse, or a change in jobs, may lead to a move. Likewise, changes in economic circumstances, such as an increase in income may enable a family to move to a bigger house or to a more desirable location. On the other hand, a fall in income may make a current residence no longer affordable. Increases in the cost of owning one's home may also induce a family to move to a cheaper home. For homeowners with fixed-rate mortgages and for the elderly who have paid off their mortgages, the most likely source of increases in the user cost of housing is an increase in property tax liabilities.

We focus on homeowners' mobility decisions in 2005, and seek to measure whether various changes that occurred during the previous three-year period influenced a decision to move in 2005. Our dataset is constructed to include nearly all Wisconsin households who owned and resided in the same home from 2002 through 2004 and made no more than one move in the 2002 through 2006 period.[13] Tax records with missing data or extreme values were excluded. [14] We identify a move by a change of address as reported for income tax purposes. Thus, movers are

[13] Preliminary analyses suggested that using 2004 moves would have resulted in very similar results. Due to the size of our dataset, the need to have multiple years of data before a move, and the small expected variation from choosing alternative years, we chose to simplify the analysis and focus on moves in a single recent year.
[14] We excluded households with reported incomes below zero and households with incomes above $1,000,000. We also excluded households residing in houses with values (as implied by property taxes paid and local tax rates) below $1,000 or above $1,000,000. Households with 2002 to 2004 income changes of more than 100 percent are dropped as are households with property tax changes outside the range of -25 percent to +40 percent. In total, we exclude approximately 10 percent of homeowners who resided in the same home between 2002 and 2004.

identified as those households whose address on their 2005 income tax return was different than their address on their 2004 income tax return.[15]

To begin exploring the reasons why homeowners move, we divide our core dataset consisting of all Wisconsin homeowners who resided in the same home from 2002 through 2004 into two groups, those who retained their same residence in 2005, labeled as *non-movers*, and those who moved to a new residence during 2005, labeled as *movers*. In Table 1, we report for both movers and non-movers the mean values of a set of variables that describe Wisconsin homeowners and their fiscal and economic environment in the year 2004. In addition to these descriptive variables, we also present mean values for a set of variables that indicate the percentage change that occurred in the value of the descriptive variables between the years 2002 and 2004. For example, we calculate the average property tax payment of both mover and non-mover households in 2004, and the percentage change in homeowner property tax payments between 2002 and 2004. Changes related to marriage and to the loss of a spouse are captured by dummy variables and reflect changes in filing status between 2002 and 2004. The change in retirement income was also captured by a dummy variable equal to one if the household reported retirement income in 2004 but had not reported any retirement income in 2002 and zero otherwise.

Given our definition of mover and non-mover households, the data in Table 1 indicate that five percent of all households moved in 2005. On the whole, movers were quite similar to non-movers. They were two and a half years younger, lived in houses of similar value, and had average incomes that were four percent higher. Family size, marital status and the share that recently retired were similar for movers and non-movers. Movers, however, experienced larger income growth during the three years prior to their move than non-movers. Movers also were

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[15] For households that remain in Wisconsin, we also required the 2006 return address to be the same as the 2005 return address to ensure we were capturing permanent change of addresses. Addresses with post office box numbers were dropped from the analysis.

more likely to have experienced recent household changes due to marriage, divorce, widowhood, or the birth of children than non-mover households. As far as fiscal factors are concerned, prior to the move, movers faced slightly higher property taxes and higher tax growth rates than non-movers. Property tax burdens, measured as property tax payments divided by income in the same year, grew markedly more rapidly for movers, on average growing 11.8 percent from 2002 to 2004 compared to 10.3 percent for non-movers.[16]

Table 1: Mean Values for Non-Mover and Mover Households

	Non-Movers	**Movers**
Number of Households	595,585	31,269
Mobility Rate		5.0%
Property Tax (2004)	$2,995	$3,031
Change in Property Tax	6.5%	6.8%
Income (2004)	$73,903	$76,968
Change in Income	5.7%	6.4%
Property Tax Burden (2004)	5.4%	5.6%
Percentage Change in Burden	10.3%	11.8%
Age of Household Head (2004)	54.0	51.4
Family Size (2004)	2.5	2.5
% Married	72.3%	69.4%
% Newly Married	0.6%	1.2%
% Newly Divorced/Widowed	1.9%	3.2%
% with Children	40.0%	44.1%
Change in Number of Children	-0.06	0.003
% Newly Retired	7.6%	7.9%
House Value (2004)	$150,031	$149,022
Change in Value	11.0%	11.6%
Percentage With Mortgage	69.3%	72.3%
Change in Property Tax Rate	-3.7%	-4.0%

Note: Change variables reflect changes between 2002 and 2004.

[16] At the median, however, the movers' burden grew at a slightly slower rate of 0.5 percent compared to the non-movers' at 0.6 percent. The mean burden changes are so much higher than the median changes because of a relatively small number of individuals with large drops in income. For example, if a household's income falls by 80 percent and property tax is unchanged, then the burden would increase 400 percent. On the other hand, if income increases by 80 percent, the burden would decline by 45 percent. Such changes would affect the mean but not the median.

Table 2 presents the same set of summary statistics for each of four age groups in an effort to better understand how decisions about moving differ for the elderly and non-elderly. Although the average age of movers and non-movers in our data set is similar, this obscures the fact that there are sizable differences in the propensity to move between age cohorts. Consistent with national data on mobility, we find higher rates of mobility for the youngest households and for the oldest elderly households. Only 3.6 percent of middle aged households, those between the ages 50 and 64, moved. The mobility rate for the "young" elderly, those between 65 and 79, was slightly higher, at 3.9 percent. The highest rate of mobility, 9 percent, was among households headed by someone 80 or older.

Table 2: Mean Values for Mover and Non-Mover Households by Age Group.

Age	Under 50		50 to 64		65 to 79		80 and over	
	Non-Movers	**Movers**	**Non-Movers**	**Movers**	**Non-Movers**	**Movers**	**Non-Movers**	**Movers**
Number of Households	243,638	16,315	221,230	8,340	107,366	4,302	23,351	2,312
Mobility Rate		6.3%		3.6%		3.9%		9.0%
Property Tax (2004)	$3,004	$2,970	$3,075	$3,259	$2,868	$2,996	$2,725	$2,701
Change in Property Tax	6.8%	6.9%	6.5%	6.8%	6.2%	6.4%	5.9%	6.5%
Income (2004)	$77,749	$81,997	$79,137	$85,151	$60,461	$59,786	$45,995	$43,925
Change in Income	8.6%	10.1%	5.1%	4.2%	1.8%	0.9%	-2.1%	-1.7%
Property Tax Burden (2004)	4.9%	4.7%	5.3%	5.5%	6.4%	7.1%	8.6%	9.1%
Percentage Change in Burden	6.6%	6.8%	11.8%	16.3%	14.7%	18.5%	16.3%	17.6%
Age of Household Head (2004)	41.7	38.8	56.1	56.2	71.2	71.7	83.5	85.2
Family Size (2004)	3.2	3.2	2.2	2.1	1.7	1.6	1.4	1.3
% Married	76.7%	77.6%	74.6%	71.4%	64.7%	56.0%	39.7%	29.2%
% Newly Married	1.0%	2.0%	0.3%	0.6%	0.2%	0.2%	0.3%	0.4%
% Newly Divorced/Widowed	1.6%	2.5%	1.4%	2.5%	3.0%	5.6%	4.4%	6.0%
% with Children	70.8%	70.8%	28.1%	25.4%	2.9%	2.3%	1.1%	0.9%
Change in Number of Children	-0.02	0.075	-0.13	-0.133	-0.01	-0.009	0.00	0.003
% Newly Retired	6.3%	7.2%	12.0%	14.1%	3.1%	2.6%	0.0%	0.0%
House Value (2004)	$151,031	$144,687	$154,759	$162,363	$142,313	$150,580	$130,287	$128,584
Change in Value	11.4%	11.7%	11.0%	11.7%	10.5%	11.1%	10.1%	10.9%
Percentage With Mortgage	89.8%	89.2%	71.7%	75.9%	31.2%	37.3%	7.2%	6.3%
Change in Property Tax Rate	-3.8%	-4.1%	-3.8%	-4.0%	-3.6%	-3.9%	-3.5%	-3.7%

Some interesting differences are evident between the four age cohorts. Among those under 50, movers had somewhat higher incomes and experienced more rapid income growth in the years prior to their move. Movers were also more likely to be recently married or divorced, or to have recently retired. Among these young households, both the amount paid in property taxes in 2004 and the growth in property taxes and property tax burdens are similar for movers and non-movers. Homeowners between the ages of 50 and 64 had somewhat higher incomes and lived in slightly more expensive houses than younger homeowners. Among these middle aged homeowners, those that moved in 2005 paid about six percent more in property taxes in 2004 than non-movers. Also, property tax levels and property tax burdens grew substantially faster for movers than non-movers.

As expected, homeowners over 65 and especially those over 80, had lower incomes than younger households. Income growth between 2002 and 2004 was much slower for the elderly compared with the non-elderly. In fact, nominal incomes fell by about two percent for the oldest group of homeowners. Among elderly households, movers were less likely to be married and more likely to have lost a spouse (through divorce or widowhood) during the previous three years. On average the elderly lived in less valuable houses than the non-elderly, and consequently paid lower property taxes. However, because of their lower incomes, elderly taxpayers, and especially the “old” old faced considerably higher property tax burdens. For example, among non-movers, the average tax burden was 4.9 percent for those under 50 and 8.6 percent for those age 80 and above. Among the oldest group of households, movers faced both higher property tax burdens (9.1 percent compared to 8.6 percent) and faced more rapid growth in property taxes than non-movers.

While this comparison of movers to non-movers provides some suggestive evidence that changes in property taxes and property tax burdens may motivate some moves, especially among elderly homeowners, a more systematic, multivariate analysis is needed. In the next section, we develop an empirical model designed to explain the mobility decisions of Wisconsin homeowners.

Model

We begin with the basic assumption that households choose their utility maximizing housing consumption bundles (location, amenities, price, etc) based on their household characteristics and preferences as well as housing costs and the housing bundles that are available. For illustrative purposes, suppose:

$$h_i = \arg\max_H U(h_j \mid Y, m, d, W, p, C, T) \quad for \quad h_j \in H \tag{1}$$

where $U(h)$ is the household utility function and h_i is the utility maximizing housing bundle among the set of available housing bundles, H. The housing choice is, itself, dependent on income, Y, marital status, m, number of dependents, d, wealth, W, a vector of preferences, p, non-tax housing costs, C, and property taxes, T.

While all of these variables influence a household's optimal housing choice, the decision to move is an altogether different choice. We assume that households only move when the disadvantages of their current home outweigh the costs involved in moving. Although the monetary value of transactions costs involved in moving are hardly insignificant, for most households the psychological and emotional costs associated with leaving friends and a familiar neighborhood and the institutions, such as schools and churches, associated with any given location tend to dominate. We argue that the decision to move is as follows:

$$move_i = \begin{cases} 0 \ if \ U(h_i) \geq E\left[\max_j \left(U(h_j) - g(h_i, h_j, \theta)\right)\right] & h_i, h_j \in H \\ 1 \ if \ U(h_i) < E\left[\max_j \left(U(h_j) - g(h_i, h_j, \theta)\right)\right] & h_i, h_j \in H \end{cases} \tag{2}$$

As described above, a household will stay ($move_i = 0$) in house h_i if the utility associated with h_i is at least as great as the expected utility of other available housing less the cost of moving, $g(h_i, h_j, \theta)$. A household will move to another residence if the expected utility associated with a new house, less the cost of moving exceeds the utility of the current house. The cost of moving is assumed to be dependent on the current and proposed housing bundles, as well as a vector of additional household specific move parameters, θ, designed to capture the pecuniary, psychological, and emotional costs of the move.

If the cost of moving is high, then moves will occur only when families have strong reasons not to stay in their home. This suggests that moves will occur only in response to important changes in the variables described in equation 1 so that their current home no longer fulfills their needs. With this in mind, in order to formally examine the effects of these changes on mobility, we begin by estimating the following probit model:[17]

$$P(move_i = 1) = \Phi(\beta_1(\Delta T_i) + \beta_2(\Delta T_i)^2 + \alpha X_i + \varepsilon_i) \qquad (3)$$

where $move_i$ is an indicator for whether household i moved in 2005, ΔT_i denotes the percentage change in gross property taxes from 2002 to 2004, and X_i denotes a vector of covariates including income in 2004, percentage change in income from 2002 to 2004, change in the number of dependents from 2002 to 2004, the squares of each of those values, and indicators for marriage, loss of a spouse, new retirement, and the presence of mortgage interest.[18]

We are particularly interested in β_1, the linear effect of changes in property tax from 2002 to 2004, and β_2, the quadratic effect of those changes in property tax. The quadratic specification is of special importance for our analysis because it allows us to compare alternative hypotheses concerning the relationship between changes in property taxes and the probability of mov-

[17] Another commonly used binary choice model is the logit. Our logit analysis produced nearly identical results, so we focus our discussion on the probit model.

[18] An individual is designated as newly married if his filing status in 2004 is married filing jointly, but it was not in 2002. Similarly loss of a spouse is defined by the filing status being changed from married filing jointly in 2002 to another designation in 2004. An individual is designated as newly retired if his 2004 return includes Social Security or pension and annuity income, but his 2002 income tax return did not include those income sources. The presence of mortgage interest was identified from informational returns and is used as a proxy for whether an individual owns his home outright.

ing. If larger property tax increases consistently result in higher probabilities of moving, we should expect $\beta_1(\Delta T)+\beta_2(\Delta T)^2$ to be positively sloped for all values of ΔT in our dataset. Alternatively, if large changes in property taxes (positive or negative) have relatively large impacts on mobility, we should expect $\beta_1(\Delta T)+\beta_2(\Delta T)^2$ to be positively sloped for large positive values of ΔT and negatively sloped for large negative values of ΔT.

As noted previously, anecdotal evidence exists that "housing rich, but income poor" elderly homeowners are often unable to pay for property tax increases without reducing essential non-housing related consumption. In the presence of rising property taxes, these *liquidity constrained* homeowners are forced to sell their homes in order to readjust their mix of housing and non-housing consumption. If in fact liquidity constraints generate increased mobility, we would expect $\beta_1(\Delta T)+\beta_2(\Delta T)^2$ to be positively sloped for all values of ΔT. The implication is that a property tax increase of 20 percent would drive more people from their homes than a property tax increase of 2 percent, but a 2 percent property tax increase would still drive more people from their homes than a property tax reduction of 20 percent. Our data include property tax changes that range from 25 percent reductions to 40 percent increases, so, if liquidity constraints related to property tax increase motivate moves, we should expect:[19]

$$-1.25\beta_1 < \beta_2 < 2\beta_1. \qquad (4)$$

On the other hand, our model suggests that a large enough property tax change in either direction is likely to influence mobility decisions. Specifically, if a change in property tax represents a change in the housing consumption bundle, we would expect extreme changes in

[19] Our constraint is that $\beta_1+2\beta_2(\Delta T)>0$ for $\Delta T\in[-0.25, 0.4]$.

either direction to increase the probability of moving relative to moderate changes.[20] Using the second constraint described above, for our dataset this means that we should expect:[21]

$$\beta_2 > \max(2\beta_1, -1.25\beta_1) \qquad (5)$$

In reality it is likely that both scenarios exist to some extent, but one is more dominant in the data than the other. Furthermore, it is possible that this dominance differs between groups of people. For example, the liquidity constraint may be most important in explaining mobility of elderly homeowners. To explore differences by age, we estimate our model for each of four age groups: less than 50, 50 to 64, 65 to 79, 80 and above. Not only do these age groups allow us to compare the non-elderly (under 65) to the elderly (65+ years), they also allow us to compare the young elderly (65 to 79) to the old elderly (80 and above).

Before proceeding to our results, we lay out a basic list of our expectations. We expect that changes to household composition, whether increasing or decreasing in family size should positively influence the probability of moving insofar as the size or location of the home may no longer be appropriate to the household's needs. Similarly a household newly entering into retirement would be more likely to move to the extent that the housing location may no longer be dictated by employment factors. Changes to income are also likely to affect the household's desired housing consumption, with large positive or negative changes being more likely to induce a move.

The remaining variables represent current levels rather than recent changes. Within our analytic framework, the effects of these variables can be interpreted as differences in baseline mobility. With respect to age, the descriptive statistics have shown higher mobility rates among the youngest and oldest groups of homeowners and we expect the model to reflect those differ-

[20] Similarly and perhaps more intuitively, a positive change in income may allow a household to increase its housing demand, while a negative change in income may cause a household to decrease its housing consumption.

[21] Here our constraints are that $\beta_1 + 2\beta_2(\Delta T) > 0$ for $\Delta T = 0.4$ and $\beta_1 + 2\beta_2(\Delta T) < 0$ for $\Delta T = -0.25$

ences. We also expect the presence of a mortgage to increase mobility. Mortgage expenses reflect relatively greater housing costs and may reflect greater financial pressure on a household to maintain its current level of housing consumption. Moreover, homeowners who have fully paid off their mortgages are most likely to have lived in their home for a long time and feel a particularly strong attachment to their home and neighborhood.

The impact of income on the probability of moving is ambiguous. Higher levels of income suggests that a household can more easily bear the costs of moving. On the other hand, higher income levels reduce the chance that a household faces mobility-inducing liquidity constraints.[22] Regardless, our model implies that the income level, itself, does not *cause* a household to move.

In our model we assume that a homeowner's decision to move is based on recent changes in property taxes rather than on property tax levels. This approach is not only grounded in our conceptual model, but it also allows us to avoid the potential endogeneity of property tax levels highlighted by both Shan (2008) and Sabia (2008).[23,24]

Results

Table 3 shows the results of the probit regression that includes homeowners of all ages. Using the average value for each of the parameters, we estimate a baseline move probability of 3.01 percent. Since the marginal effects in a probit model are more easily interpreted than the coefficient estimates, the conventional approach is to focus discussion on these values. We in-

[22] The exclusion of income levels does not noticeably alter the marginal effects of the change variables included in our regression. .

[23] Shan frames the central hypothesis about the relationship between property taxes and elderly mobility in terms of recent "sharp increases" in property taxes, and she discusses her results by referring to *increases* in property taxes being associated with increases in the rate of mobility. In her empirical formulation, however, Shan does not measure the influence of changes in the property taxes experienced by a given household on its decision to move, but rather, she explores how different levels of property taxes across households influence mobility decisions.

[24] The inclusion of property tax levels in our probit regression indicates that higher property taxes are associated with greater mobility. Our conceptual model suggests, however, that the relationship can not be interpreted as causal.

clude a set of marginal changes to each variable and the amount by which each marginal change increases or decreases the baseline probability of moving.[25]

As shown in the table, comparing an individual with the mean property tax change of 6.6 percent to an individual experiencing a one percentage point higher property tax change increases the probability of moving by a very small, although statistically significant, amount (0.01 percent).

Table 3: Probit Regression Results, All Ages

Probability of Moving in 2005 Probit Maximum Likelihood Estimates					
Parameter	**Estimate**	**Standard Error**	**Pr > Chi Sq**	**Marginal Change**	**Marginal Effect**
Intercept	1.0809	0.0355	<.0001	NA	NA
Property Tax Change	-0.0936	0.0377	0.013	6.6% to 7.6%	0.01
Property Tax Change Squared	1.2329	0.1572	<.0001		
Income Change	-0.0644	0.0111	<.0001	5.7% to 6.7%	0
Income Change Squared	0.3031	0.0192	<.0001		
Income	1.23E-06	8.958E-08	<.0001	$74,000 to $75,000	0.01
Income Squared	-1.13E-12	1.67E-13	<.0001		
Age	-0.1056	0.00131	<.0001	53.9 to 54.9 yrs	-0.05
Age Squared	0.000897	0.000012	<.0001		
Dependents Change	0.0265	0.00533	<.0001	0 to 1	0.26
Dependents Change Squared	0.0122	0.00223	<.0001		
Marriage (dummy)	0.1179	0.0293	<.0001	0 to 1	0.9
Newly Retired (dummy)	0.0754	0.0103	<.0001	0 to 1	0.55
Homeowner - Has Mortgage (dummy)	0.0503	0.00756	<.0001	0 to 1	0.34
Loss of Spouse (dummy)	0.2175	0.0177	<.0001	0 to 1	1.8
Baseline move probability for all variables at the mean: 3.01% Marginal effects are calculated by increasing each variable in turn by the marginal change, holding all others equal to the mean, and measuring the change in the probability of moving					

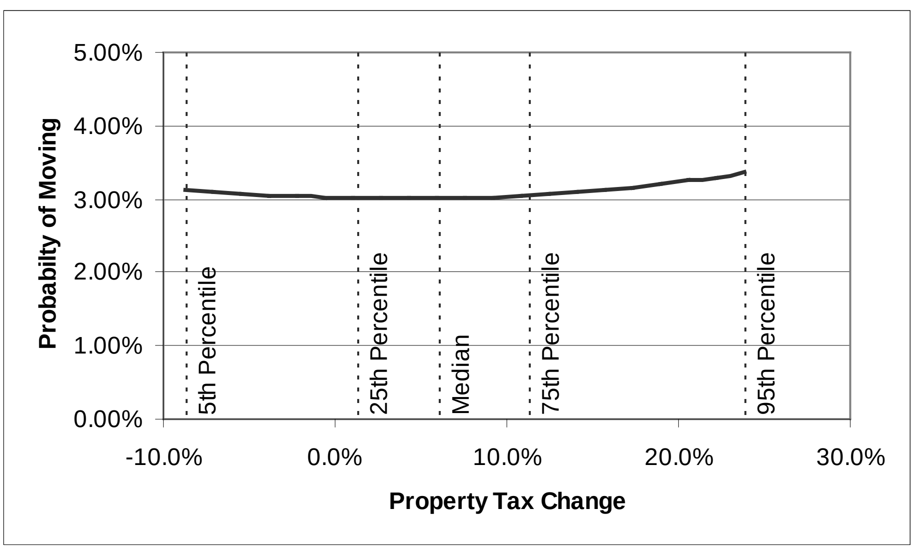
It is important to note that both the linear and quadratic components of the property tax change variable are statistically significant in the probit regression shown in Table 3. When comparing an individual with the median property tax change of 6.1 percent to an individual with a slightly higher or lower rate of change, the property tax change appears to have a negligible impact on the decision to move. An individual at the 95th percentile of the distribution of proper-

[25] The original model included variables for the change in property tax rates and the change in house values. Neither variable was statistically significant, so they are not included in the probit regression reported in Table 3. We also estimated the model using a property tax change variable based on changes in property taxes *net* of property tax credits. The variable was not statistically significant and the results are not reported here.

ty tax changes faced a 24 percent increase in property taxes. This large increase in property taxes increased the probability of moving to 3.4 percent compared with a probability of 3.0 percent for homeowners who experienced the median change in property taxes. Interestingly, homeowners who benefited from property tax decreases appear to be somewhat more likely to move than homeowners with no change or modest increases in their property tax bills.

As shown in Figure 1, large positive and negative changes in property taxes have a greater effect on the decision to move than small property tax changes. The coefficient estimates satisfy equation 5 and fail to satisfy equation 4. We can thus reject the hypothesis that increases in property taxes are creating liquidity constraints that are forcing homeowners to move. Although some moves are related to large increases and decreases in property taxes, our results suggest that most homeowners that moved in 2005 were not forced to move because of binding liquidity constraints. Figure 1 clearly shows that for the 90 percent of households in our dataset between the 5th and 95th percentile in the distribution of property tax changes, increases and decreases in property tax had very little impact on these households' decisions to move.

Figure 1: The Effect of Property Tax Changes on the Probability of Moving



The top panel of Table 4 shows the values of the percentage change in property taxes, age, income, and the percentage change in income evaluated at the 5th percentile, 25th percentile, median, 75th percentile, and 95th percentile of their distribution in our dataset. The bottom panel illustrates the probability of moving at each of those values when all the other variables are held equal to their means.[26]

Table 4: Marginal Probability of Move by Percentiles

	Percentile	Property Tax Change	Age	Income	Income Change
Summary Statistics	5th	-8.7%	34	$18,834	-39.2%
	25th	1.3%	44	41,043	-5.8%
	50th (median)	6.1%	52	62,329	5.7%
	75th	11.2%	63	89,466	17.3%
	95th	23.9%	78	$160,341	50.6%
Baseline Move Probabilities, All Other Variables Evaluated at the Mean	5th	3.12%	8.89%	2.62%	3.54%
	25th	3.00%	4.42%	2.77%	3.06%
	50th (median)	3.00%	3.14%	2.92%	3.01%
	75th	3.05%	2.96%	3.11%	3.01%
	95th	3.39%	5.78%	3.60%	3.35%

Consistent with the data presented in Table 2, the probability of moving is highest among both the youngest and the oldest groups of homeowners. At the fifth percentile of the age distribution, 34 years old, the probability of moving is nearly nine percent, almost three times higher than the probability of moving by the median aged homeowner. On the other end of the distribution, the probability of moving is close to six percent for the 78 year olds at the 95th percentile of the age distribution. Age is not explicitly included in equations 1 or 2, but we expect that a number of unobserved (to us) factors that impact mobility occur most frequently among both young and old homeowners. Examples include employment changes and changes in health status. Explicit information about these factors might mitigate some of the impact on mobility that we attribute to age.

[26] The dummy variables and the change in the number of dependents are excluded since they do not vary as much as the remaining variables. The dummy variables are always zero or one, while the change in the number of dependents is almost always -1, 0, or +1.

With the 5th to 95th percentiles of the income distribution, higher income levels are associated with higher probabilities of moving. Individuals at the 5th percentile (with incomes of $18,834, have a 2.62 percent probability of moving, and that probability rises steadily with income. Individuals with income of $160,341, the 95th percentile in our data, have a 3.6 percent probability of moving. We hypothesized that low incomes may increase the probability of moving because low-income homeowners may find it difficult to bear the costs associated with their current residences. On the other hand, higher incomes might increase the probability of moving, as homeowners can more easily afford the costs associated with moving, and are likely to face a larger set of affordable alternative housing locations. Our finding, that the probability of moving rises with income, suggests that the high costs of staying in one's current home are not motivating low-income homeowners to move.

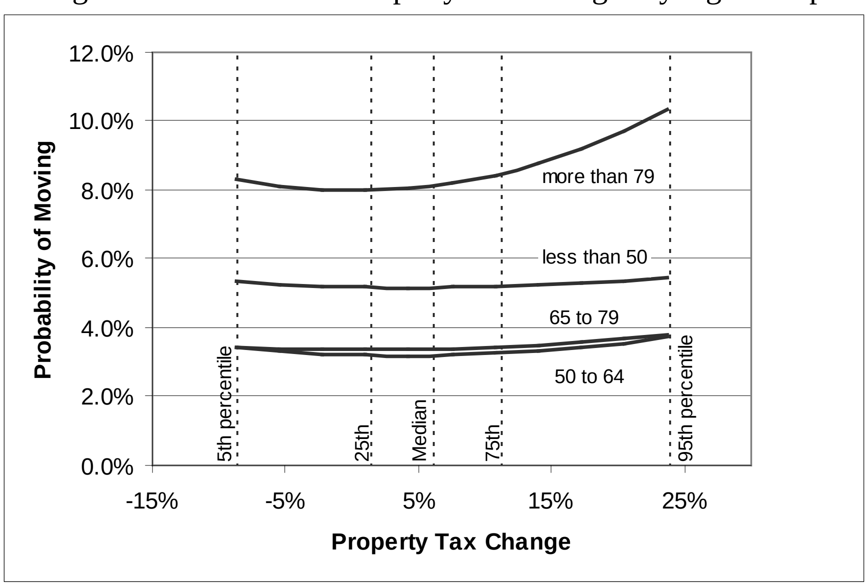
The data indicate that large changes in income (positive or negative) tend to increase the probability of moving, while modest changes have a negligible impact on mobility. The middle 50 percent of the population, those households with income changes between -5.8 percent and +17.3 percent, have estimated mobility rates of 3.06 percent and 3.01 percent, respectively. Individuals at the 5th percentile of the distribution of income changes experienced declines in income of 39.2 percent, and a probability of moving of 3.54 percent. At the other end of the distribution, individuals at the 95th percentile experienced increases of income of 50.6 percent, and a probability of moving of 3.35 percent. Thus, even among homeowners who experienced large changes in income between 2002 and 2004, the probability of moving in 2005 remains quite low.

The other variables largely perform as expected. Marriage, loss of a spouse, retirement, the presence of a mortgage, and an increase in the number of dependents all increase the likelihood of moving. The sole exception to our expectations is that a one person decrease in the number of dependents, marginally decreases the likelihood of moving.

In order to more fully understand the impact of age on mobility decisions, we estimated the probit regression shown in Table 3 separately for each of the four age categories described in Table 2. These regression results are reported in the appendix. By using separate regressions, we allow each age group to have unique responses to the independent variables in the model. Rather than discussing the results of these regressions in isolation, we focus on how the results differ between age groups.

We are primarily interested in the differing effects of property tax changes between age groups. Figure 2 shows the predicted probability of moving for each age group as property taxes change. In each case, the other variables are evaluated at the mean value for the age group. The vertical lines show the 5th percentile, 25th percentile, median, 75th percentile, and 95th percentile property tax changes for the full dataset. The distribution of property tax changes is very similar across age groups. [27]

Figure 2: The Effect of Property Tax Changes by Age Group



[27] Table A5 in the appendix shows the percentiles for each age group.

For the old elderly homeowners (80 years and older), a decline of 10 percent in property taxes has nearly the same impact on mobility as an increase of 10 percent. However, these households appear to be considerably more sensitive to large increases in their property taxes than younger households. In order to understand the implications of this finding note that our data include 12,800 old elderly households that faced property tax increases above the median. Our results indicate that on average the property tax increases experienced by this group of homeowners increased their probability of moving by 0.66 percentage points. This increase in probability implies that 85, or approximately one in 300 households, moved as a result of property tax increases that were larger than the median change in property taxes. For homeowners under the age of 80 the story is very different. Changes in property taxes, both increases and decreases, have almost no impact on the probability of moving. Even very large percentage increases in property taxes are not associated with higher than average rates of mobility.

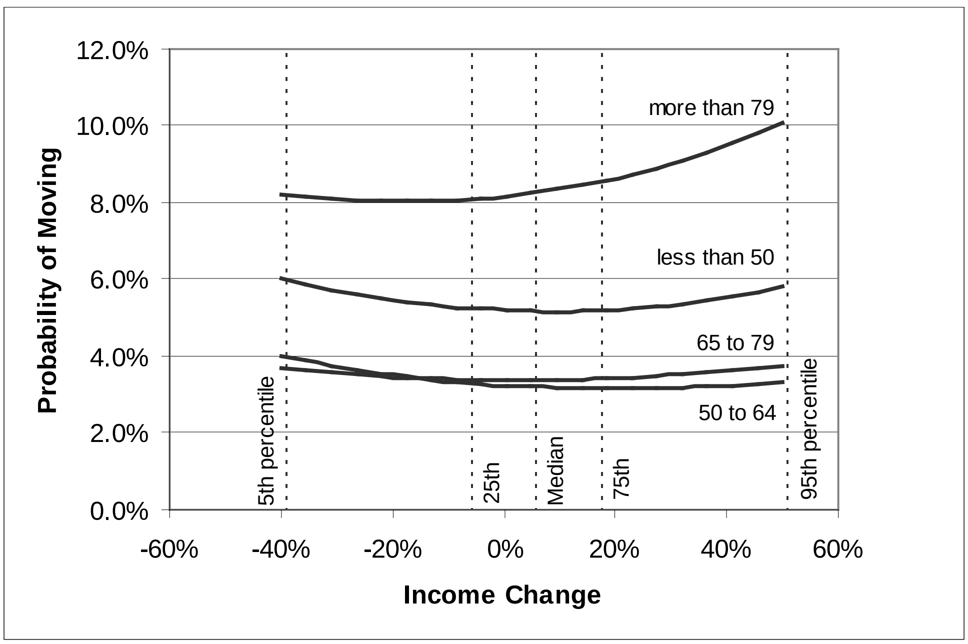
The assumption that homeowners move because they face a binding liquidity constraint implies that homeowners who experienced the largest reductions in property taxes would have the lowest probability of moving. However, Figure 2 shows that for each age group, the households that are least likely to move are those for whom property taxes increased from zero to five percent. Although it is not clear from Figure 2 alone, the linear coefficients are not statistically significant for three of the four age groups (the exception is the 50 to 64 group), but, underscoring the importance of the magnitude of changes, the quadratic coefficients are always statistically significant and positive.

Figure 3 shows the effects of income changes on mobility rates for the 5th to 95th percentiles within our dataset.[28] The effects of changes in income on the probability of moving parallel

[28] The dotted vertical lines represent the percentiles for the full dataset. Although the three youngest age groups are similarly distributed, the oldest age group exhibits slower income growth. As a result, the vertical lines are not as

the impact of property tax changes on mobility observed in Figure 2. The oldest age group is most likely to move for all income changes and appears to be most sensitive to large increases in income. None of the age groups appear to be particularly sensitive to income decreases, which may indicate a strong desire not to move even when incomes decline. This finding is consistent with attitudinal surveys that show strong preferences among homeowners to “age in place.” These results certainly do not support claims that any of the age groups are being forced to sell their homes in response to adverse economic conditions. The quadratic coefficients are statistically significant for each age group and the linear coefficients are significant for the non-elderly.

Figure 3: The Effect of Income Changes by Age Group



For spousal changes, the results are mixed. Marriage is only significant among households who are less than 65. For these non-elderly households, getting married increase the probability of moving by about 1 percentage point. Since there are so few new marriages among households over age 65, the large standard errors are not surprising. The loss of a spouse through

indicative of the age specific percentiles for the old elderly age group. Table A6 in the appendix shows the percentiles for each age group.

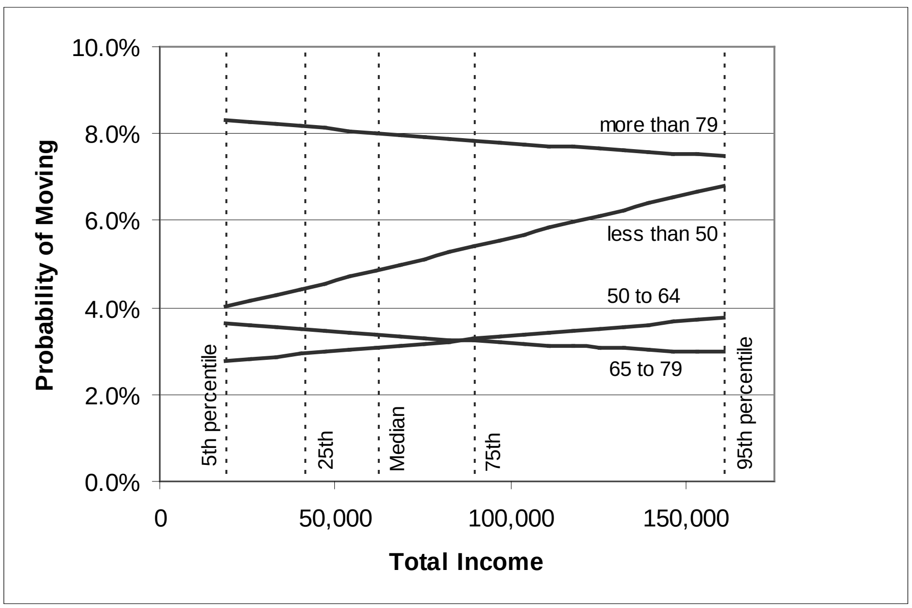
divorce or death, is, however, statistically significant for all age groups. The loss of a spouse increases the probability of moving by 2.2 percentage points for both non-elderly groups, 2.8 percentage points for the young elderly, and 3.4 percentage points for the old elderly. To the extent that the death of a spouse becomes more common relative to divorce as individuals age, the coefficients may reflect a greater propensity to move after a spouse dies compared to when a divorce occurs.

Changes in the number of dependents are only statistically significant for the youngest age group. This is not surprising since the youngest age group is the most likely cohort to have dependents and the most likely to have changes in the number of dependents. One additional dependent increases the probability of moving by 0.45 percentage points, while one fewer dependent decreases the probability of moving by 0.09 percentage points. Although the effect of a decrease in dependents is contrary to our model predictions, we can still intuitively understand why an increase in the number of children has a more dramatic effect than a decrease. We expect that increases in the number of dependents are usually associated with the birth of a child, while decreases are associated with children becoming adults and forming their own households. As family size grows, homeowners frequently look for a larger house. It appears to be less likely that children leaving home leads to downsizing.

For our full dataset, the presence of a mortgage increased the mobility rate. Interestingly, among the youngest homeowners having a mortgage decreases the probability of moving by 1.4 percentage points. A mortgage increases the probability of moving by 0.7 percentage points among the 50 to 64 year-old age group and 1.4 percentage points among the 65 to 79 year-old age group. Nearly all homeowners over the age of 79 own their homes outright, presumably having paid off their mortgage. Thus, not surprisingly, the mortgage variable is statistically insignificant for this age group. Among older homeowners it is possible that a paid off mortgage indicates long-time tenure and presumably an emotional attachment to a home.

Using our full dataset, we found that the probability of moving increased for higher income households. The results of our separate age group regressions indicate that this increased mobility rate at higher income levels is true only for non-elderly homeowners. As shown in Figure 4, the mobility rate of the youngest age cohort increased by approximately 0.02 percent per $1,000 of income and the middle-aged cohort's mobility rate increased by 0.01 percent per $1,000 of income. The income variable is not significant for the old elderly homeowners, and the young elderly had lower mobility rates at higher income levels.

Figure 4: The Effect of Income on Mobility Rates by Age Group[29]



Conclusions

For over 30 years, starting with California's Proposition 13, voters and state legislatures have been approving constitutional amendments or enacting laws to limit property taxes, especially on homeowners. One of the most often-heard justifications for restricting property taxes is

[29] The dotted vertical lines represent the percentiles for the full dataset. Table A7 in the appendix shows the percentiles for each age group.

the assertion, sometimes supported with anecdotal evidence, that without such limits, rising property tax burdens will force many elderly homeowners to sell their homes. The argument that property taxes are driving the elderly from their homes and neighborhoods continues to be heard, even in states that have enacted circuit breakers and other property tax relief measures targeted to the elderly homeowners.

Surprisingly, with the exception of several recent papers, there has been very little empirical research directly addressing the question of whether increases in property taxes influence mobility decisions, especially among the elderly. In this paper, we address this question using a large panel dataset that contains detailed information on nearly all homeowners in the state of Wisconsin who lived in the same home from 2002 through 2004. Using these data we develop and estimate a probit model of homeowner mobility decisions in 2005.

The major source of our data is the state and federal income tax returns filed each year by Wisconsin residents. Because Wisconsin's income tax includes a property tax credit available to all homeowners, all taxpayers are required to report information on property taxes paid on their state income tax returns. Residential mobility is measured by noting changes in address on annual income tax returns.

We start our analysis by looking at the impact of changes in property taxation on decisions to move among all homeowners irrespective of age. While a quarter of all homeowners saw their property tax payments grow by more than 11.2 percent between 2002 and 2004, the marginal impact of that property tax increase was to raise the mobility rate in 2005 from 3.0 to 3.05 percent. Even the very large 25 percent two-year property tax increase faced by homeowners at the 95th percentile of property tax changes only resulted in a mobility rate of 3.39 percent.

Turning to the elderly, our analysis shows striking differences in the mobility behavior of the young and old elderly, defined as those below 80 and those age 80 and above, respectively. Among the young elderly, increases in property taxes have almost no impact on their probability of moving. For the old elderly however, large property tax increases do increase the probability of moving. Thus, the homeowner facing the median two-year property tax increase has an 8.1 percent probability of moving, while the homeowner at the 95th percentile of the distribution of property tax changes, facing a 21 percent two-year increase in property taxes, has a 9.8 percent probability of moving.

How should we interpret these results? One way is to calculate the number of moves by Wisconsin homeowners attributable to increases in property taxes. Using our full dataset, we calculate that in 2005, 389 homeowners moved because their property taxes rose at a rate in excess of the median change in property taxes over the previous two years. Of these homeowners, 85 were over the age of 79. These numbers imply that of all Wisconsin homeowners (irrespective of age), approximately 1 in 1,600 chose to move because of an above-median increase in their property taxes. Among homeowners over the age of 79, 1 in 300 moved because their property taxes grew at an above-median rate.

Our results also suggest that even among elderly homeowners over the age of 79 who chose to move because of increases in property taxes, most of these taxpayers were not being forced out of their homes because they could not afford their increased property tax payments. We reach this conclusion because we find no increase in the probability of moving among old elderly homeowners who experienced large decreases in income.

We conclude that increases in property taxes result in very little additional mobility, even among elderly homeowners over the age of 79. Nevertheless, paying property taxes undoubtedly creates economic hardship for some elderly homeowners who are determined to remain in their homes. Unfortunately public policy in Wisconsin has primarily focused on the rate of property tax growth rather than on potential economic hardships the property tax may create for some homeowners.

In responding to citizen complaints about the property tax, policymakers in Wisconsin have enacted a number of measures designed explicitly to limit the annual rate of growth of property tax revenue. Starting in the mid-1990s, the legislature has imposed a per student dollar cap on the growth of the sum of state equalization aid to school districts and school property tax levies. More recently, the legislature has enacted annual percentage limits on the growth of property tax levies imposed by all municipal and county governments.

While there is good reason to believe that these policies have in fact reduced the rate of growth in property tax revenue in Wisconsin, our results suggest that they have had little if any impact on residential mobility in Wisconsin. In recent years, policy in a number of other states has also focused on limiting the annual growth of annual property tax revenues, often by artificially limiting the growth rate of assessed values. The results in this paper suggest that states would more effectively address citizen complaints about the property tax by establishing or expanding policies designed to reduce the burden of property taxes on those taxpayers, including the elderly, who face particularly high property tax burdens.

Appendix

Tables A1 through A4 show the results of our probit regressions for each age group.

Table A1: Probit Regression Results, Age Less Than 50

Probability of Moving in 2005 - Age Less Than 50 Years Probit Maximum Likelihood Estimates					
Parameter	Estimate	Standard Error	Pr > Chi Sq	Marginal Change	Marginal Effect
Intercept	1.2249	0.1541	<.0001	NA	NA
Property Tax Change	-0.0828	0.0544	0.1283	6.8% to 7.8%	0
Property Tax Change Squared	0.8055	0.2243	0.0003		
Income Change	-0.0557	0.0174	0.0014	8.7% to 9.7%	0
Income Change Squared	0.3289	0.0294	<.0001		
Income	2.29E-06	1.387E-07	<.0001	$78,000 to $79,000	0.02
Income Squared	-2.59E-12	2.68E-13	<.0001		
Age	-0.1028	0.00805	<.0001	41.5 to 42.5 yrs	-0.38
Age Squared	0.000788	0.000103	<.0001		
Dependents Change	0.0249	0.0066	0.0002	0 to 1	0.45
Dependents Change Squared	0.0162	0.00278	<.0001		
Marriage (dummy)	0.1021	0.034	0.0027	0 to 1	1.17
Newly Retired (dummy)	0.0525	0.0157	0.0008	0 to 1	0.58
Homeowner - Has Mortgage (dummy)	-0.1237	0.013	<.0001	0 to 1	-1.42
Loss of Spouse (dummy)	0.1814	0.0291	<.0001	0 to 1	2.21

Baseline move probability for all variables at the mean: 5.17%
Marginal effects are calculated by increasing each variable in turn by the marginal change, holding all others equal to the mean, and measuring the change in the probability of moving

Table A2: Probit Regression Results, Age 50 to 64

Probability of Moving in 2005 - Age 50 to 64 Years Probit Maximum Likelihood Estimates					
Parameter	Estimate	Standard Error	Pr > Chi Sq	Marginal Change	Marginal Effect
Intercept	0.2557	0.9668	0.7914	NA	NA
Property Tax Change	-0.1426	0.0673	0.0339	6.5% to 7.5%	0.01
Property Tax Change Squared	1.771	0.2799	<.0001		
Income Change	-0.1241	0.0186	<.0001	5.1% to 6.1%	-0.01
Income Change Squared	0.3053	0.0327	<.0001		
Income	1.15E-06	1.497E-07	<.0001	$79,000 to $80,000	0.01
Income Squared	-1.08E-12	2.75E-13	<.0001		
Age	-0.0821	0.0343	0.0166	56.1 to 57.1 yrs	0.01
Age Squared	0.000743	0.000302	0.014		
Dependents Change	0.0121	0.0109	0.2679	0 to 1	0.13
Dependents Change Squared	0.00593	0.00459	0.1969		
Marriage (dummy)	0.1747	0.0718	0.015	0 to 1	1.47
Newly Retired (dummy)	0.0695	0.0148	<.0001	0 to 1	0.52
Homeowner - Has Mortgage (dummy)	0.0991	0.0116	<.0001	0 to 1	0.68
Loss of Spouse (dummy)	0.2501	0.0358	<.0001	0 to 1	2.24

Baseline move probability for all variables at the mean: 3.20%
Marginal effects are calculated by increasing each variable in turn by the marginal change, holding all others equal to the mean, and measuring the change in the probability of moving

Table A3: Probit Regression Results, Age 65 to 79

Probability of Moving in 2005 - Age 65 to 79 Years Probit Maximum Likelihood Estimates					
Parameter	**Estimate**	**Standard Error**	**Pr > Chi Sq**	**Marginal Change**	**Marginal Effect**
Intercept	6.0986	2.2194	0.006	NA	NA
Property Tax Change	-0.021	0.0969	0.8285	6.2% to 7.2%	0.01
Property Tax Change Squared	1.0401	0.4179	0.0128		
Income Change	-0.0136	0.0267	0.61	1.8% to 2.8%	0
Income Change Squared	0.2142	0.0483	<.0001		
Income	-1.01E-06	2.369E-07	<.0001	$60,000 to $61,000	-0.01
Income Squared	1.95E-12	4.04E-13	<.0001		
Age	-0.2375	0.0619	0.0001	71.2 to 72.2 yrs	0.13
Age Squared	0.00177	0.00043	<.0001		
Dependents Change	-0.00672	0.0324	0.8358	0 to 1	-0.04
Dependents Change Squared	0.00113	0.0106	0.915		
Marriage (dummy)	-0.1544	0.1645	0.348	0 to 1	-1.01
Newly Retired (dummy)	-0.0537	0.0444	0.2265	0 to 1	-0.39
Homeowner - Has Mortgage (dummy)	0.1732	0.0152	<.0001	0 to 1	1.38
Loss of Spouse (dummy)	0.2918	0.0342	<.0001	0 to 1	2.81

Baseline move probability for all variables at the mean: 3.38%
Marginal effects are calculated by increasing each variable in turn by the marginal change, holding all others equal to the mean, and measuring the change in the probability of moving

Table A4: Probit Regression Results, Age Greater Than 79

Probability of Moving in 2005 - Age Greater Than 79 Years Probit Maximum Likelihood Estimates					
Parameter	**Estimate**	**Standard Error**	**Pr > Chi Sq**	**Marginal Change**	**Marginal Effect**
Intercept	2.8901	4.492	0.52	NA	NA
Property Tax Change	-0.00991	0.1628	0.9515	5.9% to 6.9%	0.05
Property Tax Change Squared	2.5778	0.7161	0.0003		
Income Change	0.0983	0.0508	0.0531	-2.1% to -1.1%	0.01
Income Change Squared	0.2754	0.0905	0.0023		
Income	-5.44E-07	4.276E-07	0.2033	$46,000 to $47,000	-0.01
Income Squared	7.68E-13	8.73E-13	0.3791		
Age	-0.1641	0.1043	0.1156	83.6 to 84.6 yrs	0.99
Age Squared	0.00135	0.000604	0.026		
Dependents Change	0.0906	0.0829	0.2744	0 to 1	1.27
Dependents Change Squared	-0.0109	0.0268	0.6847		
Marriage (dummy)	0.1917	0.1855	0.3014	0 to 1	3.28
Newly Retired (dummy)	-0.00936	0.5345	0.986	0 to 1	-0.14
Homeowner - Has Mortgage (dummy)	0.0383	0.0451	0.3961	0 to 1	0.59
Loss of Spouse (dummy)	0.2006	0.0517	0.0001	0 to 1	3.42

Baseline move probability for all variables at the mean: 8.13%
Marginal effects are calculated by increasing each variable in turn by the marginal change, holding all others equal to the mean, and measuring the change in the probability of moving

Table A5: Distribution of Property Tax Changes for Each Age Group

Property Tax Change Distribution by Age Group						
Age Group	Mean	5th Pctl	Lower Quartile	Median	Upper Quartile	95th Pctl
less than 50	6.8%	-8.8%	1.3%	6.2%	11.6%	24.8%
50 to 64	6.5%	-8.6%	1.4%	6.1%	11.2%	23.7%
65 to 79	6.2%	-8.6%	1.2%	5.8%	10.6%	22.6%
more than 79	6.0%	-8.1%	1.3%	5.7%	10.2%	21.0%
All Ages	6.6%	-8.7%	1.3%	6.1%	11.2%	23.9%

Table A6: Distribution of Income Changes for Each Age Group

Income Change Distribution by Age Group						
Age Group	Mean	5th Pctl	Lower Quartile	Median	Upper Quartile	95th Pctl
less than 50	8.7%	-34.6%	-2.0%	8.7%	19.7%	51.2%
50 to 64	5.1%	-41.5%	-6.6%	5.7%	16.8%	50.7%
65 to 79	1.8%	-42.8%	-10.7%	1.2%	12.5%	51.1%
more than 79	-2.1%	-38.7%	-11.0%	-1.4%	4.9%	35.4%
All Ages	5.7%	-39.2%	-5.8%	5.7%	17.3%	50.6%

Table A7: Distribution of Income for Each Age Group

Income Level Distribution by Age Group						
Age Group	Mean	5th Pctl	Lower Quartile	Median	Upper Quartile	95th Pctl
less than 50	78,016	23,181	47,059	68,317	93,008	157,935
50 to 64	79,355	20,677	43,774	66,029	95,399	174,875
65 to 79	60,435	15,883	32,925	48,678	70,389	138,422
more than 79	45,808	12,009	20,806	34,582	53,680	115,213
All Ages	74,056	18,834	41,043	62,329	89,466	160,341

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