CAUSES OF DIFFERENCES IN EFFECTIVE PROPERTY TAX RATES

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INTRODUCTION

THE PROPERTY TAX HAS BEEN, AND CONTINUES TO be, the major source of local revenue. It is used to fund a variety of services, particularly education. The property tax is the only tax levied in all 50 states (Bell, 2005), and the effective tax rates, at least for housing, vary substantially across the states (ACIR, 1989).

THEORETICAL IMPLICATIONS OF VARYING EFFECTIVE PROPERTY TAXES

This paper provides new measures of effective property tax rates and uses that data to test for determinants of variations in those rates. The most recent published estimates on effective property tax rates across states are for 1987 (ACIR, 1989) and these are limited to single family homes with FHA mortgages. Lorelli (2001) published residential property tax rates in the largest city in each state for 1999.

There are three basic views of the property tax: the "old" view, the "benefit" view and the "new" view. Under the "old" view the property tax has two portions: a tax on land and a tax on structures. The land tax falls on landowners and the structure portion, assuming capital is mobile, falls on consumers of final goods, including homeowners, renters, and consumers of products (Wildasin, 1986). Thus, the old view would produce a regressive tax as most of the burden would fall on consumers, and low income people consume a larger proportion of their income. The benefits approach introduced by Hamilton (1975), which relies on the Tibeout (1956) model, suggests the property tax is a non-distorting payment for local public goods. The benefits approach suggests that the property tax is not actually a tax but acts like a user fee. In the "new" view, originated by Mieszkowski (1972), the property tax has two parts: the average nationwide rate, which falls on all owners of capital and the local differential rate, which has excise tax effects. Wildasin (1986) and Aaron (1975) present an extensive discussion of the old and new views.

This essay relates, in part, to the benefits view of the property tax, therefore will test key variables — share of the population that is school aged, share of the population that is elderly, and share of property in business related to that view as determinants in the variations of property tax rates.

The new data set includes assessment cycle information and therefore can test for an additional factor — tax revolts. Brunori (2003) discusses the resentment against the property tax, which has given rise to property tax "revolts" as evident in California's Proposition 13, as arising from the visibility of the tax and perceptions of unfairness in assessment. This perception may be exacerbated by infrequent assessments which may cause large intermittent increases in the property tax and allow market and assessed values to deviate. According to Aaron (1975, pp. 68-69):

> "While regular assessment on a three to eight year cycle is becoming increasing common, the jump in taxes at reassessment may be 50 percent or more, especially in rapidly appreciating areas. When such increases are combined with a correction in long-standing underassessment, the shock to taxpayers can only deepen the unpopularity of the tax."

DATA

The data set consists of effective property tax rates for 49 states and DC and variables that, according to the theories outlined previously, could explain variation in those rates across states for tax year 2000.[1] The effective property tax rates were determined by dividing state and local property tax collections from the Census State and Local Governments financial data by estimates of the 2000 market values of total property in each state.

2000 market values of statewide property were developed using the assessed values collected from the states' assessments, auditing, or tax depart-

*The views expressed in this paper are those of the author and should not be interpreted as those of the Congressional Budget Office.

ments. Values of assessed property were gathered from all but one state: California. California was excluded from the base regressions since the assessment limitations, California's Proposition 13, significantly reduced the ability to reliably adjust the available assessed data to 2000 market value. However, because California is such a large state both in population as well as potential property value, a separate analysis was done including imputed values of property in California. These imputations were all based on actual data collected from California.

Three methods were used to control for sensitivity in the imputation measures. California's State Board of Equalization produces estimated market values of commercial and industrial property for the purpose of adjusting railroad property which does not fall under Proposition 13. The estimate for 2000 was used to obtain an assessment ratio which was applied to the 2000 assessed values for all property to impute total market value of property in California. Second, the average share of residential across the states that broke out such data was used to impute the market value of total property based on the commercial and industrial market values. Lastly, a "rule-of-thumb" value of 60 percent was used to impute California assessed values to market values.[2] The imputed values are also used in the incidence analysis.

States vary significantly both in the timing of assessment and assessment ratios. Some states use the assessment ratio, percentage of market value, to determine the taxable value of property on which the district, local, or county tax rates are applied. Table 1 shows general information on the assessment cycle and assessment ratios for the states used.

Due to complexities in the property tax structures across states, this table represents general information gathered from state and local websites and officials, and does not necessarily represent the complete structure of the property tax in each state.[3] 2000 market values were estimated using the assessment ratios to raise assessed or taxable values up to market value. These values were then indexed up or down to 2000 according the last data for assessed value.

A second important limitation in the available data concerns the treatment of personal property. 17 of the 50 states do not tax personal property. Those states that do not tax personal property do not collect any information on the value of personal property. For states that do tax personal property, taxes on real and personal property are not available separated. States therefore vary in the inclusion of personal property in the base reported, as well as the amount of taxes collected.

The exclusion of personal property from the property base produces forms of bias in the effective property tax rates according to the generation of the rates. The first option is to develop an effective tax rate on all property as the total taxes collected divided by the total real and personal property. For those states that do not tax personal property there is an upward bias in the value of the ETR as the lack of data does not account for the zero effective tax rate on personal property. The second option is to develop an effective property tax on only real property. In this case, for states that tax personal property, there is an upward bias in the effective tax rate of T_P/B_R.[4]

Table 2 provides the effective property tax rates on total property and on real property of the states beginning with the highest effective tax rate, including the three methods of imputing California market value of property. All the analysis will present the three methods of adjusting California values as there is no a prior belief about the best method to impute California values.

As can be seen in table 2, New Hampshire has the highest effective tax rate regardless of using real or total property. Those states whose effective tax rates do not change between total and real are states that do not tax personal, and thus no data are available or that data could not be removed (in the case of Alabama), a limitation discussed earlier.

Perhaps surprising is the low tax rate on property in Hawaii. This low tax rate for Hawaii is consistent with Lorrelli's (2001) finding for Honolulu, which also ranked lowest in effective property tax rates compared to major cities in other states. A possible explanation is that as a tourist destination, Hawaii has a large share of highly valued commercial property, such as mega resorts, which does not require significant public services like education.

The national effective property tax rate on total property is 1.51 percent, 1.43 percent, and 1.36 percent, including California using the residential share imputation, the commercial assessment ratio imputation, and the 60 percent assessment rule imputation, respectively. The national effective property tax rate on real property is higher by nature of the exclusion of the zero effective tax rate personal property inherent in the total property base values. The national effective real

Table 1
General Assessment Cycles and Rates Across the 50 States and DC

State	*Assessment cycle**	*Assessment rate*
Alabama	1	30% (utilities), 10% (agriculture/forest/residential), 15% (private motor vehicles), 20% (all other property)
Alaska	1	Rates vary by municipalities from about 60% to 99% for real property averaging about 90%, and from as low as 1% to around 99% averaging about 50% for personal.
Arizona	1	Rates vary over nine classes from 1% to 25%
Arkansas	3	20%
California**	1	60% to 88%
Colorado	2	29% (property other than producing resources and residential including personal), 100% (producing mines at production value), 9.15% (residential in 2001-varies every odd number year)
Connecticut	4	70%
Delaware***	22	2004 data suggest that current assessed values are 100% of 1983 values, 60% of 1987 values, and 50% of 1974 values
District of Columbia	1	100%
Florida	1	100%
Georgia	1	40%
Hawaii	1	100%
Idaho	1	100%
Illinois	1	33.33%
Indiana†	10	33.33%
Iowa	2	100%
Kansas	1	100%
Kentucky	1	100%
Louisiana	1	Land 10%, Improvements for Residential 10%, Improvements for Commercial 15%, Business Movable Property (Personal) 15%, Public Service (Excluding Land) 25%, Agriculture 10%
Maine	1	Municipalities range from 32% to 100%, average assessment ratio is 97%
Maryland	3	100%
Massachusetts	1	100%
Michigan	1	50%
Minnesota	1	100%
Mississippi	1	Residential 10%, public service and motor vehicles 30%, personal and all other real 15%.
Missouri	2	Residential 19%, Agriculture 12%, all other real 32%, personal property varies from 0.5% to 33.3%.
Montana	4	100%
Nebraska	1	100% except agriculture and horticultural land at 80%
Nevada	1	35%

Table 1 (continued)
General Assessment Cycles and Rates Across the 50 States and DC

State	*Assessment cycle**	*Assessment rate*
New Hampshire	5	Essentially market value
New Jersey	1	100%
New Mexico	1	Taxable value 1/3 of market value assessment
New York	1	100%
North Carolina	4	100%
North Dakota	1	Assessed value is 50% of true value; residential taxable 9% of assessed, all other 10% of assessed
Ohio	3	Real 35%, personal 25%
Oklahoma	1	Real between 11 and 13.5 %, personal between 10 and 15%, public service 22.85%, railroads and airlines 12.08%
Oregon	1	90%, personal annual market
Pennsylvania	1	100%
Rhode Island	1	100%
South Carolina	5	4% (owner-occupied (primary residence) and private agriculture), 10.5% (manufacturing, utility, personal), 6% (corporate agriculture, other real estate), 9.5 railroads
South Dakota	1	85%
Tennessee	6	Residential 25%, farm 25%, commercial and industrial 40%, public utility 55%, business personal 30%
Texas	1	100%
Utah	1	100%, 55% (primary residential and mobile home)
Vermont	1	100%
Virginia	1	100%
Washington	2.6	Ratio varies by county, ranges from 73% to 98%
West Virginia	1	60% on all property
Wisconsin	1	100%
Wyoming	1	9.5% (real and personal); 11.5% (industrial), 100% (mineral/mines)

*Assessment cycles represent average cycle for the state, where there is more than one assessment cycle. Some states assess different portions of the state annually but therefore end with non-annual cycle for a given portion.

**Due to complications from the introduction of Proposition 13, there are no estimates for assessment ratios on all property in California. Historical assessment ratios on commercial/industrial range from 65 to 88 percent, which represent the amount assessed relative to the estimated full market value on that property, and some researchers suggest that a rough rule of thumb assessment ratio for aggregate property may hover around 60 percent.

***22 is the average number of years since the last reassessment in Delaware, which the current values are based on. Data provided estimated market values for 2004 which were adjusted down to 2000 values.

† Indiana recently moved to 100 percent market based assessed values. It had, prior to the move to annual market assessment in 2002, generally assessed every 10 years at 331/3 percent of the value with some restrictions in assessed value growth.

Table 2
Effective Property Tax Rates on Total and Real Property

State	*Total ETR%*	*State*	*Total ETR%*	*State*	*Real ETR%*	*State*	*Real ETR%*
New Hampshire	2.69	Mississippi	1.44	New Hampshire	2.69	Georgia	1.59
New York	2.54	DC	1.35	New York	2.54	Maryland	1.54
New Jersey	2.48	Missouri	1.28	Rhode Island	2.51	West Virginia	1.47
Maine	2.20	Wyoming	1.19	New Jersey	2.48	Missouri	1.46
Rhode Island	2.16	Georgia	1.19	Texas	2.45	Louisiana	1.44
Texas	2.01	Idaho	1.18	Maine	2.28	Wyoming	1.38
Pennsylvania	1.96	Oregon	1.16	Connecticut	2.17	DC	1.35
North Dakota	1.95	**California (res)**	1.10	Indiana	2.12	Oklahoma	1.34
Wisconsin	1.95	Oklahoma	1.10	Wisconsin	2.01	Idaho	1.28
Iowa	1.94	West Virginia	1.07	Kansas	1.98	Oregon	1.19
Vermont	1.93	Washington	1.07	Vermont	1.97	Virginia	1.18
Illinois	1.86	Louisiana	1.06	Pennsylvania	1.96	**California (res)**	1.17
Connecticut	1.85	Virginia	1.05	North Dakota	1.95	Washington	1.15
Kansas	1.78	Colorado	0.96	Mississippi	1.94	Kentucky	1.14
Indiana	1.77	Tennessee	0.93	Iowa	1.94	Utah	1.05
South Dakota	1.75	Utah	0.92	Illinois	1.86	Arkansas	1.04
Mass.	1.74	North Carolina	0.87	Michigan	1.86	Colorado	1.03
Montana	1.67	Nevada	0.83	Ohio	1.85	Tennessee	1.02
Michigan	1.67	**California (ratio)**	0.81	Mass.	1.80	North Carolina	1.01
Minnesota	1.66	Arkansas	0.76	Montana	1.80	Nevada	0.90
Nebraska	1.65	Kentucky	0.73	South Carolina	1.79	**California (ratio)**	0.87
Florida	1.59	New Mexico	0.69	Florida	1.77	New Mexico	0.69
Ohio	1.57	Delaware	0.65	Nebraska	1.76	**California (rule)**	0.68
South Carolina	1.53	Alabama	0.64	South Dakota	1.75	Delaware	0.65
Alaska	1.50	**California (rule)**	0.64	Alaska	1.69	Alabama	0.64
Arizona	1.48	Hawaii	0.51	Minnesota	1.68	Hawaii	0.51
Maryland	1.45			Arizona	1.62		

*California appears three times in the distribution according the different imputation methods.

tax rate is 1.65 percent, 1.57 percent, and 1.49 percent, including California using the residential share imputation, the commercial assessment ratio imputation, and the 60 percent assessment rule imputation, respectively.

DETERMINANTS OF VARIATION IN EFFECTIVE PROPERTY TAX RATES

Table 3 shows the results of the basic cross section regression excluding California. These basic results include variables designed to capture the above theories — share of 65, assessment cycle, and share of school age children. Two additional variables are included as controls: the share of housing units that are owner-occupied, and the share of urban housing units. A lower share of owner occupied housing may allow for higher tax rates because, even though renters ultimately pay property taxes, those taxes are hidden in the rental price. Urban housing may benefit from economies of scale in the benefits used and thus require less tax revenue.[5] This initial base case excludes the imputed values for California.

As can be seen, the results for total effective tax rates are robust across different specifications of urban designation, except for the measures of the share of housing that is urban. The constant term

Table 3
Cross Section Regression on Total Effective Property Tax Rates Across 49 States and DC

Total ETR	*Urban 1**		*Urban 2***		*Urban 3****	
Variables	*coefficient*	*t stat*	*coefficient*	*t stat*	*coefficient*	*t stat*
Constant	-.0872821	-4.04	-.0851472	-3.73	-.0813012	-3.45
Share over 65	.0022146	4.80	.0020806	4.30	.0021309	4.19
Owner occupied housing	-.0161783	-1.24	-.0115238	-0.84	-.0115152	-0.80
Share housing urban	-.015015	-3.04				
Share housing urban areas			-.0082783	-1.98		
Share housing urban clusters					-.0092858	-0.82
Assessment cycle	-.000283	-1.57	-.000307	-1.61	-.0002403	-1.20
Share school age (5-19)	.2712033	4.11	.2408521	3.51	.2563397	3.44
1999 per capita income	1.72e-06	5.6	1.59e-06	4.74	1.05e-06	3.32

*R^2=0.49, adj. R^2=0.42; ** R^2=0.43, adj. R^2=0.35, *** R^2=0.39, adj. R^2=0.30

also suggests that in absence of the other factors the property tax would actually be a subsidy. There is no theoretical reason to assume that the effective property tax rates should be bounded at zero, particularly in the presence of other taxes.

Clearly the benefits view has some merit, as the share of school age children was positive and significant at high levels (over the standard 95 percent confidence level), suggesting a dominating factor for property taxes is to pay for schooling large populations of children.

An interesting result is the positive and highly significant effect of the share of elderly. Generally, large populations of elderly should reduce effective property taxes as they vote more and do not have children who would benefit from the taxes' use in paying for schools. However, there are a couple of possible reasons for the opposite result. First, many states give credits and other property tax relief, such as circuit breakers, to the elderly and therefore they may be willing to accept or even vote for higher property taxes knowing that they will not ultimately pay those taxes in full. Available data from the states made it difficult to account for this. Second, perhaps the ability to "vote with your feet" is not applicable for the elderly. That concept relies on a high degree of mobility and it may be that the elderly are not nearly as mobile as might be supposed by the "flying south" retirees phenomena suggests. Furthermore, the elderly may in fact be extremely immobile and unwilling to leave the homes they have finally paid off and therefore provide a relatively inelastic group of homeowners to tax. They also may be more likely to be immobile because change, particularly moving, is difficult and costly and they have families and longtime friends close by from which they would be unwilling to uproot. Lastly, the shares of elderly are not large and would not be likely to constitute the median voter.

With respect to the tax revolt concept, the assessment cycle is negative, which is consistent with the theory that longer assessment cycles would result in lower effective taxes in order to avoid tax revolts when the jump in taxes comes. This variable, however, is only weakly significant (hovering around the 90 percent confidence interval). Given the relative high frequency of annual assessments, this result suggests that, while assessment cycles may not be major contribution to the variation in effective tax rates, long assessment cycles may force officials to keep taxes low so as not to incite property owners when newly assessed property jumps in value and taxes.

As discussed earlier, there are biases in the data on total effective tax rates due to the inability to obtain the value of personal property in states that do not tax such property. Therefore the other option was to look only at effective tax rates on real property. Table 4 shows the results for the same regression analysis on the real effective property tax rates, excluding California.

As table 4 shows, the results are essentially the same. The key variables of the share of elderly, share of school age children, and the assessment cycle, while slightly less significant in exact values, are all significant at the same levels as with the results using total effective tax rates. Note,

Table 4
Cross Section Regression on Real Effective Property Tax Rates Across 49 States and DC

Real ETR	*Urban 1**		*Urban 2***		*Urban 3****	
Variables	*coefficient*	*t stat*	*coefficient*	*t stat*	*coefficient*	*t stat*
Constant	-.0724992	-2.96	-.0702408	-2.75	-.0669275	-2.61
Share over 65	.0018797	3.60	.0017585	3.25	.0018525	3.35
Owner occupied housing	-.0088155	-0.59	-.0044825	-0.29	-.0115152	-0.38
Share housing urban	-.0133207	-2.37				
Share housing urban areas			-.0064668	-1.38		
Share housing urban clusters					-.0142955	-1.16
Assessment cycle	-.0003081	-1.51	-.0003258	-1.53	-.0002493	-1.14
Share school age (5-19)	.2302343	3.08	.2030756	2.64	.2285806	2.83
1999 per capita income	1.44e-06	4.14	1.29e-06	3.42	7.67e-07	2.22

*R^2=0.35, adj. R^2=0.26; ** R^2=0.30, adj. R^2=0.20, *** R^2=0.29, adj. R^2=0.19

however, that the weakly significant owner occupied housing is no longer significant at reasonable confidence levels. The drop in effect is perhaps due to the owner occupied housing varying less as a share of real property across states.

Because the number of observations is only 50, and due to the variability in extremes of some of the variables, table 5 shows the results using Robust regression, which weights the observations to minimize the leverage of outliers (the weights are iterated for using both Huber weighting and biweighting). It is a useful check for the importance of outliers, when those outliers are not viewed as data error but appropriate valuable observations. Table 5 includes only the "share of urban" definition, as with the prior analysis the urban areas and urban clusters, did not appear to be as significant as the combined urban measure.

Most of the variables retain the same sign and essentially the same or higher level of significance. However, the sign on the assessment cycle has reversed. In both cases the level of significance is not so small as to be unconcerned with the sign. Previously, the assessment cycle was weakly significant and negative implying that longer assessment cycles depressed taxes to avoid revolts. The robust regression, by design, reduces the importance of outliers or observations with extreme deviations. It is these extremes that likely yielded the negative significant results in the first place. Only 14 states have an assessment cycle greater than a year and only a few of those have cycles longer than three or four years. It may be that for those states (the outliers) that have very long assessment cycles (one even has 22 years) the revolt scenario is an important consideration in determining the taxes. In the extreme, if the impact of those states were removed only the states with 1-, 2-, 3-, or 4-year cycles would be left and it may be that those cycles are simply not long enough to incite revolts but rather allow states to maintain higher tax rates as the population will not notice them as much because of the years of retarded assessment. In this case, the robust regression, by downplaying the importance of the revolt potential states, would find that slightly longer assessment cycles generally allow states to have higher property taxes. In either case, the results suggest that some of the variation in effective tax rates is due to differences in the assessment cycle.

These first cases were done excluding California because full data to adjust to 2000 market values was unavailable. However, because California is a major state, at least in its potential property values, the results were repeated for all measures of California values. Table 6 shows regression results on both total effective tax rates including the three different imputed measures of California for the standard OLS. As can be seen from the table, the inclusion of California does not alter the conclusions drawn above.[6]

One problem in determining the true effective tax rate for a given tax is accounting for important interactions between different tax systems. Many states have individual income taxes that vary in the rate brackets and structures. Because many states allow for real estate taxes to be deducted from income, a case can be made that the true effective tax rate on property is therefore lessened

Table 5
Robust Regressions for Total and Real Effective Tax Rates

	Total ETR		*Real ETR*	
Variables	*coefficient*	*t stat*	*coefficient*	*t stat*
Constant	-.1004496	-4.83	-.0810851	-3.44
Share over 65	.0025423	5.71	.0021698	4.30
Owner occupied housing	-.0167914	-1.32	-.0110968	-0.77
Share housing urban	-.0160991	-3.40	-.0148551	-2.77
Assessment cycle	.0004515	1.33	.0004952	1.29
Share school age (5-19)	.2979129	4.65	.2485336	3.42
1999 per capita income	1.85e-06	6.35	1.52e-06	4.59

Table 6
OLS Regression Results on Total ETR Including Three Measures of California Effective Property Tax Rates

Total ETR	*Imputed using Avg. Residential Shares*		*Imputed using Com/Ind Assessment Ratio*		*Imputed using 60% Assessment Ratio*	
Variables	*coefficient*	*t stat*	*coefficient*	*t stat*	*coefficient*	*t stat*
Constant	-.0868964	-4.04	-.086552	-3.95	-.0863501	-3.89
Share over 65	.0022161	4.83	.0022175	4.75	.0022183	4.69
Owner occupied housing	-.0146366	-1.14	-.01326	-1.01	-.012453	-0.94
Share housing urban	-.0155697	-3.20	-.016065	-3.24	-.0163553	-3.25
Assessment cycle	-.0002826	-1.58	-.0002823	-1.55	-.0002821	-1.53
Share school age (5-19)	.2661264	4.07	.2615933	3.94	.258936	3.84
1999 per capita income	1.72e-06	5.64	1.73e-06	3.95	1.73e-06	5.49

by the value of these deductions. Using real estate taxes listed by states from the Statistics of Income and assuming the top state income tax bracket, or in cases of credit the maximum allowable credit, effective tax rates were adjusted for the value of real estate tax deductions against state income tax. This measure is rough and assumes the amount of state deductions is equivalent to federal deductions and that those deductions are all valued at the highest tax bracket. However, as the results in tables 7 and 8 show, the basic conclusions for the determinants of variability in effective property tax rates across states are not significantly different.[7]

States' reliance on property taxes, and therefore their respective effective tax rates, could also depend on the states' reliance on other taxes revenue needs. Some states may have a larger ability to substitute property taxes with other state level taxes for local needs. In addition, states' equalization of the property tax, and thus school spending equalization, may have blurred the links between school spending and property taxes. To account for states' relative reliance on other major taxes, three indices for state sales taxes, income taxes, and corporate income taxes are included. The index is the ratio of the individual state's specific tax collections to the national average tax collections. Thus, states with above average sales, income, or corporate tax collections will have a value above one and states with no sales, income, or corporate tax collection will have a value of zero. Each type of tax index was included separately and also included together. Tables 9 and 10 show the results of including these measures under the OLS and robust regressions.

As can be seen in table 9, the fundamental conclusions regarding the impact of school age children and the elderly on effective property tax rates has not changed. The effects of the elderly and the school age population are still significant and positive. While not continually of high significance, the addition of other state taxes increased the significance of the effect of the assessment cycle in all specifications, with significance at standard levels in the full specification. The other state

Table 7
OLS Results on Real Estate Income Tax Deduction Adjusted Total and Real ETR for All Treatments of California

Total ETR	*Excluding California*		*Residential shares*		*Com/Ind Assessment Ratio*		*60% Assessment Ratio*	
Variables	*coefficient*	*t stat*	*coefficient*	*t stat*	*coefficient*	*t stat*	*coefficient*	*t stat*
Constant	-.0788177	-3.61	-.0784099	-3.61	-.0780892	-3.54	-.0778874	-3.48
Share over 65	.0020638	4.44	.0020654	4.46	.0020666	4.39	.0020674	4.33
Owner occupied housing	-.0173548	-1.31	-.0157295	-1.21	-.0144478	-1.09	-.0136408	-1.02
Share housing urban	-.0140486	-2.81	-.0146317	-2.98	-.0150928	-3.02	-.0153832	-3.04
Assessment cycle	-.0002427	-1.34	-.0002423	-1.34	-.000242	-1.32	-.0002418	-1.30
Share school age 5-19	.2527056	3.80	.247344	3.75	.2431235	3.63	.2404662	3.54
1999 per capita income	1.57e-06	5.08	1.58e-06	5.12	1.58e-06	5.05	1.58e-06	4.99

Table 8
Robust Regression Results on Real Estate Income Tax Deduction Adjusted Total and Real ETR for All Treatments of California

Total ETR	*Excluding California*		*Residential shares*		*Com/Ind Assessment Ratio*		*60% Assessment Ratio*	
Variables	*coefficient*	*t stat*	*coefficient*	*t stat*	*coefficient*	*t stat*	*coefficient*	*t stat*
Constant	-.0933261	-4.37	-.0935308	-4.49	-.0915028	-4.28	-.0913552	-4.19
Share over 65	.0024369	5.33	.0024263	5.44	.002392	5.22	.0023886	5.11
Owner occupied housing	-.0175964	-1.34	-.0152498	-1.21	-.0147953	-1.14	-.014453	-1.09
Share housing urban	-.0153513	-3.16	-.016082	-3.43	-.0161988	-3.36	-.0163109	-3.32
Assessment cycle	.0005304	1.52	.0005279	1.55	.0005086	1.46	.0005067	1.42
Share school age 5-19	.2808391	4.28	.2763339	4.33	.2706702	4.13	.26954	4.04
1999 per capita income	1.72e-06	5.75	1.74e-06	5.95	1.71e-06	5.70	1.71e-06	5.60

taxes themselves generally do not affect effective tax rates significantly. Not surprisingly, however, heavy reliance on state sales and income taxes has some tendency to reduce the reliance on property taxes, and therefore the effective property tax rates. These results were also consistent across the different measures of California property and for real ETRs.

The robust regression results in table 10 also reveal the same trend seen in previous analysis. In particular, the impact of the elderly and school is still significant and positive. The significance of the assessment cycle has declined and as with the previous analysis, which excluded other state taxes, the sign on the assessment cycle has changed.

Lastly, there is some possibility that the share of residential property may influence states' abilities to reduce taxes. States with a high share of businesses may be able to have lower taxes as businesses would not demand as many services as residents. Lack of adequate data made testing this hypothesis difficult. However, table 11 shows the results for the smaller sample of 27 states which provided data broken out into residential and nonresidential. Table 12 shows the effective tax rates and residential shares of the smaller sample.

As can be seen from table 11, the share of residential is not generally significant at standard confidence levels. This variable is only significant under the robust regression with no adjustments for income tax deductions of real estate taxes paid. It may also be interesting to note that the assessment cycle is generally weakly or very weakly significant, at or below the 90 percent confidence interval, but more importantly flips signs between the OLS and Robust regressions. Previously the assessment cycle effect was negative under the OLS but became positive under the robust regression, the results for this sample are the opposite. This change in the sign of the assessment cycle is most likely

Table 9

OLS Results Total ETR, Excluding California, Controlling for Other State Taxes

Total ETR	*Sales Tax Only*		*Income Tax Only*		*Corporate Tax Only*		*Full Specification*	
Variables	*coefficient*	*t stat*	*coefficient*	*t stat*	*coefficient*	*t stat*	*coefficient*	*t stat*
Constant	-0.08014	-3.76	-0.0868383	-4	-0.0871077	-4	-0.080687	-3.76
Share over 65	0.002179	4.87	0.0022344	4.82	0.0022283	4.8	0.002084	4.72
Owner occupied housing	-0.01735	-1.37	-0.0166245	-1.26	-0.0114229	-0.76		
Share housing urban	-0.01057	-1.98	-0.0149392	-3.01	-0.0137135	-2.56	-0.008240	-1.52
Assessment cycle	-0.00041	-2.18	-0.0002841	-1.57	-0.0003206	-1.69	-0.000493	-2.67
Share school age 5-19	0.258673	4.02	0.2658489	3.99	0.2600456	3.79	0.214525	3.48
1999 per capita income	0.0000015	5.07	0.000002	5.56	0.0000016	4.64	0.000002	4.64
Sales tax index	-0.00317	-1.92					-0.003190	-1.79
Income tax index			-0.0009379	-0.78			-0.001530	-1.27
Corporate tax index					0.0005728	0.66	0.000600	0.77

Table 10

Robust Regression Results Total and Real ETR, Excluding California, Controlling for Other State Taxes

Total ETR	*Sales Tax Only*		*Income Tax Only*		*Corporate Tax Only*		*Full Specification*	
Variables	*coefficient*	*t stat*	*coefficient*	*t stat*	*coefficient*	*t stat*	*coefficient*	*t stat*
Constant	-0.091389	-4.49	-0.100489	-4.74	-0.101922	-5.06	-0.090839	-4.78
Share over 65	0.0024683	5.73	0.0025346	5.59	0.0026178	6.05	0.0021591	5.32
Owner occupied housing	-0.017940	-1.45	-0.016064	-1.24	-0.006448	-0.46		
Share housing urban	-0.010692	-2.09	-0.016058	-3.33	-0.014618	-2.95	-0.009645	-2
Assessment cycle	0.0003723	1.13	0.0004344	1.25	0.0004194	1.27	0.0001294	0.43
Share school age 5-19	0.2817611	4.54	0.2947308	4.49	0.2772762	4.35	0.2489039	4.56
1999 per capita income	0.0000016	5.62	0.0000019	6.09	0.0000017	5.32	0.0000016	5.49
Sales tax index	-0.003428	-2.17					-0.003756	-2.38
Income tax index			-0.000442	-0.38			-0.002456	-1.99
Corporate tax index					0.0010753	1.35	0.0020213	1.91

Table 11

OLS and Robust Regression Results Including Residential Share Variable

Total ETR	*OLS no income tax adjustment*		*Robust no income tax adjustment*		*OLS income tax adjusted*		*Robust income tax adjusted*	
Variables	*coefficient*	*t stat*	*coefficient*	*t stat*	*coefficient*	*t stat*	*coefficient*	*t stat*
Constant	-.071594	-2.65	-.0604163	-4.33	-.0618294	-2.20	-.051904	-3.13
Share over 65	.0019652	2.75	.0025067	6.81	.0016915	2.28	.0022932	5.24
Owner occupied housing	-.0299513	-1.50	-.015504	-1.51	-.0274459	-1.32	-.0145306	-1.19
Share housing urban	-.0131029	-1.68	-.008383	-2.08	-.0130299	-1.60	-.0091103	-1.19
Assessment cycle	.0005957	1.13	-.0004103	-1.51	.0007048	1.29	-.0002422	-0.75
Share school age 5-19	.2789804	3.07	.1868387	3.98	.2505093	2.64	.1654679	2.97
1999 per capita income	1.16e-06	2.10	6.38e-07	2.25	1.15e-06	2.00	6.50e-07	1.93
Share residential	.0054567	.057	.009716	1.95	.0015725	0.16	.0056318	0.95

Table 12
Total and Real Effective Tax Rates and Residential Shares for Limited Sample

State	*Total ETR*	*Residential Share of Total Property*	*Real ETR*	*Residential Share of Real Property*
Alabama	0.64%	62.11%	0.64%	68.05%
Colorado	0.96%	74.92%	1.03%	80.32%
Connecticut	1.85%	67.59%	2.17%	79.20%
District of Columbia	1.35%	54.68%	1.35%	54.68%
Idaho	1.18%	50.40%	1.28%	54.83%
Illinois	1.86%	68.46%	1.86%	68.46%
Iowa	1.94%	52.96%	1.94%	52.96%
Kansas	1.78%	62.54%	1.98%	69.47%
Louisiana	1.06%	42.68%	1.44%	57.86%
Massachusetts	1.74%	78.69%	1.80%	81.45%
Michigan	1.67%	66.39%	1.86%	73.88%
Minnesota	1.66%	65.34%	1.68%	66.30%
Mississippi	1.44%	35.83%	1.94%	48.46%
Missouri	1.28%	60.00%	1.46%	74.08%
Montana	1.67%	46.94%	1.80%	50.51%
Nebraska	1.65%	45.38%	1.76%	48.41%
New Hampshire	2.69%	72.87%	2.69%	72.87%
North Dakota	1.95%	37.33%	1.95%	37.33%
Ohio	1.57%	57.88%	1.85%	68.36%
Oregon	1.16%	41.92%	1.19%	50.81%
South Carolina	1.53%	39.99%	1.79%	46.89%
Tennessee	0.93%	59.51%	1.02%	65.36%
Texas	2.01%	49.86%	2.45%	60.80%
Utah	0.92%	38.17%	1.05%	65.83%
Vermont	1.93%	66.36%	1.97%	68.68%
Wisconsin	1.95%	67.46%	2.01%	69.64%
Wyoming	1.19%	43.52%	1.38%	49.14%

due to the particulars of the small sample. As noted earlier, the robust regression weights observations to reduce the effect of outliers. It may be that the states in this sample are similar to the weighted full sample in the robust regressions. In fact, the states with extremely high assessment cycles are not included in this sample. The other variables of interest — share of elderly and share of children — are still significant in the smaller sample and have the same predicted effect across the specifications.

CONCLUSION

Many challenges exist in obtaining data needed to research the effects of property tax. States vary significantly in the forms of property they do and do not tax, data they collect, and timing and rates of assessment of property for tax purposes. This essay used data collected from all of the states, adjusting for assessment practices to obtain a database of market values of property and subsequently effective property tax rates across the 50 states. Effective tax rates ranged from 0.5 percent to 2.6 percent. These data were used to estimate the major determinants of variation in effective tax rates across the states, focusing on common theories for taxes.

There are general theories that can be used to explain why taxes may vary. One theory is to fund different levels of benefits, because of differences in the median votes or consequences of voting with your feet. All of these can apply as potential

explanations for variations in effective property tax rates across the states. However, in addition to these, differences in timing of assessment may be linked with potential tax revolts and restrict states' ability to tax property.

The property tax, as suspected, is generally a benefits tax designed to pay for schools. The perhaps surprising sign on the share of elderly suggest that they do not act as median voters and therefore do not hold sway over taxes. Moreover, a higher share of immobile elderly may provide a relatively inelastic base on which to tax, provided some relief is allowed. These results were robust across a number of specifications. There is some question as to the impact of assessment cycle and the results are not consistent. Under some specifications, longer cycles were found to increase effective tax rates with weak significance and under others found to decrease effective tax rates with weak significance. In general, the results suggest that the assessment cycle may matter to some extent in a non-monotonic fashion, but is not a dominant factor. In fact, it may be that extremely long cycles lead to tax revolts reducing effective tax rates but slightly longer cycles, perhaps two to three years, allow states to tax property unawares.

Notes

[1] States vary in the definition of tax year; values are used as close to 1/1/2000 as possible. Therefore, 1999 data were used when assessment fell late in the year, for example, October assessment deadlines.

[2] The rule of thumb value was obtained based on conversations with California property tax researchers.

[3] Many states have annual assessment cycles but do not physically inspect property annually but do adjust the property values for the tax cycle. In addition to the general assessment rates, many states offer a variety of other exemptions or reductions in the valuation of property, such as agricultural or historical use.

[4] In one observation the data available did not separate real and personal property.

[5] According to the census, urban areas generally consist of a large central place and adjacent densely settled census blocks that together have a total population of at least 2,500 for urban clusters, or at least 50,000 for urbanized areas. These measures are a subset of the general measure of urban.

[6] Results are robust against California values for real ETRs and using robust regression estimation.

[7] Results are robust for measures using real ETRs.

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