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How Do Cities and Counties Respond to Changes in Their Property Tax Base?

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Abstract: Over the past decade, the per capita property tax bases of local governments have experienced large upward and downward movements as the result of the boom and bust in real estate markets. This paper provides some evidence on how local governments balance their budgets as their tax base changes. The results suggest that millage rates are adjusted in an attempt to stabilize property tax revenues. The millage rate offset is nearly complete for counties, but less than complete for cities. Cities alter selected expenditures to keep total expenditures in line with total revenues.

Keywords: Local government budgets, Property tax base

JEL Codes: H11, H72

1. INTRODUCTION

Because of the heavy reliance on property tax revenue by local governments, there has been considerable interest in how these governments have responded to recent large upward and downward swings in real estate values. Changes in these values cause corresponding changes in per capita property tax bases, which force local governments, in light of balanced budget laws, to respond in one or more of the following manners: 1) change the millage rate in the opposite direction from the change in the tax base in order to maintain property tax revenues at current levels, 2) institute policies that will result in changes in other sources of revenue to offset the change in property tax revenue, and 3) change expenditures to match the change in revenues. If expenditures are changed the decision must be made whether an across the board or discretionary change will occur, and if it is the latter which specific expenditures are to be altered. What response or combination of responses is taken may alter the impact a local government has on the welfare of its citizens by income class. For example, there may be a change in the regressivity of local taxes or in the distribution of public service benefits. There may also be other consequences, such as changes in the relative tax burdens and service provision between commercial and residential property owners. In the long run, how local governments respond to changes in their property tax base in the short run may alter the attractiveness of the community to different groups. In light of all of these possible consequences, it would be useful to know the elasticity of revenue by category, expenditure by category, and millage rate with respect to the per capita property tax base. Estimating these elasticities, however, has been limited by the available data. Generally, states do not collect detailed budgetary data from their local governments, and when they do there is still the problem of matching these data to property tax

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roll data, which may be available at the county level but seldom at the city level. Moreover, to control for unobserved heterogeneity across jurisdictions, obtaining reliable elasticity estimates probably necessitates the use of panel data, so the collection of the requisite data must cover a sufficient number of years to estimate two–way (place and time) fixed effects models.

Because of its strong open records laws, the state of Florida is well known for providing a relatively rich array of publicly available data bases. Two of these data bases allowed me to build a unique 15-year panel, separately for counties and cities, that I use in this paper to estimate revenue, expenditure, and millage-rate elasticities with respect to the per capita property tax base. Two–way fixed-effects models are estimated to obtain these elasticities. Two sets of models are estimated. In the first set the assumption is made that estimated elasticities are invariant to whether the per capita tax base is moving upward or downward. In the second set, elasticities are allowed to vary with the direction of the tax base change.

This paper is organized as follows. In the next section the literature is reviewed that has focused on the local fiscal effects of changes in real estate values. The central difference between these earlier studies and the present study is that they have focused only on the values of single–family homes, while I relate changes in the assessed value of all properties on the tax roll to city and county budgets. Studies that focus on the fiscal impact of changing housing values tend to be case studies, yielding findings that may not be generally applicable, because the impact that movements in housing values has on assessed values varies widely across communities, as the result of differences in assessment lags, caps, and other types of property tax limitations. In Section 3 the data are described. Section 4 presents an overview of how city and county expenditures and revenues broken down by functional category have changed over the course of my 15 year panel. Section 5 describes the two–way fixed-effects models that are estimated in order to obtain the desired elasticities. Sections 6 and 7 present the estimated revenue, expenditure, and millage rate elasticities for cities and counties, respectively. Section 8 summarizes my findings and offers some suggestions for future research.

2. LITERATURE REVIEW

In light of the attention that has been given to the house price boom and subsequent crash that occurred over the past decade, it is not surprising that a number of studies have investigated the impact that the boom (and in some studies the crash) had on the budgets of local governments. The first study by Lutz (2008) uses both national data (source: Census Bureau's State and Local Government Finance Data) and jurisdictional level data (source: State and Local Government Finance Data) to estimate in separate regressions the elasticity of property tax revenue with respect to house prices (source: OFHEO, which is now FHFA). Both regressions yield similar results and suggest that the elasticity is roughly 0.4 and that it takes about three years for house price increases to begin to impact tax revenues. The 0.4 elasticity estimate implies that policymakers offset 60 percent of the revenue increase that would have occurred from rising house values by reducing effective tax rates. This inference is not suggested by evidence on actual changes in millage rates. The reason for the lagged response is not investigated, but the author suggests that it is likely due to delays in bringing assessed values into line with market values and caps and other types of limitations on the tax that exist in many places throughout the nation. Lending support to the empirical strategy that I have adopted, Lutz notes that "There is significant heterogeneity in the administration of the tax across jurisdictions—a bewildering array of different institutional features" (p. 558).

Following Lutz there have been four more recent studies that have investigated the impact that changing housing values have on local budgets. All four studies reach the same conclusion; namely, that the recent run–up and subsequent crash in housing values has had little effect on these budgets. Without exception, the stability of the revenues it generates is lauded as an important advantage of local governments' reliance on the property tax.

In a follow–up study to his earlier work, Lutz, Molloy, and Shan (2011) conduct two analyses: the first examines how decreases in housing values affect local government tax revenues and the second examines the relationship between housing market deflation and state tax revenues. Hence, while the focus in Lutz's first paper was on the budgetary implications of rising house values, in the second paper the interest is in the effects of the housing crash on state and local government revenues. Most pertinent to the present study are the results Lutz et al. obtain from conducting their first analysis. Using the same Census data and methodology that Lutz used in his earlier work, they find that property tax revenues do not tend to decrease following house price declines. They explain their result positing the same hypothesis that Lutz advanced in his first paper; namely, that there is resilience in property tax receipts because there are significant lags between changes in market and assessed values and policymakers tend to offset declines in the tax base by raising millage rates.

Using data on California cities, Vlaicu and Whalley (2011) reach very different conclusions than Lutz, Molloy, and Shan, in that they find that changes in housing prices strongly affect property tax revenues. This is a surprising finding due to the provisions of California's Proposition 13, which place a hard cap on the tax rate as well as on assessed value appreciation. Using a two–way fixed effects model, they regress property tax revenue per capita in city *i* in year *t* on average house price in city *i* in year *t-2*. House price is instrumented to control for possible endogeneity resulting from high public service expenditures attracting population into the jurisdiction and thereby driving up housing prices. Their results show an elasticity of 0.74, which is not found to be significantly different from one. They explain their large estimated elasticity by first noting that under Proposition 13 the adjustment of property tax revenue to housing market conditions occurs through the reassessment of residential property transactions to current market prices. They hypothesize that an acceleration in transactions occurred during the housing boom and that this is what explains the strong relationship they find between tax revenues and housing values. Interestingly, while they find housing prices strongly affect property tax revenues, they do not find an effect on total revenue or total expenditure. Their results suggest that changes in housing values reduce other taxes that largely offset the increase in property tax revenue. To explain their results, they hypothesize that cities respond to revenue windfalls (both positive and negative) by altering non–property tax rates, but they do not provide any evidence in support of this hypothesis.

The results of two additional studies support the findings of Lutz (2008) and Lutz, Molloy, and Shan (2011) and contradict those of Vlaicu and Whalley (2011). Doerner and Ihlanfeldt (2011) use panel data on Florida cities to estimate two–way fixed-effects models that relate revenues per capita within specific categories to a repeat sales housing price index constructed separately for each city. Housing prices are found to affect total revenues through a number of pathways, such as new construction, assessed values, millage rates, and revenues coming from sources other than ad valorem taxes. While the strongest pathway is through assessed values, they find that changes in housing prices are only weakly related to a city's property taxes. Over all of the pathways, they also find that housing prices have little effect on total city revenue per capita. They explain these findings by noting that Florida has an assessment cap law that allows increases in assessed values of only three percent or the rate of inflation, whichever is lower. Moreover, there is a catch–up provision in the law that allows increases in assessed values as long as the assessed value is less than the market value, even if market values are falling.

The final study is by Alm, Buschman, and Sjoquist (2011). They use data from the U.S. Census Bureau Quarterly Summary of State and Local Government Tax Revenue to demonstrate that there is considerable heterogeneity across communities in the impact that housing values have on property tax revenues, but that substantial numbers of local governments, at least thus far, have avoided any budgetary impact from declining house values. They also provide evidence from school districts in Georgia which supports Lutz's assertion that local governments frequently offset property tax revenue changes that would have occurred from changing house values by changing the millage rate in the opposite direction.

The above findings, especially those of Alm, Buschman, and Sjoquist, help motivate the current study by showing that the impact of changes in housing values on local budgets varies across the states and local communities. This is not at all surprising, given that assessment laws and practices vary and the latter define the relationship that will exist between house value and assessed value. For example, where there are assessment lags or assessment caps or where local tax assessors "smooth" or work less hard to keep assessed values in line with market values, there will be a weaker relationship between changes in housing values and changes in local budgets. Instead of focusing on housing values, I focus directly on the property tax base per capita and address the question how do local governments respond to changes in their tax bases brought on by changes in real estate values.[1] After all, it has not only been housing values that have boomed and burst, but commercial real estate has also experienced large swings in value over the past decade that mimic the changes that have occurred in single–family housing markets.[2] The relative importance of residential and commercial changes in value on local budgets will depend on the contribution that each makes to the local property tax base. In my data on Florida cities and counties, the tax base is, on average, about half residential value and half commercial value for both types of local governments. By focusing on the impact of the property tax base, I avoid having to deal with the varying relationships that may exist between market values and assessed values across communities and I study the variable that local policymakers actually must respond to, which is their tax base (and not housing values). Perhaps more importantly, however, unlike previous work, I investigate how each revenue and expenditure category, as well as the millage rate, is impacted by upward and downward movements in a community's property tax base per capita. I seek to uncover not only whether millage rates, total revenues, and total expenditures are affected, but the types of revenues and expenditures that are most affected.

[1] The property tax base can change as a result of changes in values or changes in the amount of improvements being valued. The latter can increase from the addition of new homes, commercial buildings, and improvements to existing property and decrease from demolitions. Changes in improvements are highly correlated with changes in population. Hence, by dividing the tax base by population and calculating the change, a measure of the change in values is obtained.

[2] The Moodys/REAL Commercial Property Price Index (CPPI) shows commercial property values almost doubling between January 2001 and January 2008. The Case/Schiller House Price Index (CSI) shows housing values increasing 74 percent over the same time period. Since 2008, the CPPI shows commercial values returning to their 2001 levels. The CSI shows that the post–crash change in housing values has left these values about 15 percent higher than they were in 2001.

3. DATA

This study relies on two sources of data: the Florida Department of Financial Services (FDFS) City and County Annual Financial Reports and the Florida Department of Revenue (FDOR) Annual County Property Tax Rolls. The FDFS data come from budgetary data that each city and county is required to submit after each fiscal year (s. 218.32, F.S.). In these reports, local governments are required by the FDFS to list aggregate amounts for various sets of defined revenue sources and expenditure categories. These categories, of which there are nine for revenues and eight for expenditures, are defined in Tables 1 and 2, respectively. The FDFS data cover the years 1994-2009.

The FDOR dataset comprises county tax rolls from each of Florida's 67 county property appraisers. Annual preparation is required by statute (s. 193.114, F.S.) and supervised by the FDOR (s. 195.002, F.S.). Tax rolls are collected for the purpose of monitoring the performance of county tax assessors. Spanning the years from 1995 to 2009, these rolls align with the FDFS data by year and across jurisdictions. Two crucial tasks are accomplished with these rolls. First, each individual parcel on a roll has a tax authority code that can place it within a city or unincorporated portion of a county. The tax authority codes identify local jurisdictions according to fiscal boundaries. Postal addresses are much less accurate for fiscal purposes. Second, by aggregating across the assessed values of all properties located within a particular city or county, we obtain the annual size of its property tax base.

I use the FDFS and the FDOR data to construct four datasets—a balanced and an unbalanced panel of 15 years, one each for cities and counties. The balanced panel for cities (counties) includes 197 cities (63 counties) that have no missing values for any of the years. The unbalanced panel includes all year/jurisdiction observations, regardless of whether a city or county has missing values for a particular year. The balanced panels are used below to follow

TABLE 1. Revenue Categories

Revenue Category	Examples/Description
(1) Ad Valorem Taxes	Property value taxes
(2) General Government Taxes	Local option sales taxes, utility service taxes, local business taxes and franchise fees
(3) Intergovernmental Transfers	Federal and state grants, state revenue sharing
(4) Local Grants	Grants from other governmental reporting entities to be used for specific purposes
(5) Service Charges	Reflects all revenues stemming from charges for current services
(6) Licenses and Permits	Franchise fees, building permits
(7) Fines and Forfeitures	Fines and penalties; forfeitures include proceeds from the sale of property seized by law enforcement agencies
(8) Other Sources	Revenues from a constitutional fee officer including payment for goods provided or services performed
(9) Miscellaneous	Impact fees, rents and royalties, contributions and donations

TABLE 2. Expenditure Categories

Expenditure Category	Major Accounts Within Category
(1) General Government Services	Legislative, Executive, Financial and Administrative, Legal, Comprehensive Planning
(2) Public Safety	Law Enforcement, Fire Control, Detention and Correction, Protective Inspections, Ambulance and Rescue
(3) Physical Environment	Utilities, Garbage and Solid Waste, Sewer and Wastewater
(4) Transportation	Roads and Streets, Airports, Mass Transit
(5) Economic Environment	Industry Development, Housing and Urban Development
(6) Human Services	Hospital and Health Services, Public Assistance Services
(7) Culture/Recreation	Libraries, Parks and Recreation
(8) Other Uses	Interfund Transfers Out, Transfer Out from Constitutional Fee Officers

the same set of jurisdictions over time to produce mean statistics describing their budgets. The use of the unbalanced panels for this purpose may have resulted in mean expenditures or mean revenues changing from year to year due to differences in the composition of the sample. In estimating the millage rate, revenue, and expenditure elasticities the unbalanced panel datasets are used to maximize the number of observations. Dropping a city or county entirely from the regression analysis because one year of data is missing would be throwing out useful information thereby reducing the efficiency of the estimated elasticities.

4. A PRELIMINARY LOOK AT THE DATA

Tables 3, 4, and 5 use the balanced panel for cities to show how the budget of the average city has changed over the course of the panel. Tables 6, 7, and 8 use the balanced panels for counties to provide identical information for the average county. Shown in Column 1 of Table 3 is the average city's real property tax base per capita in 2009 dollars. The base increased dramatically (up 114 percent) and monotonically from 1995 to 2007 and then fell by 17 percent between 2007 and 2009. In year 2007, real estate values peaked in Florida. Other columns show that real per capita property tax revenue, real per capita total revenue, and real per capita total expenditure followed the same up and down movements as the tax base. Interestingly, despite the considerable growth that occurred in the tax base between 1995 and 2007, the mean millage rate also went up over this period, until 2006, when the state mandated a rollback in property taxes. Since the rollback, the millage rate has trended back upward.

Table 4 shows the real per capita amount of each of the nine revenue categories for selected years of the panel. Between 1995 and 2007 there was a tremendous increase (89 percent) in real property tax revenue per capita. Between 2007 and 2009, this revenue shrunk by nine percent. However, property taxes as a share of total revenue are higher in 2009 than in any

TABLE 3. Florida City Budget Data [a]

Year	Real Property Tax Base Per Capita ($1,000)	Real Property Tax Revenue Per Capita	Millage Rate	Real Expenditure Per Capita	Real Revenue Per Capita
1995	61.98	269	4.696	1,723	1,930
1996	62.08	268	4.628	1,795	1,999
1997	62.44	263	4.658	1,809	2,101
1998	63.25	271	4.760	1,851	2,067
1999	66.27	277	4.832	1,886	2,159
2000	69.86	278	4.897	1,920	2,155
2001	75.29	291	4.852	1,952	2,013
2002	80.62	316	4.907	2,075	2,130
2003	88.17	339	4.935	2,166	2,421
2004	96.38	361	4.969	2,224	2,494
2005	108.41	394	4.926	2,288	2,708
2006	128.67	441	4.771	2,424	2,784
2007	132.50	506	4.262	2,488	2,915
2008	124.77	471	4.400	2,433	2,343
2009	109.26	462	4.661	2,387	2,452

[a] Values expressed in 2009 dollars. Balanced panel of 197 cities.

TABLE 4. City Means of Revenue Per Capita by Source of Revenue [a]

	1995	2000	2005	2007	2009
Ad Valorem Taxes	269	278	394	509	462
	(15.8)[b]	(14.7)	(16.1)	(19.1)	(20.9)
General Government Taxes	230	258	279	208	222
	(15.4)	(14.4)	(12.7)	(8.7)	(10.6)
Intergovernmental Transfers	167	173	290	230	189
	(10.8)	(10.2)	(12.4)	(9.4)	(8.8)
Local Grants	9	13	23	34	21
	(0.4)	(0.8)	(0.9)	(1.2)	(0.9)
Service Charges	718	734	822	867	890
	(33.0)	(31.0)	(27.7)	(27.1)	(32.0)
Licenses and Permits	35	45	64	132	132
	(2.1)	(2.3)	(2.7)	(5.5)	(6.6)
Fines and Forfeitures	20	24	18	16	16
	(1.4)	(1.3)	(0.8)	(0.6)	(0.7)
Other Sources	225	287	440	420	306
	(10.1)	(11.7)	(14.0)	(12.8)	(11.7)
Miscellaneous	244	325	356	481	198
	(10.9)	(13.7)	(12.6)	(15.4)	(7.6)
Total Revenue	1,930	2,155	2,708	2,915	2,452

[a] Values expressed in 2009 dollars. Balanced panel of 197 cities.
[b] The amount as a percentage of total in parentheses.

other year, standing at 20.9 percent. At the beginning of the panel this percentage is 15.8 percent. An increase in property tax revenue as a share of total revenue implies that one or more of the other revenue categories must have shrunk as a share of total revenue. The one stand out category in this regard is General Government Taxes which decreased in share from 15.4 percent in 1995 to 8.7 percent in 2007. The taxes comprising this category are local option sales taxes and utility service taxes.

Besides the growth in property taxes, other categories of revenue also showed substantial growth between 1995 and 2007; particularly, Intergovernmental Revenue (up 38 percent), Licenses and Permits (up 277 percent), Miscellaneous Revenue (up 97 percent), and Other Sources of revenue (up 87 percent). Except for Licenses and Permits, all of these revenue categories experienced substantial losses between 2007 and 2009. Total revenue per capita increased 51 percent between 1995 and 2007 (from $1,930 in 1995 to $2,915 in 2007), and then declined by 16 percent to $2,452 in 2009. What the numbers in Table 4 clearly show are the following facts: 1) there has been tremendous growth in city government, 2) this growth has been financed by multiple sources of revenue and not just property taxes, and 3) the crash in real estate markets caused a nontrivial shrinkage of local government after 2007.

Table 5 shows the real per capita amount of each of the eight expenditure categories for the same years as displayed in Table 4. All categories experienced significant growth between 1995 and 2007, with the exception of Human Services which remained remarkably constant. Most of the expenditure categories show declines after 2007. As expected, movements over time in total expenditures match those that occurred in total revenues. What is most remarkable about the numbers in Table 5 is that each expenditure category holds essentially its same share of total expenditure (shown in parentheses under the per capita amount) throughout the panel. While the total revenue pie may get larger or smaller over time, the slice of the pie given to each type of

TABLE 5. City Means of Expenditures Per Capita by Type of Expenditure [a]

	1995	2000	2005	2007	2009
General Government	329	350	458	517	495
	(20.3)[b]	(19.2)	(20.4)	(20.8)	(20.5)
Public Safety	384	429	514	547	528
	(25.4)	(25.0)	(25.2)	(24.3)	(25.0)
Physical Environment	558	577	688	708	717
	(28.7)	(27.3)	(27.6)	(26.3)	(27.5)
Transportation	124	149	164	187	166
	(8.6)	(8.7)	(8.2)	(8.5)	(7.9)
Economic Environment	33	32	37	50	52
	(1.6)	(1.2)	(1.4)	(1.8)	(1.8)
Human Services	17	12	14	14	14
	(0.9)	(0.6)	(0.5)	(0.5)	(0.5)
Culture/Recreation	109	139	153	191	161
	(6.6)	(7.5)	(6.9)	(7.5)	(7.2)
Other Uses	169	230	256	272	253
	(7.9)	(10.3)	(9.7)	(10.1)	(9.5)
Total Expenditures	1,723	1,920	2,288	2,488	2,387

[a] Values expressed in 2009 dollars. Balanced panel of 197 cities.
[b] The amount as a percentage of total in parentheses.

expenditure remains pretty much the same. This suggests that in response to changes in revenues cities tend to adopt across the board percentage raises or cuts.

Turning to the county government tables, Table 6 shows that the average county's intertemporal movements in the tax base, property tax revenue, millage rate, total revenue, and total expenditure match those observed for the average city, with growth across the board until 2007 and declines thereafter. The major difference between the average county and the average city is not in any of the trends but rather the facts that the county, in comparison to the city, has for all years, 1) a tax base that is only about two-thirds the size of the city's and 2) a millage rate that is about four times larger than the city's. Because the county's smaller base is offset by a higher millage, there is little difference between property tax revenue per capita between the county and the city. The county means by revenue category are reported in Table 7. The average county, like the average city, experienced a tremendous increase in property tax revenue per capita, growing 121 percent between 1995 and 2007. Also like the average city, the average county experienced large increases in many of the other revenue categories.

The final table for counties, Table 8, displays the expenditure means by category. Here are found some differences in comparison to what was reported for cities in Table 5. For the average city there was one expenditure category that did not grow between 1995 and 2007—Human Services. In the case of the average county, all expenditure categories experienced considerable growth over this period, including Human Services (up 48 percent). A second difference is that the expenditure categories as a share of total expenditures are less stable over time for the average county than for the average city. In particular, for the average county, the General Government share has declined (from 23.0 percent in 1995 to 17.6 percent in 2009), while the Public Safety share has increased (from 22.4 percent in 1995 to 25.9 percent in 2009).

TABLE 6. Florida County Budget Data [a]

	Real Property Tax Base Per Capita ($1,000)	Real Property Tax Revenue Per Capita	Millage Rate	Real Expenditure Per Capita	Real Revenue Per Capita
1995	27.93	237	17.700	949	990
1996	28.74	242	17.717	1019	1057
1997	30.35	246	17.963	1023	1050
1998	31.54	258	17.763	1079	1172
1999	33.44	270	17.271	1129	1210
2000	35.53	282	17.095	1195	1273
2001	38.77	287	17.138	1269	1335
2002	42.20	311	16.969	1383	1418
2003	47.02	332	18.629	1461	1488
2004	53.80	361	16.567	1479	1558
2005	64.98	394	15.581	1590	1760
2006	81.27	449	14.867	1756	1913
2007	85.53	523	13.908	1906	2008
2008	81.47	508	14.030	1888	1923
2009	72.16	506	14.525	1884	1890

[a] Values expressed in 2009 dollars. Balanced panel of 63 counties.

TABLE 7. County Means of Revenue Per Capita by Source of Revenue [a]

	1995	2000	2005	2007	2009
Ad Valorem Taxes	237	282	394	523	506
	(24.8) [b]	(23.2)	(22.9)	(26.4)	(27.6)
General Government Taxes	81	111	134	130	132
	(8.8)	(9.1)	(8.0)	(6.8)	(7.3)
Intergovernmental Transfers	157	200	310	328	333
	(17.1)	(17.4)	(19.3)	(17.5)	(18.2)
Local Grants	2	3	7	10	8
	(0.2)	(0.2)	(0.4)	(0.5)	(0.4)
Service Charges	177	212	282	301	322
	(16.4)	(15.3)	(15.2)	(14.2)	(16.5)
Licenses and Permits	9	13	23	25	66
	(0.9)	(1.0)	(1.3)	(1.3)	(3.8)
Fines and Forfeitures	14	14	12	16	13
	(1.5)	(1.2)	(0.8)	(0.8)	(0.7)
Other Sources	227	311	453	465	421
	(21.9)	(23.4)	(25.2)	(22.9)	(21.9)
Miscellaneous	81	113	121	184	63
	(8.2)	(9.2)	(6.9)	(9.4)	(3.5)
Total Revenue	990	1,273	1,760	2,008	1,889

[a] Values expressed in 2009 dollars. Balanced panel of 63 counties.
[b] The amount as a percentage of total in parentheses.

TABLE 8. County Means of Expenditures Per Capita by Type of Expenditure [a]

	1995	2000	2005	2007	2009
General Government	209	219	285	325	325
	(23.0) [b]	(18.8)	(18.0)	(17.1)	(17.6)
Public Safety	202	272	394	447	474
	(22.4)	(23.5)	(25.5)	(24.1)	(25.9)
Physical Environment	98	111	168	175	192
	(10.0)	(9.1)	(10.1)	(8.6)	(9.6)
Transportation	123	143	192	292	251
	(13.1)	(12.5)	(12.5)	(15.8)	(13.7)
Economic Environment	25	37	52	72	55
	(2.8)	(3.2)	(3.3)	(3.8)	(2.9)
Human Services	54	68	74	80	85
	(5.0)	(4.5)	(4.1)	(3.6)	(3.8)
Culture/Recreation	31	42	62	83	77
	(3.3)	(3.5)	(3.8)	(4.4)	(4.2)
Other Uses	206	266	321	381	374
	(20.4)	(21.6)	(19.9)	(19.7)	(19.3)
Total Expenditures	949	1,195	1,590	1,906	1,884

[a] Values expressed in 2009 dollars. Balanced panel of 63 counties.
[b] The amount as a percentage of total in parentheses.

5. ESTIMATED MODELS

Using the unbalanced 15-year panels for cities and counties, I estimate two-way (jurisdiction and year) fixed effects models to relate the property tax base per capita to the millage rate, revenues by category and expenditures by category. The estimated millage rate equation is:

(1) $$M_{i,t} = \alpha_i + \gamma_t + \beta_0 Base_{i,t-1} + \beta_1 Income_{i,t} + \varepsilon_{i,t}$$

The estimated revenue equations are:

(2) $$R^j_{i,t} = \alpha_i + \gamma_t + \beta_0 Base_{i,t-1} + \beta_1 Income_{i,t} + \varepsilon_{i,t}$$

The estimated expenditure equations are:

(3) $$E^j_{i,t} = \alpha_i + \gamma_t + \beta_0 Base_{i,t-1} + \beta_1 Income_{i,t} + \varepsilon_{i,t}$$

where *M* is the natural log of the millage rate of the city (county); R^j is the natural log of the per capita amount of the *j*th revenue category; E^j is the natural log of the per capita amount of the *j*th expenditure category; α_i is a vector of city (county) fixed effects and γ_t is a vector of year fixed effects; *Base* is the natural log of the property tax base per capita of the *i*th city (county); and *Income* is the natural log of the per capita income of the *i*th city (county). By expressing all variables in logs, the estimated coefficients can be interpreted as elasticities.

The expenditure and revenue amounts are for fiscal years that begin on October 1 and end the following calendar year on September 30. The calendar year at the end of the fiscal year defines the fiscal year. Hence, the 2002 expenditures are for outlays that occur from October 1, 2001, to September 30, 2002. Fiscal year expenditures are based on the property tax base as of January 1 of the calendar year when the fiscal year begins. For example, 2002 expenditures are based on the tax base of January 1, 2001. Hence, the property tax base is lagged one year in the estimated models.

Note that the estimated equations include per capita income as a control variable. This variable is included in Equations (1) and (3) because it varies over time and registers changes in the overall demand for public services as well as changes in the composition of public service demands. While other variables may also affect the demand for public services, to the extent that these factors are time–invariant, their influence is captured by the fixed effects. In the case of Equation (2), per capita income is included because it may affect all of the revenue sources to varying degrees. In particular, sales tax revenues depend on income because of its correlation with consumption levels.

To permit an increase in the tax base to have a different effect from a decrease in the tax base, Equations (1), (2), and (3) are modified to allow for asymmetric effects:

(4) $$M_{i,t} = \alpha_i + \gamma_t + \beta_0 Base_{i,t-1} + \beta_1 Income_{i,t} + \beta_2 Base_{i,t-1} \times Up_{i,t-1} + \beta_3 Up_{i,t-1} + \varepsilon_{i,t}$$

(5) $$R^j_{i,t} = \alpha_i + \gamma_t + \beta_0 Base_{i,t-1} + \beta_1 Income_{i,t} + \beta_2 Base_{i,t-1} \times Up_{i,t-1} + \beta_3 Up_{i,t-1} + \varepsilon_{i,t}$$

(6) $$E^j_{i,t} = \alpha_i + \gamma_t + \beta_0 Base_{t-1} + \beta_1 Income_{i,t} + \beta_2 Base_{i,t-1} \times Up_{i,t-1} + \beta_3 Up_{i,t-1} + \varepsilon_{i,t}$$

where $Up_{i,t-1} = 1$ if $Base_{i,t-1} - Base_{i,t-2} > 0$ and $Up_{i,t-1} = 0$ if $Base_{i,t-1} - Base_{i,t-2} < 0$. [3]

[3] In estimating the asymmetrical models, the issue arises whether there is sufficient upward and downward movement in the tax base to identify possible asymmetric effects. For cities, Up is equal to 1 for 89 percent of the cases, resulting in 373 observations

A number of specification issues arise in estimating the models presented in this section. First, there is the issue of whether the per capita amounts should be expressed in real or nominal values. Because year fixed effects are included in all estimated models and these effects register changes in general price levels, the per capita amounts are expressed as nominal values. Second, the revenue and expenditure equations could be estimated as a system rather than individually. However, estimating the equations as a system only has the benefit of improving the efficiency of the estimates if the independent variables are different across equations, which is not the case here. Third, rather than using city (county) fixed effects (FE) to control for time–invariant unobserved heterogeneity across places, first differencing (FD) could be used to accomplish the same objective. As described by Wooldridge (2000, p. 447), for wide and not especially long panels like the one used here, the choice between FE and FD hinges upon the relative efficiency of the estimators, which is revealed by the serial correlation in the idiosyncratic errors. While it is hard to test whether the errors are serially correlated after FE estimation, it is easy to test whether the differenced errors are serially correlated after FD estimation. Therefore, the rule of thumb advocated by Wooldridge (2000, p. 447) is to use FE if the FD errors display substantial negative serial correlation. In the limit, if serial correlation of the differenced errors equals -0.5, the errors in the FE model are uncorrelated and FE is the most efficient estimator. When the models presented in this section are estimated by FD, the serial correlation of the errors is substantially negative. FE is therefore the preferred estimator. Finally, there is the issue of whether the per capita tax base is endogenous. For example, higher expenditure levels on public services may attract population into the jurisdiction, resulting in more housing construction and thereby a larger property tax base. It is unclear, however, whether the property tax base in per capita terms will be affected. Moreover, the additional construction that may be induced by expenditures in time t cannot affect the base measured at time t-1. Hence, the base is contemporaneously exogenous in the models that are estimated. Inconsistent estimates, however, may also occur if the base is not strictly exogenous (Wooldridge, 2002, p. 146). Strict exogeneity requires that expenditures in time t do not feedback and affect the base in time $t + n$. While this condition may not be satisfied for the estimates I provide, the FE model does have the advantage of being less sensitive to violation of the strict exogeneity assumption, especially with longer panels (Wooldridge, 2000, p. 447).

TABLE 9. Estimated Millage Rate Elasticities for Cities[a]

	Property Tax Base	Tax Base Up	Tax Base x Up	Per Capita Income
Symmetrical	–0.097			–0.198
Effects (n=3525)	(0.042) [b]			(0.173)
Asymmetrical	–0.107*	–0.021	0.005	–0.189
Effects (n=3525)	(0.043)	(0.102)	(0.009)	(0.171)

[a] Estimated models include city and year fixed effects.
[b] Standard errors clustered at the city level in parentheses.
* indicates statistical significance at the 5% level.

where the base moved downward. For counties, Up is equal to 1 for 88 percent of the cases, resulting in 100 observations where the base moved downward.

6. ESTIMATED MILLAGE RATE, REVENUE, AND EXPENDITURE ELASTICITIES FOR CITIES

Table 9 reports estimated millage rate elasticities with respect to the per capita property tax base for cities. A one percent change in the tax base changes the millage rate by 0.097 percent and the effect is invariant between an upward and downward movement in the base. These results suggest that cities attempt to offset part of the change that would have occurred in property tax revenue from a change in the base by changing the millage rate in the opposite direction.

Tables 10 and 11 report estimated elasticities for each of the nine sources of revenue and for total revenue, assuming symmetrical and asymmetrical effects, respectively. The property tax base is found to have an asymmetrical effect on property tax revenue, although the difference in the up (0.489) versus down (0.455) elasticity is not large and both imply that a one percent change in the tax base changes tax revenue in the same direction by about 0.5 percent. These elasticities, together with the estimated millage rate elasticity reported in Table 9, suggest that while cities attempt to offset some of the impact of a change in the base on property tax revenue by altering the millage rate, the offset is not complete and the latter revenues are allowed to move directly with changes in the base.

TABLE 10. Estimated Revenue Elasticities for Cities Assuming Symmetrical Effects[a]

	Property Tax Base Per Capita	Per Capita Income
Ad Valorem Taxes (*n*=3,539)	0.480***	0.103
	(0.106)[b]	(0.184)
General Government Taxes (*n* =3,539)	0.066	1.044***
	(0.086)	(0.256)
Intergovernmental Transfers (*n*=3,539)	–0.014	0.597
	(0.061)	(0.368)
Local Grants (*n* =3,435)	0.281	–0.868
	(0.196)	(1.203)
Service Charges (*n* =3,539)	–0.046	0.755*
	(0.083)	(0.416)
Licenses and Permits (*n* =3,539)	0.301*	–0.068
	(0.155)	(0.513)
Fines and Forfeitures (*n* =3,539)	0.003	–0.610
	(0.100)	(0.100)
Other Sources (*n* =3,538)	0.286	–0.241
	(0.227)	(0.851)
Miscellaneous (*n* =3,410)	0.275**	1.148*
	(0.131)	0(.587)
Total Revenue (*n* =3,539)	0.233***	0.531**
	(0.065)	(0.210)

[a] Estimated models include city and year fixed effects.
[b] Standard errors clustered at the city level in parentheses.
***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 11. Estimated Revenue Elasticities for Cities Allowing for Asymmetrical Effects [a]

	Property Tax Base Per Capita Down	Tax Base Up	Tax Base x Up	Property Tax Base Per Capita Up	Per Capita Income
Ad Valorem Taxes	0.455***	–0.379	0.034*	0.489***	0.100
(n=3539)	(0.112)[b]	(0.250)	(0.019)	(0.098)	(0.181)
General Government	0.042	–0.246	0.025	0.067	1.051***
Taxes (n=3539)	(0.086)	(0.207)	(0.019)	(0.088)	(0.258)
Intergovernmental	–0.011	–0.100	0.005	–0.006	0.586
Transfers (n=3,539)	(0.002)	(0.321)	(0.029)	(0.060)	(0.367)
Local Grants	0.260	0.019	0.007	0.267	–0.841
(n=3,435)	(0.220)	(0.923)	(0.087)	(0.199)	(1.202)
Service Charges	–0.039	0.217	–0.017	–0.056	0.764*
(n=3,539)	(0.083)	(0.269)	(0.025)	(0.086)	(0.414)
Licenses and Permits	0.245	–0.562	–0.058*	0.187**	–0.052
(n=3,539)	(0.153)	(0.372)	(0.035)	(0.093)	(0.509)
Fines and Forfeitures	–0.009	–0.210	0.018	0.009	–0.613
(n=3,539)	(0.102)	(0.343)	(0.033)	(0.090)	(0.422)
Other Sources	0.321	0.722	–0061	0.260	–0.223
(n=3,538)	(0.229)	(0.802)	(0.074)	(0.238)	(0.849)
Miscellaneous	0.272*	0.105	–0.006	0.266**	1.161*
(n=3,410)	(0.140)	(0.495)	(0.045)	(0.130)	(0.588)
Total Revenue	0.246***	0.175	–0.017	0.229***	0.530**
(n=3,539)	(0.073)	(0.180)	(0.017)	(0.066)	(0.209)

[a] Estimated models include city and year fixed effects.
[b] Standard errors clustered at the city level in parentheses.
***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Two of the other revenue sources also have elasticities that are statistically significant—Licenses/Permits Revenues (0.301) and Miscellaneous Revenues (0.275). In the case of Miscellaneous Revenues the difference between the up tax base and down tax base elasticities is not statistically significant, indicating a symmetric effect. In the case of Licenses/Permits Revenues the up and down elasticities are significantly different but are similar in magnitude (0.245 versus 0.187). That these particular revenue sources are affected by the tax base is not surprising. Increases in the tax base come from increases in real estate values which in turn create incentives for new construction, resulting in more license and permit fee revenues and more impact fees (the largest component of Miscellaneous Revenue). The final elasticity reported in the tables is for Total Revenue. The tax base has a symmetric effect on total revenue and the estimated elasticity is 0.233.

The data allowed a breakdown of General Government Taxes into its subcategories as listed in Table 1. One subcategory yielded a statistically significant elasticity: the elasticity of "local business taxes and franchise fees" with respect to the property tax base is negative (–0.271) and statistically significant at the 5 percent level. This elasticity is not found to vary between upward and downward movements in the property tax base. These results suggest that cities use their control over these particular revenue sources to partially offset changes in property tax revenues caused by changes in the property tax base. When the base contracts (expands) cities raise (lower) the taxes and fees levied on business enterprises.

The control variable entering the models (in addition to the time and place fixed effects) is the county level of per capita income. The estimated income elasticities are quite plausible in both significance level and magnitude. In their own right, these elasticities are of interest since they help in projecting future revenue. A one percent increase in per capita income increases General Government Taxes (which are mostly sales taxes) by 1.044 percent, Service Charges by .755 percent, and Miscellaneous Revenues by 1.148 percent. Overall, an income increase of one percent raises Total Revenue by 0.531 percent.

Turning to the estimated expenditure elasticities, because changes in the tax base impact revenues, they must also affect expenditures. Tables 12 and 13 report the expenditure elasticities estimated for cities assuming symmetrical and asymmetrical effects, respectively. Only one of the interactions in Table 13 suggests that expenditures respond differently to upward and downward movements in the tax base; the up elasticity for Physical Environment expenditures is

TABLE 12. Estimated Expenditure Elasticities for Cities Assuming Symmetrical Effects [a]

	Property Tax Base Per Capita	Per Capita Income
General Government (n=3539)	0.254***	0.544*
	(0.094) [b]	(0.308)
Public Safety (*n*=3,539)	0.147***	–0.144
	(0.049)	(0.325)
Physical Environment (*n*=3,513)	0.198**	0.679
	(0.093)	(0.529)
Transportation (*n*=3,513)	0.156	–1.007
	(0.104)	(0.655)
Economic Environment (*n*=2,785)	–0.024	0.204
	(0.251)	(1.428)
Human Services (*n*=2,264)	0.132	0.688
	(0.118)	(1.026)
Culture/Recreation (*n*=3,487)	0.317*	0.378
	(0.165)	(0.407)
Other Uses (*n*=3,510)	0.148	–0.301
	(0.212)	(0.817)
Total Expenditure (*n*=3,539)	0.220***	0.347*
	(.061)	(.181)

[a] Estimated models include city and year fixed effects.
[b] Standard errors clustered at the city level in parentheses.
***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 13. Estimated Expenditure Elasticities for Cities Allowing for Asymmetrical Effects [a]

	Property Tax Base Per Capita Down	Tax Base Up	Tax Base x Up	Property Tax Base Per Capita Up	Per Capita Income
General Government (n=3,539)	0.264*** (0.101) [b]	0.144 (0.245)	–0.013 (0.023)	0.251*** (0.096)	0.544* (0.307)
Public Safety (n=3,539)	0.138*** (0.051)	–0.130 (0.249)	0.012 (0.024)	0.150*** (0.159)	–0.145 (0.326)
Physical Environment (n=3,513)	0.251** (0.105)	0.660** (0.313)	–0.064** (0.029)	0.187* (0.098)	0.672 (0.562)
Transportation (n=3,513)	0.150 (0.109)	–0.202 (0.481)	0.015 (0.045)	0.165 (0.106)	–1.017 (0.653)
Economic Environment (n=2,785)	0.009 (0.280)	0.646 (1.306)	–0.056 (0.125)	–0.047 (0.272)	0.223 (1.428)
Human Services (n=2,264)	0.132 (0.120)	–0.313 (0.574)	0.021 (0.053)	0.153 (0.123)	0.648 (1.028)
Culture/Recreation (n=3,487)	0.291* (0.167)	–0.529 (0.468)	0.045 (0.043)	0.336** (0.164)	0.364 (0.410)
Other Uses (n=3,510)	0.125 (0.202)	–0.269 (0.781)	0.026 (0.072)	0.151 (0.223)	–0.298 (0817)
Total Expenditure (n=3,539)	0.228*** (0.068)	0.080 (0.161)	–0.009 (0.015)	0.219*** (0.061)	0.344* (0.180)

[a] Estimated models include city and year fixed effects.
[b] Standard errors clustered at the city level in parentheses.
***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

0.187 while the down elasticity is 0.251. The rest of the discussion will focus on Table 12, which are the estimated symmetrical effects. Four of the eight expenditure categories have estimated elasticities that are statistically significant: General Government (0.254), Public Safety (0.147), Physical Environment (0.198), and Culture/Recreation (0.317). The relative magnitudes of these statistically significant elasticities, especially the largest being for Culture/Recreation, along with insignificant elasticities for such categories as Human Services and Economic Environment paint an interesting picture of cities' spending priorities. Given an increase in their tax base, cities tend to favor those expenditure categories that might be considered luxuries and choose not to spend on items that would more directly benefit the poor.

Only the income elasticity for General Government expenditure (0.544) is statistically significant in the individual expenditure models. The income elasticity for Total Expenditures

(0.347) is also statistically significant. The single significant income elasticity in the individual expenditure models contrast somewhat to the income elasticities reported for the city revenue categories, where the elasticity is statistically significant in three cases. This difference may be due to the use of county rather than city income in the estimated models. City revenues may depend on county income because residents throughout the county do business in the city (e.g., they may work or purchase there). The city's expenditure levels, however, may depend only on the city's income level, because it is only the preferences of city residents that determine the city's levels of public services. Measurement error surrounding the use of county rather than city income may therefore be a greater source of attenuation bias in the expenditure models.

7. ESTIMATED MILLAGE RATE, REVENUE, AND EXPENDITURE ELASTICITIES FOR COUNTIES

The county government estimated millage rate elasticities with respect to the property tax base are reported in Table 14. The elasticity obtained from the symmetrical model is larger (in absolute magnitude) than the one estimated for cities (–0.183 versus –0.097). In addition, unlike the city elasticity, the county elasticity varies between upward (–0.171) and downward (–0.212) movements in the property tax base. Counties respond to a reduction in their tax base by raising the millage rate and this response is stronger than the decrease in the millage rate that occurs when the tax base increases.

The estimated revenue elasticities for counties are reported in Tables 15 and 16. Because the millage rate offset is larger for counties than for cities, the estimated elasticity of property tax revenue with respect to the tax base is smaller for counties (0.225) than for cities (0.480). A second difference between counties and cities is that for counties the property tax revenue elasticity is invariant between upward and downward movements in the tax base. A final difference between counties and cities is that the other sources of revenue affected by a change in the tax base are different: for counties the only affected revenue category is General Government Taxes (0.318), while for cities the affected revenue categories are Licenses/Permits and Miscellaneous Revenues. The finding that General Government Taxes are affected for counties but not for cities may reflect the fact that local option sales taxes are only allowed at the county level within the state. The finding that Licenses and Permits are affected for cities but not for counties likely reflects the fact that in Florida cities require these payments to much greater extent than counties, as revealed by the difference in their per capita mean amounts ($25 for counties and $132 for cities in 2007).

TABLE 14. Estimated Millage Rate Elasticities for Counties [a]

	Property Tax Base	Tax Base Up	Tax Base x Up	Per Capita Income
Symmetrical	–.183**			–.010
Effects (n=850)	(.075) [b]			(.161)
Asymmetrical	–.212***	–.392***	.041***	–.041
Effects (n=850)	(.075)	(.147)	(.014)	(.161)

[a] Estimated models include county and year fixed effects.
[b] Standard errors clustered at the county level in parentheses.
, * indicate statistical significance at the 5% and 10% levels, respectively.

TABLE 15. Estimated Revenue Elasticities for Counties Assuming Symmetrical Effects [a]

	Property Tax Base Per Capita	Per Capita Income
Ad Valorem Taxes (n=850)	0.225**	0.447***
	(0.088) [b]	(0.148)
General Government Taxes (n=850)	0.318*	0.689*
	(0.170)	(0.404)
Intergovernmental Transfers (n=850)	–0.107	0.746***
	(0.123)	(0.265)
Local Grants (n=850)	–0.240	3.174***
	(0.299)	(1.193)
Service Charges (n=850)	0.136	0.466
	(0.161)	(0.349)
Licenses and Permits (n=850)	–0.092	–0.596
	(0.123)	(0.579)
Fines and Forfeitures (n=850)	–0.252	–0.282
	(0.257)	(0.629)
Other Sources (n=850)	0.296	0.539
	(0.193)	(0.467)
Miscellaneous (n=845)	–0.156	0.737
	(0.134)	(0.470)
Total Revenue (n=850)	0.091	0.644***
	(0.079)	(0.192)

[a] Estimated models include county and year fixed effects.
[b] Standard errors clustered at the county level in parentheses.
***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Perhaps the most salient difference between cities and counties is that for counties the larger millage rate offset to changes in the base, combined with revenue reductions (i.e., negative elasticity) in some categories (that alone are not statistically significant, but are significant when combined), result in the elasticity of Total Revenue with respect to the tax base being small and statistically insignificant. There is, therefore, little response in any of the expenditure categories for counties to a change in the tax base (see Table 17 for symmetrical effects and Table 18 for asymmetrical effects). The estimated elasticity for Total Expenditures is small (0.111) and is significant at only the 10 percent level.

Four of the county revenue categories have income elasticities that are statistically significant: Property Tax Revenue (0.447), General Government Taxes (0.689), Intergovernmental Transfers (0.746), and Local Grants (3.174). Controlling for the tax base, higher county income may raise county property tax revenues by reducing the number of tax delinquencies and nonpayments. Increases in income raise spending limits and thereby sales taxes, which are the largest component of General Government Taxes. The positive impact that county income has on grant and transfer income likely reflects the greater resources that more-

TABLE 16. Estimated Revenue Elasticities for Counties Allowing for Asymmetrical Effects[a]

	Property Tax Base Per Capita Down	Tax Base Up	Tax Base x Up	Property Tax Base Per Capita Up	Per Capita Income
Ad Valorem Taxes (n=850)	0.224***	0.011	–0.003	0.221**	0.451***
	(0.083)[b]	(0.194)	(0.018)	(0.088)	(0.152)
General Government Taxes (n=850)	0.359	0.491	–0.047	0.312**	0.718*
	(0.235)	(0.908)	(0.089)	(0.156)	(0.426)
Intergovernmental Transfers (n=850)	–0.017	.995**	–0.091*	–0.108	0.790***
	(0.135)	(0.498)	(0.048)	(0.114)	(0.264)
Local Grants (n=850)	–0.140	1.130	–0.105	–0.245	3.227***
	(0.300)	(1.555)	(0.151)	(0.299)	(1.209)
Service Charges (n=850)	0.166	0.400	–0.041	0.125	0.495
	(0.204)	(0.665)	(0.065)	(0.149)	(0.360)
Licenses and Permits (n=850)	–0.156	–0.846	0.088	–0.068	–0.660
	(0.156)	(0.957)	(0.095)	(0.117)	(0.601)
Fines and Forfeitures (n=850)	–0.395	–1.692	0.163	–0.232	–0.377
	(0.274)	(1.069)	(0.099)	(0.237)	(0.629)
Other Sources (n=850)	0.198	–1.068	0.096	0.294	0.497
	(0.174)	(0.761)	(0.071)	(0.193)	(0.465)
Miscellaneous (n=845)	–0.087	0.850	–0.086	–0.173	0.795*
	(0.145)	(0.667)	(0.064)	(0.133)	(0.463)
Total Revenue (n=850)	0.102	0.109	–0.013	0.089	0.649***
	(0.090)	(0.264)	(0.025)	(0.078)	(0.196)

[a] Estimated models include county and year fixed effects.
[b] Standard errors clustered at the county level in parentheses.
***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 17. Estimated Expenditure Elasticities for Counties Assuming Symmetrical Effects[a]

	Property Tax Base Per Capita	Per Capita Income
General Government (n=850)	0.120*	0.643***
	(0.073)[b]	(0.217)
Public Safety (n=850)	0.058	0.615***
	(0.059)	(0.186)
Physical Environment (n=849)	0.014	0.376
	(0.183)	(0.364)
Transportation (n=850)	0.145	0.462
	(0.114)	(0.366)
Economic Environment (n=849)	–0.005	–0.693
	(0.155)	(0.506)
Human Services (n=850)	0.279	1.103***
	(0.205)	(0.364)
Culture/Recreation (n=850)	0.260*	0.281
	(0.131)	(0.623)
Other Uses (n=850)	0.249	1.061**
	(0.185)	(0.531)
Total Expenditure (n=850)	0.111*	0.664***
	(0.064)	(0.184)

[a] Estimated models include county and year fixed effects.
[b] Standard errors clustered at the county level in parentheses.
***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 18. Estimated Expenditure Elasticities for Counties Allowing for Asymmetrical Effects[a]

	Property Tax Base Per Capita Down	Tax Base Up	Tax Base x Up	Property Tax Base Per Capita Up	Per Capita Income
General Government (n=850)	0.123	0.022	–0.001	0.122*	0.641***
	(0.083)[b]	(0.364)	(0.034)	(0.072)	(0.225)
Public Safety (n=850)	0.001	–0.656**	0.062**	0.063	0.580***
	(0.058)	(0.272)	(0.025)	(0.057)	(0.190)
Physical Environment (n=849)	0.184	2.071**	–0.203**	–0.019	0.504
	(0.199)	(0.966)	(0.089)	(0.199)	(0.371)
Transportation (n=850)	0.192*	0.539	–0.050	0.142	0.488
	(0.114)	(0.521)	(0.048)	(0.319)	(0.364)
Economic Environment (n=849)	0.084	1.148	–0.116	–0.032	–0.612
	(0.139)	(0.882)	(0.081)	(0.145)	(0.509)
Human Services (n=850)	0.393	1.367	–0.133	0.260	1.183***
	(0.250)	(0.858)	(0.084)	(0.186)	(0.357)
Culture/Recreation (n=850)	0.341*	0.834	–0.072	0.269*	0.307
	(0.180)	(0.952)	(0.090)	(0.128)	(0.642)
Other Uses (n=850)	0.253	0.050	–0.005	0.248	1.065*
	(0.160)	(0.945)	(0.083)	(0.180)	(0.550)
Total Expenditure (n=850)	0.138*	0.354	–0.036	0.102*	0.688***
	(0.074)	(0.252)	(0.024)	(0.059)	(0.189)

[a] Estimated models include county and year fixed effects.
[b] Standard errors clustered at the county level in parentheses.
***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

affluent counties allocate toward attracting these revenues. In the county expenditure equations, income is positive and statistically significant for half of the categories, with Human Services having the largest elasticity (1.103). The stronger results for income in the county in comparison to city expenditure equations likely reflects, as noted above, the use of county income in both sets of models.

8. CONCLUSIONS

This paper used unique 15-year panels for Florida cities and counties covering their millage rates, tax base, revenues, and expenditures to investigate how the budgets of these jurisdictions have changed over time, and how jurisdictions respond to changes in their property tax base. Interest in the latter question has been heightened by the recent large swings that have occurred in real estate values.

Based upon an analysis of how mean revenues and expenditures have changed over time for the same sample of jurisdictions, the following conclusions were reached: 1) there has been a tremendous growth in both the average city and county government in Florida, as measured by the size of their budgets, 2) this growth has been mostly financed by rising property tax revenues, but increases in other sources of revenue are important as well, 3) since the real estate market crashed in Florida in 2007, the size of both city and county government budgets have shrunk by nontrivial amounts, and 4) the shares of total expenditures represented by specific budget categories have remained remarkably stable for cities (but not for counties) over the course of the 15 year panel.

The second part of the paper presented the results from estimating two–way fixed effects models relating changes in millage rates, revenues, and expenditures to changes in a jurisdiction's property tax base. Both cities and counties are found to adjust their millage rates to offset changes in their tax base, which helps stabilize property tax revenues. In the case of counties, the offset is almost complete, resulting in no need to change expenditures. In the case of cities, the offset is less than complete, and cities balance their budget by changing four categories of expenditures: General Government, Public Safety, Physical Environment, and Culture/Recreation.

Extant evidence on the elasticity of business investment in a community with respect to the community's property tax rate shows that the elasticity is larger in absolute magnitude intra–regionally than inter–regionally. The explanation that has been provided for this result is that from a firm's perspective alternative locations within a region are closer substitutes for one another than alternative locations across regions. Because Florida's counties are large, they can be thought of as the "region" and the cities within them as sub-regional jurisdictions competing against one another for the region's business investment. This provides an explanation for my finding that cities alter their millage rates to a lesser extent than counties in response to a change in the property tax base. If the tax base is declining and the city responds by raising its millage rate, it risks losing business investment to the other cities within the county. If the tax base is increasing, a city may look upon this as an opportunity to lower its millage rate and attract business investment away from its neighbors. But a city may be reluctant to lower its millage rate too much out of a fear that this may precipitate a bidding war among cities within its region, resulting in long–term negative consequences for its property tax revenues. In contrast, counties can change their millage rates without as much concern regarding competition from surrounding counties.

With regard to future research, the results in this paper pertain to the average city's and county's response to a change in its property tax base. Building upon the foundation provided by this paper, future researchers may wish to explore whether there is a differential response among cities and counties with different characteristics. For example, a typology of cities frequently utilized in empirical work on local government budgets is based on the form of government: council—manager versus mayor—council. It would be interesting to explore whether these types of cities respond differently to changes in their tax base. Cities where the chief executive officer is a professional manager, rather than an elected mayor, for example, may be less likely to increase the millage rate in response to a loss in tax base and more likely to find new sources of revenue or ways to improve efficiency in the provision of public services.

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