House Prices and Local Government Revenues

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Abstract

Very little is known about how recent large upward and downward swings in single-family home values have impacted local government budgets. We focus on the state of Florida, where the popular beliefs are that 1) the run-up in values during the first half of the 2000s left cities flush with revenues, and 2) the drop in values since the bust in single-family home markets have left cities strapped for cash. Using a unique 15-year panel, we find 1) cities were, indeed, flush with revenues, but this was not the result of the run-up in single-family housing values, and 2) cities are now not strapped for cash, although we do find the fall in single-family home values has reduced real per capita revenues.

I. Introduction

Because the property tax is an important source of revenue for cities and the tax is ad valorem, fluctuations in housing values may have important budgetary consequences for local governments. While this issue has not received much attention from economists in the past, the recent boom and bust cycle in select single-family home markets in the U.S. has moved the issue up the collective research agenda. The purpose of this paper is to provide new evidence from the state of Florida.

Florida was home to some of the nation's most accelerated appreciations in housing prices during the first half of the last decade.[2] But starting in Southwest Florida in 2006, prices began to fall suddenly. Like a contagion, depreciations spread eastward and northward

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[2]The Case-Shiller index computes house prices for major metropolitan areas across the nation. Miami and Tampa were among the most quickly appreciating metropolitan areas in 2006 and 2007. California was the only other state to have two cities in the top ten.

across the state until prices had declined throughout the state by the end of 2009.[3] A few years into the real estate booms, Florida newspapers painted a picture of local governments who were flush in property tax revenues (Kennedy, 2005, Nov. 16; 2006, Jul. 1; 2007, Mar. 25). Sentiments abruptly changed after 2006 to reports about a housing bust that left jurisdictions strapped for cash (Goodnough, 2007, Apr. 7; Nickens, 2008, Feb. 24) and unable to respond (Padgett, 2009, Jun. 29; Wiseman, 2010, Mar. 29).[4] However, these perceptions were largely anecdotal; reports provided little hard evidence. Our research is motivated by two questions: 1) Were these characterizations of local budgets correct?, and 2) What role did changes in real housing prices play in explaining the changes in budgets that actually occurred?

The Florida story can be told with a unique 15-year panel containing information about local governmental budgets and housing markets. The goal is to measure how city revenues are affected by changes in the real price of single-family homes in Florida. Our estimated models allow house price changes to have asymmetric effects on local budgets. Several sets of auxiliary models enable us to differentiate between influences on the property tax base, property taxes, and total revenues. Those auxiliary models also provide insights about subsequent changes to millage rates, sales taxes, and other revenue sources.

The results suggest that changes in the real price of single-family housing have an asymmetric effect on government revenues: price increases do not raise real per capita revenues, but decreases do dampen revenues. The auxiliary model results suggest that the complex explanations contain the following elements:

- Increases in real housing prices cause only modest boosts in real per capita ad valorem

[3]Another well-known house price index is computed by the Federal Housing Finance Agency (FHFA), formerly known as the Office of Federal Housing Enterprise Oversight (OFHEO). According to the FHFA index, Florida housing prices surged 120 percent between the fourth quarter of 2000 and the fourth quarter of 2006. Between that last point and the fourth quarter of 2009, prices declined by 37 percent. This is consistent with the findings of Reinhart and Rogoff (2009).

[4]From 2000 to 2009, Google News archived about 22,000 articles on local government and the property tax in the United States. When housing prices peaked in 2007, Florida was mentioned in 1,130 (31.1%) articles. The majority of all other articles, nearly 9,600 (43.8%), were written after the housing decline.

tax revenues, which are insufficient to cause a rise in real per capita total revenues.

- The weak relationships between real per capita ad valorem tax revenues and real housing prices stems partly from changes in housing values having relatively small impacts on the real per capita property tax base. This may reflect the fact that in Florida assessments increases are capped for homes occupied by their owners (s. 193.155, F.S.). Another possibility is that tax assessors, who are elected in Florida, do not raise assessed values to follow the market.[5] These alternative explanations are not investigated in this paper, but will be included as we continue to enrich our panel data base.

- The wavering relationship between real per capita ad valorem tax revenues and real housing prices also can be attributed to a tendency of local governments to reduce the millage rate as the real per capita property tax base expands.

- The build up in real house price fails to raise real per capita total revenues not only because the link between house prices and ad valorem taxes is weak, but also because as the real per capita tax base expands cities tend to cut local sales tax rates.

- The cutbacks in real per capita total revenue that comes from depreciation in real housing price is partially explained by local governments failing to raise millage rates as their real per capita tax base declines.

- The reduction in real per capita total revenue primarily comes from depressed prices reducing both real per capita ad valorem tax revenues and other sources of revenue, in particular real per capita miscellaneous revenues. These revenues include impact fees

[5]Property appraising is not a simple as selecting comparable market prices based on market fluctuations. Asymmetric information problems arise from unobserved valuations that are not capitalized into actual transactions (Quan and Quigley 1991). Other noise is introduced when private appraisers choose to deviate from the prescribed appraisal process (Diaz 1990). In fact, it has long been suggested that appraisals may be smoothed, at least for commercial properties (McAllister, Baum, Crosby, Gallimore, and Gray 2003). Consumers exert noticeable pressure on private appraisers (Wolverton and Gallimore 1999) and property owners wield related control over elected county appraisers.

which are common in Florida and apparently fall substantially as real housing prices decline.

This paper is organized as follows. The next section describes the panel, discusses initial trends, and presents questions about the relationship between housing prices and local governments. Section III offers several regression models to weigh the claims found in the popular press and presents the estimation results. Section IV outlines the next steps of this project and Section V concludes.

II. Connecting local governments to housing markets

A. Data

This study relies on a combination of datasets from two state agencies-jurisdictional revenues come from the Florida Department of Financial Services (FDFS) and housing market characteristics are recorded by the Florida Department of Revenue (FDOR). Each of these sources is collected per statutory mandate and is available for public access.

The FDFS data come from "Annual Financial Reports" (AFRs) that cities and counties are required to submit after each fiscal year (s. 218.32, F.S.).[6] In these reports, local governments are required by the FDFS to list aggregate amounts for various revenue sources.[7] The AFRs are gathered for all cities and counties beginning with the 1994 fiscal year and are currently available through 2008.

The AFRs contain a vast amount of detail. Revenue sources cover 22 categories. Table 1 describes how the information is redefined into 12 major revenue categories. The reported magnitudes are converted into real dollars using the CPI for the Southeast Region (base year 1984).[8] A handful of cities do not turn in an AFR every year.[9] A city might be

[6]Fiscal years run from October 1 through September 30 of the following calendar year.

[7]The AFRs for recent years can be found online at `https://apps.fldfs.com/LocalGov/Reports/`.

[8]Annual consumer price indexes (CPI) are obtained from the Bureau of Labor Statistics.

[9]Out of the 413 cities represented in the panel, 232 are perfectly balanced. There are 13 cities that enter the sample after a few years and 57 cases where cities disappear after disbanding their charter or being annexed, The APRs are missing for a single year in 30 cities.

missing during a particular year because it had not yet been chartered, was disbanded by voters, or was annexed by a neighboring community. Some cities simply ignore the statutory compliance.

The FDOR dataset is comprised of 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.).[10] Tax rolls are collected for the purpose of monitoring county property tax assessors. Spanning from 1995 to 2009, these rolls align with the FDFS data by year and across jurisdictions.

The county tax rolls allow for the creation of three crucial measures: city identifiers, repeat house sale indexes, and property tax bases. First, each individual parcel has a tax authority code that uniquely assigns it to a city or unincorporated portion of a county.[11] The tax authority codes distinguish local jurisdictions according to fiscal boundaries. Postal addresses are much less accurate for fiscal purposes. Second, each tax roll contains the two most recent sales of each property. From those transactions, a basic repeat sales price index is computed for qualified arms-length sales of single-family homes. These indexes capture the percentage change in the real price of single-family housing within each city.[12] Third, by aggregating across the assessed values of all properties located within a particular city, we can assemble a city's property tax base.

AThe FDFS and FDOR datasets merge together into a panel with 15 years of data for 350 cities, or 5,250 city/year observations. During estimation, the panel is first differenced to control for unobservables that are constant over time. The final dataset yields approximately 2,500 to 3,000 observations depending on the particular model estimated, as described below.[13]

[10]The most recent year's rolls are available online at `ftp://sdrftp03.dor.state.fl.us/`. The FDOR's internal computer network houses files dating back to 2000. Other remaining rolls are stored on disk tapes.

[11]Tax authority codes were assembled over multiple steps. First, a master database was created by downloading codes from county appraiser and tax collector websites. Second, the FDOR provided tax authority codes used by local jurisdictions in 2008. The lists were checked for consistency and merged. Finally, the remaining codes were assigned to jurisdictions after phone calls to various county offices.

[12]See the Appendix for a description of our repeat sales models and indexes.

[13]In addition to losing some city/year observations for the reasons mentioned above, we also drop those

B. Summarizing the overall trends

Figure 1 depicts three panels of alternative repeat sales price indexes (RSIs) for the state, cities, and counties. The first panel shows that movements in the FDOR based index are almost identical to those shown by the indexes provided by the Federal Housing Finance Agency (FHFA) and Case-Shiller. The middle and right panels decompose the FDOR RSI into individual city and county measures. An overall trend is present in both images. Rising property values began to appreciate more quickly beginning around 2003, peaked around 2006, and plummeted to current levels thereafter. The vertical axes show that a handful of cities saw extreme swings from values of 1,000 down to the mid-200s. In comparison, the county RSIs seldom exceeded 300. Since all jurisdictions began at a base of 100 in the panel's initial year, this contrast suggests that city and county governments may have distinct responses to changes in single-family house prices.[14]

Table 2 depicts city means of total revenues per capita for four separate years that span the length of our panel (1995, 2000, 2005, and 2008). Separate means are reported for all cities, cities broken down by population size (small, medium, and large), and cities broken down by region of the state (south, central, and north). The means support the argument that cities were flush in revenues prior to the housing bust. Over the ten year period of 1995 to 2005, the nominal per capita total revenue mean for all cities swelled from $1,313 to $2,374, which is an 81% increase. More meaningful are the real per capita revenue amounts, which are calculated using 1995 as the base year and are reported in parentheses under the nominal values. Here, the ten year change is 43%, which is still a remarkably large gain in per capita terms.

The most noteworthy comment about Table 2 is that mean city revenues have not plunged in recent years. Mean per capita revenues for all cities shot up from 1995 and dropped in 2008, but remained above the original values.[15] In real terms, the total revenue figure is

cities where the repeat sales sample contained less than 10 observations. This is done to reduce measurement error in the computation of changes in real house prices.

[14] In this paper, we focus only on cities, but intend to include counties in the continuation of this project.

[15] Higgs (1985, 1987) labeled this sort of permanent government expansion the "ratchet phenomenon."

lower in 2008 than in 2005, but only by 4.5%. However, the breakdown by type of city shows that large cities (those having a population of 50,000 or more) have experienced more substantial real losses in revenues. Here, the decline between 2005 and 2008 is 20.1%. Also, only large cities have a real per capita total revenue amount that is lower in 2008 than in 1995. A related story could be told about city revenues if they were broken down by region instead of population size.

In summary, all local governments in Florida, as measured by the size of their budgets, were much larger in 2005 than in 1995. While city budgets have shrunk in recent years, it has only been large cities that might now be considered "strapped for cash."

Table 3 reports for all cities mean revenues for each of the four years broken down into the 12 revenue categories. Ad valorem taxes have grown the most in real per capita terms, increasing by $126 between 1995 and 2008. These tax revenues have also amplified as a share of the average city budget, from 15% in 1995 to 21% in 2008.[16] Also noteworthy is that real ad valorem taxes continued to accumulate after 2005.

While mounting ad valorem tax revenues may have paved the way for burgeoning city budgets, Table 3 shows that ten of the other 11 revenue categories also contributed to this expansion. Especially strong hikes occurred in Service Charges, Other Sources, and Miscellaneous Revenues. The only category to fall is Fines and Forfeitures.

Because ad valorem tax revenues expanded as a share of the average city budget, one or more of the revenue categories must have shrunk in share. The only category to ebb significantly in share is General Government Taxes, which declined from 17% in 1995 to 12% in 2008. This revenue category includes sales taxes and taxes on utility services.

To summarize what we have learned from Tables 2 and 3: 1) the evidence is consistent with the idea that Florida cities were "flush" with revenues before housing markets turned downward around 2006, 2) the expansion in revenues, however, were the result of increases

[16]The increase in the per capita property tax has already been documented across states by Dye and Reschovsky (2008). However, evidence has not been presented about why the collections grew. A local analysis can provide answers. Higher millage rates or an expanding tax base are two capable forces that are investigated in this paper.

in, not only property taxes, but many other revenue sources, 3) after 2005, total revenues fell, but the magnitude of the decline appears significant for only large cities, and 4) for all cities real per capita ad valorem tax revenues continued to climb through 2008.

C. The Principal Questions Investigated

We have documented a number of facts which serve to define the principal questions that we wish to empirically investigate with our panel. These facts are:

1. Single-family home values increased dramatically between 1995 and 2006 and since then have plummeted in Florida.
2. Real per capita city revenues grew enormously between 1995 and 2005 and since 2005 have fallen.
3. Real per capita ad valorem tax revenues have also grown enormously and have continued to grow through the end of the final year of our panel.

Our primary goal is to determine the extent to which the first fact might explain the second two facts. To accomplish this goal we seek answers to two principal questions:

(1) How do changes in the real price of housing affect the representative city's real per capita revenues?

There should be a direct causal path between house prices, the property tax base, property tax revenues, and the total tax revenues collected by a jurisdiction. The expectation is that increases and decreases in the value of single-family housing would cause corresponding changes in the city's property tax base and, thereby, similar changes in property tax and total revenues.[17] A number of factors, however, may weaken the overall connection between housing prices and total revenues.

[17]This assumes that house prices are capitalized into the tax base which, in turn, determines the property and total revenues that are collected. Hamilton (1976) provides a model for how a lack of full capitalization can lead to disparate tax burdens with only two types of housing, low and high income. Goodman (1983) shows that capitalization differences can also exist between municipalities.

Consider the connection between housing values and property taxes. There are four relevant factors that could undermine the direct relationship. First, Florida passed a constitutional amendment, commonly labeled "Save Our Homes" (SOH), in 1992. The law limits assessment build ups on homesteaded properties to no more than 3 percent per annum or the annual rate of inflation, whichever is lower.[18] The cap weakens the possible link between movements in home values and property tax revenues. Second, annual changes in the market values of homes are required by statute to be reflected in the assessed values that county tax assessors place on individual homes. However, movements in assessments may not fully follow the market. One reason is that Florida's county tax appraisers are elected, not appointed. Those officials may feel pressured to respond to local voters.[19] Third, local bureaucrats may reduce millage rates to offset rising property values. That is, while rising house values may expand the property tax base, tax revenues may not rise proportionately or at all if millage rates are lowered. Fourth, rising home values may not have much of an effect on property tax revenues if the tax base is comprised largely of properties other than single-family homes. Although single-family homes account for over 50.6% of property parcels in Florida, they only make up 42.2% of the total tax base across cities. Property tax bases are skewed toward coastal condominiums and commercial property wealth tied to the tourist industry.

There may also be reasons to doubt the link between ad valorem tax revenues and total collections. For example, even if real housing prices and property taxes move in tandem, total real revenues per capita could remain stagnant. As housing values rise or fall, shifts may occur in other revenue sources?not just the ad valorem tax. For example, consumption generally accompanies appreciation in the housing market (Case 1992; Campbell and Cocco 2007).[20]

[18]To obtain a homestead exemption, a property owner must permanently reside in the home. Homesteaders have been able to receive a $25,000 reduction in taxable value on their homes since a constitutional amendment in 1980. The amount was increased to $50,000 with a 2008 amendment. Seven other minor exemptions exist for the military, elderly, widowed, or disabled, ranging from $500 to $5,000.

[19]Vote-seeking and tax-setting appear interconnected at a state level (Besley and Case 1995). Although county appraisers do not set tax rates nor collect revenues, they do control the rolls used for local taxation.

[20]Consumption may rise due to a wealth effect (Case, Quigley, and Shiller 2005; Bostic, Gabriel, and Painter 2009). Another possibility is higher housing values generate greater remodeling expenditures. Case,

Spending will spill over directly into sales taxes collections. In the other direction, diminished wealth leads to less spending and, subsequently, lower tax collections. After a negative shock to house prices, households react to wealth effects, but they also restrict spending because budget constraints now become binding. Dissatisfied homeowners are expected to vote for lower sales tax rates and pressure politicians for cheaper service charges.[21] This self-interested behavior should be expected in cities where property taxes do not fall as quickly as housing prices.

In summary, the relationships between changes in the real price of single-family homes and local budgets are complex. A priori, it is difficult to predict the magnitude or direction of these relationships. To better understand these relationships, we propose a second principal question:

(2) Do increases and decreases in the real price of housing have symmetrical impacts on local government revenues?

The influence of changing real home prices on real per capita revenues may depend on local political incentives. Lower tax rates can be a popular reelection strategy (Besley and Case 1995). As their city's tax base grows, city counselors may reduce millage rates, but not by enough to offset previous revenue gains. If the tax base declines, then counselors may be reluctant to raise the millage rate.[22] Instead, services may be cut, but that could be politically risky, as well. Therefore, counselors might seek other revenue sources that would cause less political rebuke. For example, fines, excise taxes, or tourism taxes could be raised. Local governments would not likely pursue these same strategies during times when house prices appreciate rapidly and property tax bases expand faster than other revenue sources. The implication of these arguments is that changes in the tax base may have a different

Pollakowski, and Wachter (1997) find repeatedly sold properties are those with frequent improvements.

[21] Biegeleisen and Sjoquist (1988) explore whether voters would support a referendum to substitute a local option sales tax for a property tax of the same magnitude. The rational voter hypothesis is confirmed. Since the sales tax is more regressive, homeowners and higher income people vote against the proposal.

[22] Such a move would be politically unsavvy. Pajcic, Weber, and Francis (1980) discuss how Florida taxpayer have actively resisted appraisal changes long far before "Truth in Taxation" legislation was passed in the early 1970s. The bills clarified how assessments and millage rates related to local budgets.

effect on local budgets depending upon whether the changes is positive or negative.

Given that Florida's local housing markets peaked between 2006 and 2007, our panel appears to capture mainly the house price appreciations that occurred throughout the state. Actually, about 22 percent of the sample shows negative percentage changes in the real price of housing.[23] Hence, asymmetrical tests are possible. Separate impacts can be estimated for upward and downward movements in the real price of housing on the property tax base and real revenues per capita. However, some concern should be exercised. Breaking a regressor, such as the price change, into two variables will diminish the overall variance and precision of the estimates, especially in the downward interaction terms. Nevertheless, isolating the direction of changes is helpful for understanding cycles and policy reactions of local governments.

III. Estimating the relationship between house prices and local governments

A. Estimated Models

Two main models and four sets of auxiliary regressions are estimated. The main models are estimated to address the two principal questions raised in Section II. The auxiliary regressions help us understand the causal factors underlying the main models. All models are estimated after first differencing the data. This controls for unobservables that may affect revenues but do not change over time. The first main model relates annual changes in real per capita city revenues to percentage changes in the real price of single-family homes (including changes in real per capita income as a control variable):

$$\begin{aligned}\Delta\text{real revenue per capita} =& \alpha + \beta(\%\Delta\text{in real housing Price}) + \\ & \gamma(\Delta\text{in real per capita income}) + \epsilon \end{aligned} \quad (1)$$

[23] As noted below, we measure percentage changes over two-year periods. If these changes are measured over a single year, then 30 percent of the city/year observations show negative changes in the real price of housing. About half of these negative changes occurred after housing prices began to fall in south Florida in 2007.

Two issues arise in estimating equation (1). First, over what time period should the changes in house price and income be measured? A priori, the answer to this question is unclear. Local governments, for example, may not respond to a single year decline in housing values, hoping that prices will rebound in the next year. Price changes measured over more than one year may therefore have a stronger impact. We experimented by measuring the percentage change in real home price and the change in real per capita income over one, two, and three years. The two-year changes are used in the final estimation of equation (1) because they explained the greatest variation in the changes in real per capita revenues.

The other issue is whether to use current or lagged values of the changes in real house price and real per capita income. We experimented with no lag, a one-year lag, and a two-year lag. The current values of the variables (i.e., no lags) performed the best.

The second main model allows asymmetrical up and down effects. This is accomplished by modifying equation (1) as follows:

$$\begin{aligned}\Delta\text{real revenue per capita} =& \alpha + \beta_1(\%\Delta\text{in real housing price up}) + \\ & \beta_2(\%\Delta\text{in real housing price down}) + \\ & \gamma_1(\Delta\text{in real per capita income up}) + \\ & \gamma_2(\Delta\text{in real per capitaincome down}) + \epsilon \qquad (2)\end{aligned}$$

where %Δreal housing price up = %Δreal housing price if %Δreal housing price> 0, otherwise 0;

%Δreal housing price down = %Δabsolute value of real housing price if %Δreal housing price< 0, otherwise 0;

Δreal per capita income up = Δreal per capita income if %Δreal per capita income> 0, otherwise 0;

Δreal per capita income down = Δabsolute value of real per capita income if %Δreal

per capita income<0, otherwise 0;

The first set of auxiliary models we estimate are the same as equations (1) and (2), except the dependent variables are now the real per capita amounts within each of the 12 different revenue categories.

The second set of auxiliary regressions investigates how changes in the real price of housing affect changes in the real per capita property tax base:

$$\begin{aligned}\Delta\text{real per capita property tax base} =& \alpha + \beta(\%\Delta\text{in real housing price}) + \\ & \gamma(\Delta\text{in real per capita income}) + \epsilon \end{aligned} \tag{3}$$

In this model, explanatory power was again maximized by measuring changes in the explanatory variables over a two-year time period without lags. Using the same approach as illustrated by equation (2), we estimate a second version of (3) which allows for the explanatory variables to have asymmetric up and down effects.

The third set of auxiliary regressions investigates how millage rates are affected by changes in the real per capita tax base:

$$\begin{aligned}\Delta\text{millage rate} =& \alpha + \beta(\Delta\text{in real per capita property tax base}) + \\ & \gamma(\Delta\text{in real per capita income}) + \epsilon \end{aligned} \tag{4}$$

In this model, changes in the explanatory variables are measured over a two-year period. The change in the real per capita tax base is lagged one year, while the change in real per capita income is a current value. Using the same approach as illustrated by equation (2), we estimate a second version of (4) which allows for the explanatory variables to have asymmetric up and down effects.

The final set of auxiliary regressions investigate how changes in the real per capita tax base affect real per capita changes in total revenues and revenues broken down into each of

the 12 revenue categories:

$$\Delta\text{real per capita revenue} = \alpha + \beta(\Delta\text{in real per capita property tax base}) + \gamma(\Delta\text{in real per capita income}) + \epsilon \quad (5)$$

The explanatory variables are again measured over two years, with the change in the tax base lagged one period and the change in income being the current value.

B. Empirical Results Obtained from Estimating the Main Models

Table 4 presents the estimation results for changes in house prices and can be read as follows. Columns 1a and 1b present the results from estimating the main regression models (i.e., equations (1) and (2)). In addition to the estimated coefficients, estimated standard errors are reported that are robust to both heteroskedasticity and serial correlation. The first column (1a) shows that growth in real housing price leads to higher real per capita total revenues. However, in the second column (1b), where up and down changes in real housing price are allowed to have asymmetric effects, the positive relationship between changes in real price and real revenues is found to come only from reductions in price decreasing revenues. Since asymmetry is found, we should only rely on the estimated coefficients listed in (1b) rather than (1a).

The results from estimating the main models suggest that the substantial run-up in single-family home values within Florida prior to 2006 did not contribute to the significant growth that has occurred in the typical city budget. The results also indicate that recent reductions in home values have played a role in explaining contractions in city budgets. The first finding and the asymmetry displayed by the two findings is surprising, but not totally unexpected in light of the discussion in Section II. We now move on to the results obtained from the auxiliary regressions which help explain our principal findings.

Columns 2a and 2b of Table 4 show that movements in real housing price cause changes in ad valorem tax revenues and the effect is found to be symmetric. These results would

seem to be inconsistent with the findings obtained from our main models that show only losses in real home price affect real per capita total revenues. However, these results can be reconciled by first noting the size of the estimated effect that changes in real house prices have on real per capita ad valorem revenues. The estimated coefficient is 0.121. Multiplying this number by a one standard deviation change in the real house price variable (a whopping 36%, but recall this is measured over a two-year period) results in real per capita ad valorem revenues increasing by about $4. The mean value of real per capita ad valorem revenues is $175, measured for all city/year observations in our panel. Hence, a rather large ascent of 36% in real house prices only returns a real per capita ad valorem revenues improvement of about 2.3%.

The results obtained from two of the other auxiliary regressions explain the weak effect that house prices has on property tax revenues. First, there are the results reported in Table 5, obtained from estimating the effect of changes in real housing prices on the real per capita property tax base. This effect is again found to be symmetric and small in magnitude. The same 36% appreciation in real house price raises the real per capita tax base by a mere 3.3%. So, increases in house values raise property taxes by only small amounts. Rising values predict only modest benefits to the property tax base. A possible explanation involves the assessment cap on homesteaded properties in Florida. Another interpretation is that tax assessors are not keeping up with changes in market values. After we finish the construction of our panel data base we will be able to sort out the relative importance of these alternative reasons.

Table 6 considers the effects of changes in the property tax base. Columns 1a and 1b show the weakening relationship between changes in real housing price and ad valorem tax revenues. By regressing changes in the millage rate on changes in the real per capita tax base, we see that increases in the tax base taper the millage rate, but reductions in the tax base have no effect (i.e., the effect is asymmetric). Hence, although rising home values may increase the tax base, the impact is negated by reductions in millage rates. As noted above,

city counselors have political incentives to lower millage rates as the city's tax base expands.

Thus far, our auxiliary results have been useful in uncovering factors that contribute to the weak relationship found between changes in real house prices and changes in real per capita ad valorem tax revenues. In turn, this helps explain the finding from our main models that increases in real house prices do not propagate local government revenues. Further explanation of the latter finding is obtained by regressing changes in real per capita general government tax revenues on changes in the real per capita property tax base (Columns 4a and 4b of Table 6). These results reveal a symmetric, inverse relationship. The types of individual taxes in this category are all sales-related. Hence, the results suggest that city counselors respond to broader property tax bases by reducing millage rates and voters complement those actions by rejecting additions to the sales tax rates. This cannot be confirmed with our data because sales tax rates are not included. However, the only alternative explanation for the results is that total sales contract as the property tax base expands, which is counterintuitive to what is anticipated from wealth effects. Larger amounts of property wealth are expected to raise local consumption and, thus, total sales.

Our second principal finding is that declines in real home price reduce real per capita total revenues. Recall that downward movements in price matter while upward movements are unimportant. This issue can be explored further by drawing upon the auxiliary regression results. In this case, the most informative regressions show the impact of changes in real house prices on the non-ad valorem tax revenue categories (see Table 4). As real house prices move downward, there are not only reductions in real per capita ad valorem taxes, but also in the real per capita amounts of Miscellaneous Revenues, Fines and Forfeitures Revenues, and Other Sources – Transfers Revenues. The decline in real per capita Miscellaneous Revenues is especially large. This is not unexpected, since this revenue category includes development impact fees, which are common in Florida and would be expected to decline as housing markets contract.[24]

[24]In fact, impact fees do dry up. The statewide total soars from $430,000 in 1995 to a nominal $310 million by 2007, but drops to $194 million in 2008. The tumble equates to nearly a 40% loss.

The asymmetry observed in the effects of real house prices on Miscellaneous Revenues (up changes do not matter, but down changes do) may reflect the fact that Florida requires cities to manage their growth. This limits the extent to which more single-family houses can be constructed as housing values rise, which would also constrain how much local governments receive from impact fees. To confirm that declines in other sources of revenues explain the finding that downward movements in real home prices reduce total revenues, we lumped together all of the non-ad valorem tax revenues and regressed changes in the real per capita value of this variable on the variables measuring up and down movements of real housing price (column 3b of Table 4). Upward movements are insignificant, while downward movements have the strong negative effect anticipated.

Overall, the two main models and four sets of auxiliary regressions have provided deeper insights into the causal links between housing prices and the budgets of local governments. There is strong evidence that the effects are not symmetric. In other words, local government budgets were affected differently during the housing boom than during the bust. Our exploration of the data points to a number of factors that may account for these asymmetries. The next section explains several ways that future work can expand the findings presented in this paper.

IV. Directions for Future Research

This paper provides the first empirical analysis of how local government budgets have been affected by the boom and subsequent bust in single-family home markets. The conventional wisdom in Florida has been that the run-up in single-family home values left local governments flush with revenues, while the downturn in values left them strapped for cash. Our results provide support for only the latter part of this belief. We find no evidence that run-ups in the real price of single-family homes have caused increases in the real per capital revenues of cities within Florida. This can at least partially be attributed, based upon our results, to local governments responding to upward housing price movements by

cutting property and sales tax rates.[25] The strong relationship we find between downward movements in the real price of homes and reductions in real per capita total revenues can be attributed to declines in both ad valorem tax revenues and the revenues obtained from non-ad valorem tax revenue sources.

Despite there apparently being no relationship between the housing price run-up and city revenues, our background tables show considerable growth in real per capita total revenues over the past 10 to 15 years for the average Florida city. While identifying the factors responsible for this growth is beyond the purview of the current study, our analysis does suggest that this growth 1) is due to increases in almost all of the revenue sources available to local governments, and 2) cannot be attributed to the strong upward movement in the prices of single-family home prices that has occurred within Florida.

As we continue this project we intend to further enrich our panel database. For example, we intend to add the percentage of single-family homes that are homesteaded within each city for each year. This will enable us to investigate how the property tax assessment cap in Florida affects budgetary adjustments attributable to changes in real housing prices. The expectation is that revenues are less responsive to increases in prices within those cities containing a higher percentage of homesteaded homes. This could also explain our failure to find a relationship between upward movements in prices and revenues per capita.

We also plan on reestimating all of our models separately for small, medium, and large cities. Large cities are less dependent on ad valorem taxes provided by single-family homes, which may cause our results to vary by city size. City size may also influence the level of assessment, or how closely assessments come within market values.

Finally, in this initial paper we have restricted our analysis to municipalities. In Florida, roughly half of the population lives outside of cities in unincorporated county areas; hence,

[25] A second thought is that house prices and consumption may not be as cointegrated as much of the literature suggests. Recently, Attanasio, Blow, Hamilton, and Leicester (2009) have found that younger households respond to housing cycles with greater variances in consumption. While this result contradicts conventional wisdom, it would be consistent in places where homeowners tend to be relatively older and a weak connection is observed between house prices, consumption, and local sales tax collections. Florida could fit this description.

it is important not to exclude these units of government from our analysis. City and county governments operate quite differently in Florida, especially in the majority of cases where the county has no charter and is therefore less independent of the state's authority. The next draft of this paper will include results for both cities and counties.

V. Conclusion

Until this study, very little was known about how upward and downward swings in single-family home values affect local government budgets. A direct causal path was supposed to exist between housing prices, property tax base, property taxes, and total revenues. To test the relationships, we assembled a unique 15-year panel for 350 cities across the state of Florida. During the panel, there were substantial increases in real house prices, real per capita ad valorem tax increases, and real per capita total revenues. A series of models and auxiliary regressions help us establish that appreciation in housing prices is not a sufficient factor that enlarges city budgets. In the other direction, depreciation in housing prices affects city budgets differently, but its weak effect is not enough to account for all revenue losses. The explanation for these asymmetric effects in upward and downward movements is reserved for future work. For now, we summarize that housing prices and ad valorem taxes are a part of what influences a city's budget. Local bureaucrats have an assortment of other techniques to balance revenue streams as housing prices vacillate in Florida.

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Appendix - Constructing a repeat house sales index

Bailey, Muth, and Nourse (1963) offer one of the earliest methods for computing a repeat sales index (RSI). Alternative weighting methods have been offered, one of the most famous by Case and Shiller (1989), but the original RSI remains extremely robust. The RSI performs well in large samples with small periods between a property's most recent and second most recent sales, which are the same characteristics of the dataset used in this study.

Before computing a RSI with the FDOR data, a series of filters eliminate sales from the possible parcels encompassed by the RSI. Only qualified sales are used, defined as being arms-length, single-family residential house transactions. Additional filters eliminate extreme outliers from the sample. Properties are allowed to remain if the two most recent sales occur in the same year, but the sales prices differ. If livable space is less than \$500 ft^2 or greater

than 6000 ft^2, then the properties are eliminated. The price per square foot must be greater than \$10 and less than \$1,000. Finally, the most recent sale must have occurred between 1994 and 2008, the years of the available tax rolls.

The FDOR RSI is computed by estimating the following regression equation

$$RSI_t = \log \frac{P_r}{P_s} = \sum_{i=1994}^{t} D_i \beta_t + u_t$$

where the subscripts denote r as the most recent sale price and s is the second most recent sale price. The variable P is the sales price. A dummy variable D_i takes on values equal to $D_r = 1$ in the year of the most recent sale, $D_s = -1$ in the year of the second most recent sale, and zero elsewhere. The subscript i goes from 1994 to the year t for which the RSI is being computed. There are some exceptions to this pattern. If a jurisdiction does not exist in 1994, then the i subscript begins later in the first year that registers qualified sales. Jurisdictional indexes are normalized to a base of 100 in those first years, which coincide with 1994 in 80% of the sample's municipalities. The final step is to pass the $\hat{\beta}_t$ coefficients back through an exponential transformation to compute annual RSIs after the base year as

$$RSI_t = RSI_i * (e^{RSI_t} - 1) + RSI_i$$

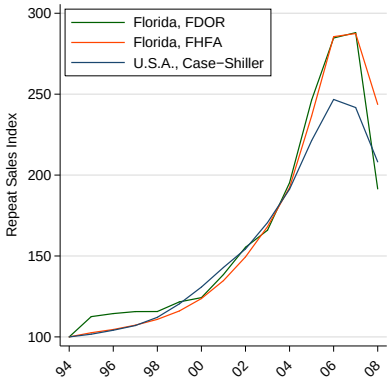
which recursively shows how the RSI will not update if housing prices did not change in a year. For instance, if house sales remain the same, then the $\hat{\beta}_t = 0$ so the right-hand side above will be $RSI_i * (e^0 - 1) + RSI_i = RSI_i$. This process is repeated over each year to construct annual RSIs. The RSI is calculated for each year t in a municipality. Properties are then aggregated by counties and the state to compute those RSIs.

The FDOR RSI is not the only source for Florida. Two common RSIs are the Case-Shiller index published by Standard & Poor's and the Housing Price Index released by the U.S. Federal Housing Finance Agency (FHFA), formerly the Office of Federal Housing Enterprise Oversight (OFHEO). The downside to using the other two RSIs is that they are available only for a handful of major metropolitan areas and they are based on selected average estimates of property values. The FDOR RSI is computed for nearly 400 municipalities over 67 counties and it uses exact property sales information. The municipalities are extracted by using a tax authority, or district, code that is available in the tax rolls. The advantage to using the tax authority code is that mailing addresses are not always accurately reported. Also, a parcel might be identified by an address inside a municipality, but it might only pay taxes to the county because it officially lies in an unincorporated region. To overcome this problem with address locations, a master list of tax authority codes is assembled based on information from property appraiser offices and a file provided by the FDOR. In the end, it is possible to assign every parcel across the state into a municipal or unincorporated area. As a municipality annexes parcels from other tax authority districts, those properties will be picked up from that year onward in the municipality's RSI. Essentially, the FDOR RSI is an exact housing price index that matches parcels to municipalities based on where they pay their taxes. The disadvantage is that it requires an extensive amount of information, which is not normally available for counties and is far less common for an entire state. Accruing the same type of data for another state would be an arduous task.

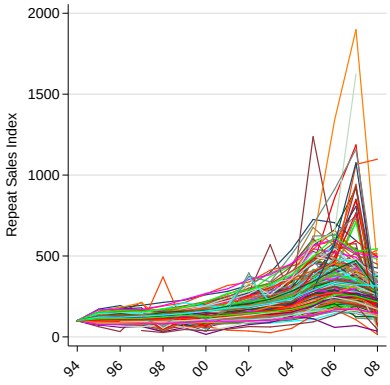
Figure 1 compares the computed FDOR index to those two other indexes in the left panel. As depicted, all three RSIs move together until 2004. The FDOR and FHFA indexes rise slightly faster than the Case-Shiller, evidencing that Florida house prices outpaced the U.S. average. The RSIs fall in 2007 with the nationwide housing market crash. Recall, the FDOR index encompasses every qualified single-family house sale instead of a handful of metropolitan areas, like the FHFA RSI. The dip in the FDOR index suggests that suburban and rural properties were hit harder than those located in major metropolitan statistical areas. In general, the FDOR RSI fits well with the other two indexes. When the FDOR RSI is broken into the state's 67 individual counties in the right panel, it is clear that several counties experience greater peaks and falls, but all of them follow the statewide pattern.

Figure 1: Repeat Sales Indexes (Arms-Length Transactions of Single-Family Houses

(a) State



(b) Cities



(c) Counties

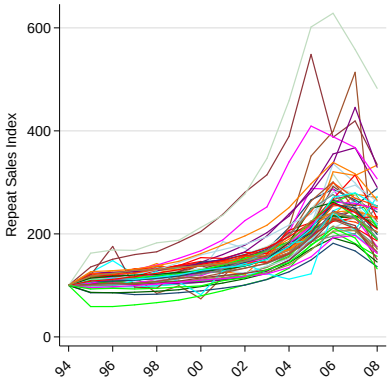


Table 1
Revenue Categories

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

Table 2
City Means of Total Revenues Per Capita

	1995	2000	2005	2008
All Cities [a]	1313	1612	2374	2519
		(1439) [b]	(1884)	(1799)
Small Cities [c]	1159	1464	2284	2648
		(1307)	(1813)	(1891)
Medium-sized Cities [d]	1485	1724	2367	2274
		(1539)	(1878)	(1624)
Large Cities [e]	2001	2234	2836	2518
		(1995)	(2251)	(1798)
North Cities [f]	1025	1306	1991	2291
		(1166)	(1580)	(1636)
Central Cities [g]	1140	1420	2033	2084
		(1268)	(1613)	(1489)
South Cities [h]	1833	2134	3095	3192
		(1905)	(2456)	(2280)

[a] Sample sizes are 371, 388, 388, and 305 for the years 1995, 2000, 2005, and 2008, respectively.
[b] Real per capita revenues in parentheses (1995 dollars).
[c] Small cities are cities with less than 10,000 people. Sample sizes are 246, 242, 228, and 171 for the years 1995, 2000, 2005, and 2008, respectively.
[d] Medium-sized cities are cities with between 10,000 and 50,000 people. Sample sizes are 93, 108, 114, and 90 for the years 1995, 2000, 2005, and 2008, respectively.
[e] Large cities have more than 50,000 people. Sample sizes are 32, 38, 46, and 44 for the years 1995, 2000, 2005, and 2008, respectively.
[f] Northern cities are defined as those located in Regional Planning Areas 1, 2, 3, and 4. Sample sizes are 116, 118, 113, and 84 for the years 1995, 2000, 2005, and 2008, respectively.
[g] Central cities are defined as those located in Regional Planning Areas 5, 6, 7, and 8. Sample sizes are 143, 147, 146, and 117 for the years 1995, 2000, 2005, and 2008, respectively.
[h] Southern cities are located in Regional Planning Areas 9, 10, and 11. The counties within each RPA are identified within all issues of the Florida Statistical Abstract. Sample sizes are 112, 123, 129, and 104 for the years 1995, 2000, 2005, and 2008, respectively.

Table 3
City Means of Revenues Per Capita By Source of Revenue [a]

	1995	2000	2005	2008
Ad Valorem Taxes	214	245 [219] [b]	381 [340]	510 [364]
	(14.8) [c]	(14.1)	(15.8)	(20.8)
General Government Taxes	160	200 [178]	249 [198]	218 [156]
	(16.6)	(16.4)	(14.8)	(11.7)
Intergovernmental Transfers				
Federal Grants	54	32 [29]	127 [101]	92 [66]
	(3.9)	(2.2)	(5.7)	(3.2)
State Grants	13	28 [25]	59 [47]	93 [66]
	(1.2)	(2.5)	(3.1)	(3.6)
State Shared/PILT	80	90 [80]	106 [84]	102 [73]
	(10.1)	(9.1)	(7.1)	(6.2)
Local Grants	6	16 [14]	20 [16]	23 [16]
	(.6)	(1.0)	(1.0)	(1.1)
Service Charges	474	554 [495]	717 [569]	832 [594]
	(31.8)	(29.7)	(26.4)	(29.7)
Licenses and Permits	26	41 [37]	64 [51]	123 [88]
	(2.0)	(2.5)	(2.9)	(5.8)
Fines and Forfeitures	17	19 [17]	18 [14]	23 [16]
	(1.7)	(1.5)	(1.0)	(1.0)
Other Sources – Transfers	94	111 [99]	154 [122]	164 [117]
	(5.7)	(5.8)	(5.7)	(6.7)
Other Sources	36	67 [60]	174 [138]	236 [169]
	(2.4)	(3.7)	(6.4)	(5.6)
Miscellaneous Revenues	139	209 [187]	305 [242]	102 [73]
	(9.1)	(11.6)	(10.0)	(4.6)

[a] Sample sizes range from 287 to 388, depending on year and category.
[b] The value of the revenue amount in 1995 dollars is reported in brackets.
[c] The revenue amount as a percentage of total revenue is reported in parentheses.

Table 4
Estimated Relationships Between Changes in Real House Price Appreciation and Changes in Real Revenue Per Capita

	(1a) Total Revenue ($1,000)	(1b) Total Revenue ($1,000)	(2a) Ad Valorem Tax Revenue	(2b) Ad Valorem Tax Revenue	(3a) Total Non-Ad Valorem Tax Revenue	(3b) Total Non-Ad Valorem Tax Revenue	(4a) General Government Tax Revenue	(4b) General Government Tax Revenue
Δ hp	.662**		.121***		.532*		.016	
	(.323)[a]		(.044)		(.290)		(.014)	
Δ hp · up		.251		.091***		.153		.016
		(.222)		(.028)		(.216)		(.014)
Δ hp · down		-2.84**		-.301		-2.534**		.009
		(1.39)		(.225)		(1.187)		(.110)
Δ income	.032***		.003**		.028***		.002	
	(.009)		(.001)		(.009)		(.002)	
Δ income · up		-.001		.002		-.003		.001
		(.009)		(.002)		(.009)		(.001)
Δ income · down		-.072***		-.004		-.066***		-.004
		(.027)		(.003)		(.025)		(.006)
R^2	.010	.018	.027	.031	.007	.015	.003	.004
Observations	2935	2935	2852	2852	2935	2935	2906	2906
Up/Down Symmetric Effect?[b]								
hp		no		yes		no		yes
income		no		yes		no		yes

Table 4, continued

	(5a) Local Grants Revenue	(5b) Local Grants Revenue	(6a) Service Charges Revenue	(6b) Service Charges Revenue	(7a) Licenses Permits Revenue	(7b) Licenses Permits Revenue	(8a) Federal Grants Revenue	(8b) Federal Grants Revenue
Δ hp	.005		.047*		.006		-.012	
	(.016)		(.020)		(.009)		(.038)	
Δ hp · up		-.001		.040		.005		-.020
		(.017)		(.027)		(.010)		(.045)
Δ hp · down		-.004		-.127		.025		-.045
		(.060)		(.131)		(.035)		(.052)
Δ income	-.000		.004		.003***		-.001	
	(.001)		(.003)		(.000)		(.001)	
Δ income · up		-.003**		.006		.001		-.001
		(.001)		(.002)		(.001)		(.002)
Δ income · down		-.004		.000		-.007***		.001
		(.004)		(.008)		(.001)		(.002)
R^2	.000	.005	.003	.004	.018	.025	.000	.000
Observations	1940	1940	2865	2865	2941	2941	2302	2302
Up/Down Symmetric Effect?								
hp		yes		yes		yes		yes
income		yes		yes		no		yes

Table 4, continued

	(9a) State Grants Revenue	(9b) State Grants Revenue	(10a) State Shared Revenues	(10b) State Shared Revenues	(11a) Fines Forfeitures Revenue	(11b) Fines Forfeitures Revenue	(12a) Other Sources Transfers Revenue	(12b) Other Sources Transfers Revenue
Δ hp	.009		.007*		-.009**		.130*	
	(.024)		(.004)		(.004)		(.078)	
Δ hp · up		-.000		.004		-.002		.036
		(.021)		(.004)		(.004)		(.048)
Δ hp · down		-.085		-.013		.054**		-1.216
		(.073)		(.015)		(.028)		(.796)
Δ income	-.003**		.001***		-.000		-.005	
	(.001)		(.000)		(.000)		(.004)	
Δ income · up		-.002		.001***		.000		-.003
		(.001)		(.000)		(.000)		(.005)
Δ income · down		.005*		-.002***		.000		.009
		(.003)		(.000)		(.000)		(.007)
R^2	.001	.002	.016	.017	.004		.002	.008
Observations	2435	2435	2927	2927	2905		2418	2418
Up/Down Symmetric Effect?								
hp		yes		yes		no		yes
income		yes		yes		yes		yes

Table 4, continued

	(13a) Other Sources Revenues	(13b) Other Sources Revenues	(14a) Miscellaneous Revenues	(14b) Miscellaneous Revenues
Δ hp	.174		.199***	
	(.180)		(.067)	
Δ hp · up		-.081		.054
		(.111)		(.051)
Δ hp · down		-1.477		-.731***
		(1.109)		(.242)
Δ income	.019**		.016***	
	(.009)		(.003)	
Δ income · up		-.010		-.012***
		(.009)		(.004)
Δ income · down		-.054**		-.052***
		(.022)		(.009)
R^2	.004			.037
Observations	2218			2926
Up/Down Symmetric Effect?				
hp		yes		no
income		no		no

[a] Standard errors robust to heteroskedasticity and serial correlation in parentheses.
[b] The null hypothesis is that the up and down coefficients are not significantly different. A rejection of the null implies an asymmetric effect.
***, **, * significant at the 1%, 5%, and 10% levels, respectively.

Table 5
Estimated Effects of Changes in Real Housing Price
on Real Per Capita Property Tax Base ($1,000)

	(a)	(b)
Δ hp	.051***	
	(.014)[a]	
Δ hp · up		.048***
		(.015)
Δ hp · down		-.085**
		(.039)
Δ income	.003***	
	(.000)	
Δ income · up		.003***
		(.001)
Δ income · down		-.002**
		(.001)
R^2	.076	.078
Observations	2914	2914
Up/Down Symmetric Effect?[b]		
hp		yes
income		yes

[a] Standard errors robust to heteroskedasticity and serial correlation in parentheses.
[b] The null hypothesis is that the up and down coefficients are not significantly different. A rejection of the null implies an asymmetric effect.
***, ** significant at the 1% and 5% levels, respectively.

Table 6
Estimated Effects of Changes in the Real Per Capita Property Tax Base ($1,000)
on the Millage Rate and Real Revenues Per Capita

	(1a) Millage	(1b) Millage	(2a) Total Revenue	(2b) Total Revenue	(3a) Ad Valorem Tax Revenue	(3b) Ad Valorem Tax Revenue	(4a) General Government Tax Revenue	(4b) General Government Tax Revenue
Δ base	-.003***		4.936*		.733***		-.167***	
	(.000)[a]		(2.871)		(.105)		(.051)	
Δ base · up		-.003***		5.045**		.733***		-.145**
		(.000)		(2.393)		(.109)		(.063)
Δ base · down		.000		-6.052		-.904		.295**
		(.000)		(7.265)		(.714)		(.132)
Δ income	-.027***		.014		.002		.003*	
	(.011)		(.016)		(.002)		(.002)	
Δ income · up		.019		-.033*		-.002		.002
		(.016)		(.017)		(.002)		(.001)
Δ income · down		.105***		-.094***		-.009***		-.004
		(.019)		(.021)		(.002)		(.006)
R^2	.017	.023	.044	.052	.110	.118	.010	.011
Observations	2597	2597	2657	2657	2583	2583	2633	2633
Up/Down Symmetric Effect?[b]								
base		no		yes		yes		yes
income		no		no		no		yes

Table 6, continued

	(5a) Federal Grants Revenue	(5b) Federal Grants Revenue	(6a) State Grants Revenue	(6b) State Grants Revenue	(7a) State Shared Revenues	(7b) State Shared Revenues	(8a) Local Grants Revenue	(8b) Local Grants Revenue
Δ base	-.155*		.112		-.082***		.173	
	(.088)		(.092)		(.029)		(.114)	
Δ base · up		-.164*		.119		-.085***		.192
		(.100)		(.094)		(.034)		(.125)
Δ base · down		.083		.106		.040*		-.235
		(.087)		(.223)		(.022)		(.233)
Δ income	-.000		-.003*		.002		-.001	
	(.001)		(.002)		(.000)		(.001)	
Δ income · up		.000		-.003		.002***		-.004**
		(.002)		(.002)		(.000)		(.003)
Δ income · down		.000		.003		-.002***		-.004
		(.002)		(.003)		(.000)		(.003)
R^2	.001	.001	.002	.002	.030	.031	.007	.014
Observations	2130	2130	2228	2228	2650	2650	1773	1773
Up/Down Symmetric Effect?								
base		yes		yes		yes		yes
income		yes		yes		yes		no

Table 6, continued

	(9a) Service Charges Revenue	(9b) Service Charges Revenue	(10a) Licenses Permits Revenue	(10b) Licenses Permits Revenue	(11a) Fines Forfeitures Revenue	(11b) Fines Forfeitures Revenue	(12a) Other Sources Transfers Revenue	(12b) Other Sources Transfers Revenue
Δ base	-.087		.109*		-.018		-.048	
	(.087)		(.058)		(.016)		(.355)	
Δ base · up		-.089		.115*		-.024		-.440***
		(.085)		(.068)		(.018)		(.148)
Δ base · down		.186		-.157		-.007		-5.795
		(.229)		(.098)		(.029)		(6.545)
Δ income	.005		.003***		-.000		-.004	
	(.003)		(.000)		(.000)		(.005)	
Δ income · up		.006***		.000		.000		.000
		(.002)		(.000)		(.000)		(.008)
Δ income · down		-.002		-.006***		.001**		.015**
		(.007)		(.000)		(.000)		(.008)
R^2	.003	.003	.023	.031	.003	.006	.001	.030
Observations	2595	2595	2663	2663	2630	2630	2199	2199
Up/Down Symmetric Effect?								
base		yes		yes		yes		yes
income		yes		no		no		yes

Table 6, continued

	(13a) Other Sources Revenues	(13b) Other Sources Revenues	(14a) Miscellaneous Revenues	(14b) Miscellaneous Revenues
Δ base	.669		.393*	
	(.791)		(.218)	
Δ base · up		.071		.716***
		(.590)		(.235)
Δ base · down		-5.861		.802
		(5.876)		(.651)
Δ income	.014*		.013***	
	(.008)		(.003)	
Δ income · up		-.008		-.018***
		(.009)		(.004)
Δ income · down		-.049***		-.066***
		(.018)		(.008)
R^2	.004	.022	.011	.041
Observations	2053	2053	2648	2648
Up/Down Symmetric Effect?				
base		yes		no
income		no		no

[a] Standard errors robust to heteroskedasticity and serial correlation in parentheses.
[b] The null hypothesis is that the up and down coefficients are not significantly different. A rejection of the null implies an asymmetric effect.
***, **, * significant at the 1%, 5%, and 10% levels, respectively.