"House Prices and City Revenues"

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Three basic questions:

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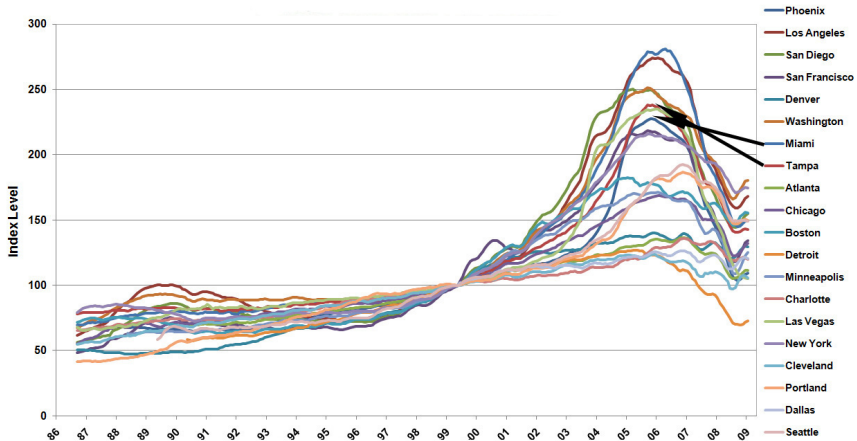3. To what extent did house prices affect city budgets?

Why should we be concerned about recent house prices?
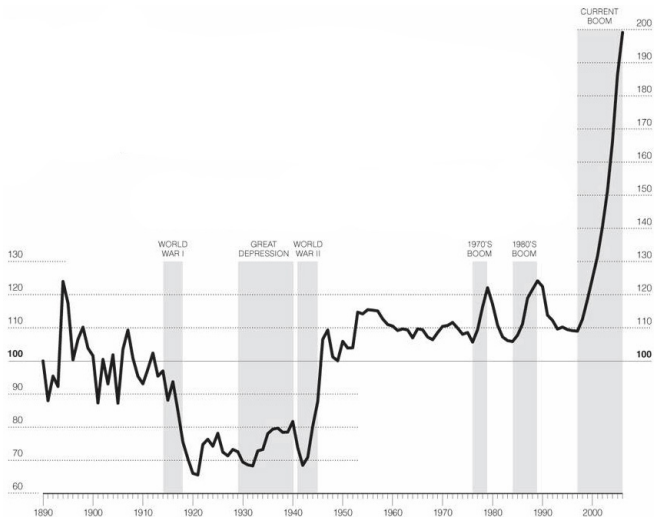
Source: *Irrational Exuberance* (2006) by Robert Shiller
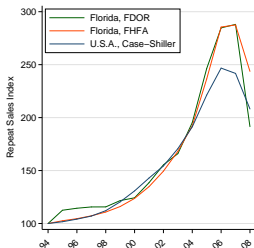
Why is Florida interesting?

Miami and Tampa have some of the largest RSI surges
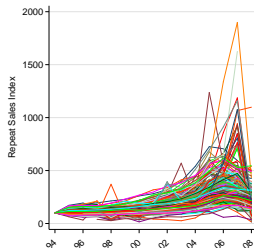

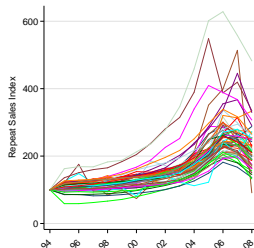www.thefundamentalanalyst.com

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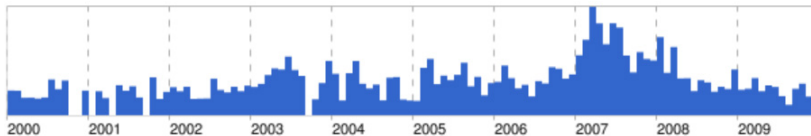Local data can be broken down extensively

State

Cities

Counties

Why is Florida interesting?

The state dominated popular news

Google News search for articles on "local government" and "property tax" in the U.S.

What were the claims during the real estate boom?

November 16, 2005 - "Hurricane rebuilding and the state's housing boom have helped pump an extra $3.2 billion of tax receipts into Florida coffers" ∼ *Orlando Sentinel*

July 1, 2006 - "The value of Volusia's taxable real estate jumped by a record 27.9 percent . . . The growth is good news for local governments because it typically means more property-tax revenue. But it also means bigger property-tax bills." ∼ *Orlando Sentinel*

March 25, 2007 - "Large or small, rich or poor, South Florida's cities and counties embarked on a multibillion-dollar spending spree fueled by seven years of property-tax collections . . . tax increases went largely unnoticed by homeowners [because of assessment caps,] . . . [b]ut the owners of other kinds of real estate that have no tax cap . . . were hit with large assessments as property values soared . . . " ∼ *Miami Herald*

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What happened when the housing market went sour?

April 7, 2007 - "State tax revenues around the country are growing far more slowly this year and in some cases falling below projections. [Florida] tax revenue is projected to drop this year for the first time since the energy crisis of the 1970s." ∼ *New York Times*

February 24, 2008 - " 'We plan the future one year at a time,'House Speaker Marco Rubio acknowledged. 'That's a horrible way to plan your state's future.' " ∼ *St. Petersburg Times*

Where do we stand now?

June 29, 2009 - "[A] painful reminder of the halcyon days when Florida's economy could lazily rely on soaring real estate prices . . . Local governments say they're broke, thanks to the housing bust, and many are trying to maintain the lofty property-tax rates . . . during the boom, many local governments spent their revenue windfalls like sailors, which makes taxpayers less sympathetic to their budget whining . . . [Miami-Dade] county commissioners were famous for having cops chauffeur them around town, which cost hundreds of thousands of dollars in police overtime." ∼ *TIME*

March 30, 2010 - "143,000 Miami-Dade property owners appealed their property tax bills last year . . . Property tax appeals in the county hit 104,000 in 2008 compared with an average 40,000 in normal years . . . Angry homeowners . . . say their tax assessments and tax bills haven't come down as fast as real estate prices . . ." ∼ *USA Today*

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Do the data support the popular claims?

What you probably know:

What you may not know:

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What you probably know:

1. How have local housing sales values changed recently?
   - They soared! An avg. city increase of 304% from 1994 to 2006.
2. How have city government revenues evolved?
   - Total revenues and property tax share went up.

What you may not know:

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1. Were city governments flush with cash?

2. Did they go broke?

3. Has the property tax been an important budgetary factor?

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What you may not know:

1. Were city governments flush with cash?
   - Yes. Real per capita revenues increased by 43% in 10 years.
2. Did they go broke?
   - No. There was a modest decline of 4.5% in real per capita revenue after 2005.
3. Has the property tax been an important budgetary factor?
   - No. While it's the largest share of the increase in revenues, only a small portion is attributable to rising house prices.

The Florida Story
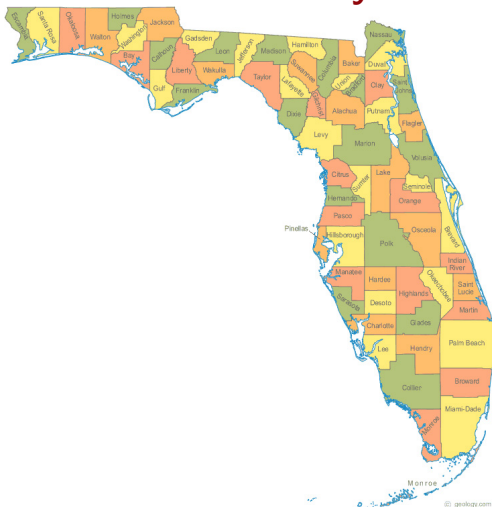
Separate Data Sets

- Department of Financial Services (FDFS)
  - Annual Financial Reports by city
  - Fiscal Years: 1994–2008 (Oct. 1–Sept. 30)
  - Variables: 12 major revenue streams

- Department of Revenue (FDOR)
  - County tax rolls
  - Years: 1995–2009 (data covers prior year)
  - Variables: last two sales, livable space, use & transaction codes

- Florida Statistical Abstracts
  - Demographic database
  - Years: 1994–2008
  - Variables: millage, population, median household income

Combined Data Set

- Connect with "tax authorities"
  - Establish who collects revenues from each parcel in the state
  - Problem: No central list tying the codes to jurisdictions
  - Fix: Make one. Used a FDOR file, websites, and made calls

- A panel of 15 years $\times$ 350 cities $=$ 5,250 observations
  - FDFS had 413 cities
  - FDOR had 412 cities
  - Merged file left 397 cities
  - Dropped city-year observations with 10 or fewer sales

- After cleaning it up, there are 3,000 observations
  - Lag independent variables one year
  - 232 fully-balanced cities (others didn't exist or were annexed)
  - Some cities failed to report revenues to FDFS for a year, lacked many repeat sales, or had a small population size

What are the Revenue Categories?

	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	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 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/donations

City Mean Revenues per capita by Revenue Categories
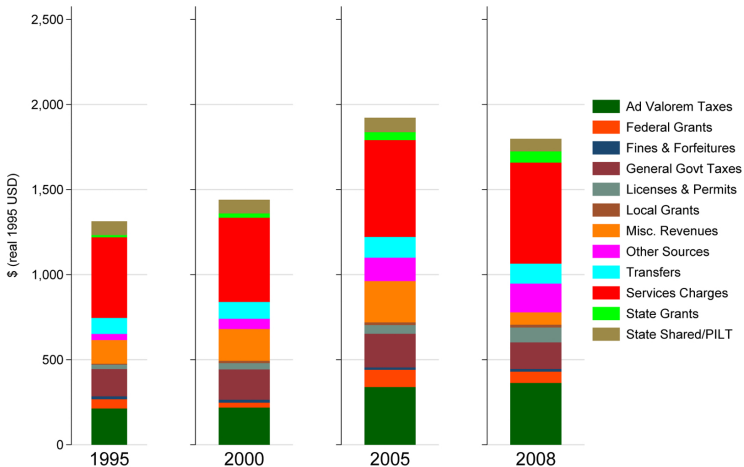
City Mean Total Revenues per capita by City Type
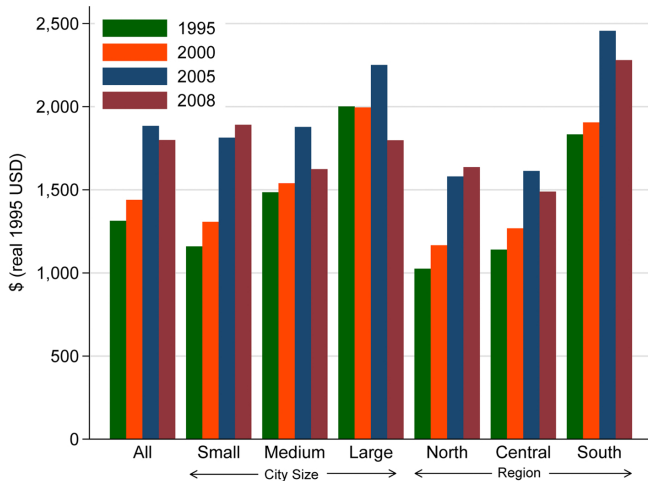
From these tables, the combined evidence suggests . . .

1. Florida cities were "flush" with revenues before housing markets turned downward around 2006;

2. Additional revenues, however, were the result of increases in many revenue sources (not only property taxes);

3. After 2005, total revenues fell, but the magnitude of the decline appears significant only for large cities;

4. Averaged across all cities, real per capita ad valorem tax revenues continued to climb through 2008; and

5. Post-2005 declines in total revenue per capita were the result of shrinkage across non-ad valorem revenue categories.

Three facts that have emerged:

1. Single-family home values in Florida increased dramatically between 1995 and 2006 and since then have plummeted.

2. Real per capita city revenues grew quickly between 1995 and 2005 and have fallen since 2005.

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 (2008).

Goal: Explore extent to which (1) accounts for (2) and (3).

Establishing a relationship:

How are city government budgets and housing markets connected?
A decomposition is useful:

$$\underbrace{\text{total revenue}}_{R} = \underbrace{\text{ad valorem revenue}}_{A} + \underbrace{\text{non ad valorem revenue}}_{S}$$

$$R = A + S$$

$$\frac{R}{P} = \frac{A}{P} + \frac{S}{P}$$

$$\frac{d\left(\frac{R}{P}\right)}{dH} = \frac{d\left(\frac{A}{P}\right)}{dH} + \frac{d\left(\frac{S}{P}\right)}{dH} \tag{1}$$

Expanding the ad valorem tax:

We can break the ad valorem tax receipts down further:

$$\begin{aligned}
R &= A + S \\
&= B \cdot M + S \\
&= (NSF + SF) \cdot M + S \\
&= (NSF + SF^H + SF^{NH}) \cdot M + S \\
&= (NSF + U^H \cdot V^H + U^{NH} \cdot V^{NH}) \cdot M + S
\end{aligned} \tag{2}$$

What does the derivative of the expanded equation look like?

$$\begin{aligned}
\frac{d\left(\frac{R}{P}\right)}{dH} =& \frac{d\left(\frac{NSF}{P}\right)}{dH} \cdot M + \frac{d\left(\frac{U^H}{P}\right)}{dH} \cdot V^H \cdot M + \frac{d\left(\frac{V^H}{P}\right)}{dH} \cdot U^H \cdot M + \\
& \frac{d\left(\frac{U^{NH}}{P}\right)}{dH} \cdot V^{NH} \cdot M + \frac{d\left(\frac{V^{NH}}{P}\right)}{dH} \cdot U^{NH} \cdot M + \\
& \frac{dM}{dH} \cdot \frac{B}{P} + \frac{d\left(\frac{S}{P}\right)}{dH}
\end{aligned} \tag{3}$$

Pathways identified by Eq. (3)

1. Non-single-family property tax base per capita
2. Number of homesteaded single-family properties per capita
3. Average assessed value of homesteaded single-family properties per capita
4. Number of non-homesteaded single-family properties per capita
5. Average assessed value of non-homesteaded single-family properties per capita
6. Millage rate
7. Amounts of revenues coming from sources other than ad valorem taxes

Principal questions for estimations:

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

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

3. What is the relative importance of each of the seven pathways in explaining the effect that house price has on revenue per capita?

Estimated estimations:

- Symmetric effects of house price

$$\left(\frac{R}{P_{it}}\right) = \alpha_i + \gamma_t + \beta_0 H_{i,t-1} + \beta_1 I_{i,t-1} + \beta_2 P_{i,t-1} +$$
$$\beta_3 H_{i,t-1} \cdot P_{i,t-1} + \epsilon_{it} \tag{4}$$

- Asymmetric effects of house price

$$\left(\frac{R}{P_{it}}\right) = \alpha_i + \gamma_t + \beta_0 H_{i,t-1} + \beta_1 H_{i,t-1} \cdot U_{i,t-1} + \beta_2 H_{i,t-1} \cdot P_{i,t-1} +$$
$$\beta_3 H_{i,t-1} \cdot U_{i,t-1} \cdot P_{i,t-1} + \beta_4 I_{i,t-1} + \beta_5 P_{i,t-1} + \beta_6 U_{i,t-1} + \epsilon_{it} \tag{5}$$

where $U_{i,t-1} = 1$ if $H_{i,t-1} > H_{i,t-2}$.

Effect of House Price on Ad Valorem Tax Revenues[a]

	Symmetric Effect	Asymmetric Effect
house price (hp)	352***	586**
	(122)[b]	(228)
hp · up		-222
		(.015)
hp · pop		-2.445*
		(143)
hp · pop · up		.885
		(.541)
income	6.419*	5.259*
	(2.910)	(3.111)
up		7643
		(10634)
population (pop)	51.749	118
	(368.484)	(370)
R^2	0.939	0.940
Observations	3103	3103
City size = 50,000	276***	
	(86)	
down		464***
		(174)
up		286***
		(84)
up-down		-178
		(122)

[a] Estimated equations include year and city fixed effects.

[b] Standard errors robust to heteroskedasticity and serial correlation.

*, **, *** indicate statistical significance at the 10%, 5%, and 1% levels

How can we interpret these ad valorem results?

- For the average-sized city (50,000 people), a 1-unit change in house price $\implies$ revenues per capita rise $0.28 (1984 dollars)
- During 1995 to 2005, the typical city experienced an average annual increase in its real house price index of 15 points, which means revenues would rise by $4.20 (1984 dollars)

What are the next steps?

- Run Eq. (4) and Eq. (5) for each of the 12 revenue categories
- Run Eq. (4) and Eq. (5) to obtain estimates of all of the derivatives in Eq. (3)

Estimated Effects of House Price Assuming **Symmetric** Effects

	Total Revenue Per Capita	Non-SF Tax Base Per Capita	Homesteaded Homes		Non-Homesteaded Homes		Millage Rate
			Parcels Per Capita	Avg. Assessed Value Per Capita	Parcels Per Capita	Avg. Assessed Value Per Capita	
house price (hp)	525**	99917**	-.0279**	28.86***	-.0130	86.69***	-.00016
	(220)	(34398)	(.0142)	(11.22)	(.0141)	(31.54)	(.00035)
income	21	3037***	.0023**	.48*	.0005	.65	-.00002
	(18)	(792)	(.0095)	(.27)	(.0009)	(.45)	(0.00003)
population (pop)	-80	-112360	.5975***	-60.78**	.1049	-121.73*	-.00196
	(2209)	(86751)	(.0244)	(29.47)	(.1298)	(71.22)	(.00339)
hp · pop	-4	-374	.0003**	-.27***	-.0003*	-.77***	-0.00001**
	(3)	(291)	(.0001)	(.10)	(.0002)	(.27)	(.00000)
R^2	.894	.919	.947	.975[a]	.961	.935[b]	.924[c]
City size = 50,000	320*	81222***	-.0109	15.22**	-.0272**	47.97**	-0.00088**
	(178)	(25138)	(.0127)	(7.50)	(.0108)	(21.74)	(.00035)

	Federal Grants Per Capita	Licenses and Permits Per Capita	Fines and Forfeitures Per Capita	Other Sources—Transfers Per Capita	Impact Fees Per Capita	Utility Services Per Capita
house price (hp)	85.64	25.19	38.13	150.76**	-4.92	-34.62*
	(54.17)	(15.92)	(31.00)	(62.70)	(12.44)	(17.78)
income	-2.28	2.08**	-.50**	2.22	-.44	7.42
	(2.79)	(1.02)	(.25)	(3.58)	(.69)	(6.20)
population (pop)	-428.72	-353.72***	32	690.41	273.05**	121.69
	(294.20)	(107.78)	(60.72)	(614.21)	(115.16)	(249.26)
hp · pop	-.31	.12	-.02	-1.32*	-.38**	-.30
	(.43)	(.17)	(.20)	(.74)	(.15)	(.22)
R^2	.334	.766	.698	.620	.281	.619
City size = 50,000	70.11**	31.03***	36.95*	84.76*	-23.91**	-49.63***
	(38.42)	(12.18)	(22.04)	(47.09)	(9.84)	(15.93)

Note: There are 3103 observations unless noted with superscripts as [a] 3102 observations, [b] 3101 observations, or [c] 3035 observations.

Interpretation of results:

- For the average-sized city (50,000 people), a 1-unit change in house price $\implies$ revenues per capita rise $0.52 (1984 dollars)
- During 1995 to 2005, the typical city experienced an average annual increase in its real house price index of 15 points, which means revenues would rise by $7.87 (1984 dollars)

Estimated Effects of House Price Allowing for **Asymmetric** Effects

	Total Revenue Per Capita	Non-SF Tax Base Per Capita	Homesteaded Homes		Non-Homesteaded Homes		Millage Rate
			Parcels Per Capita	Avg. Assessed Value Per Capita	Parcels Per Capita	Avg. Assessed Value Per Capita	
house price	605	123470***	-.0380	32.64**	-0.0400**	85.00**	.00055
	(581)	(37598)	(.0248)	(15.23)	(.0184)	(33.60)	(.00052)
hp · up	-26	-20412	.0104	-2.33	.0260*	3.50	-.00075*
	(486)	(17887)	(.0163)	(6.68)	(.0143)	(15.50)	(.00040)
hp · pop	-8**	-481	.0006***	-.32**	.0000	-.68**	-.00001**
	(4)	(320)	(.0002)	(.12)	(.0002)	(.27)	(.00000)
hp · pop · up	4**	104	-.0002*	.04	-.0002*	-.08	.00000
	(2)	(101)	(.0001)	(.04)	(.0001)	(.10)	(.00001)
up	-28447	-476931	-.8098	-676	-1.1558	1258.44	0.07199*
	(39310)	(1402853)	(1.3865)	(452)	(1.0953)	(1074.20)	(.04094)
R^2	.895	.920	.947	.975[a]	.961	.935[b]	.924[c]
City size = 50,000							
down	181	99394***	-.0095	16.78	-0.0422***	50.23***	-.00013
	(467)	(27135)	(.0128)	(10.61)	(.0148)	(14.40)	(.00049)
up	354***	84190***	-.0097	16.53**	-.0273**	50.86***	-.00090**
	(38)	(11636)	(.0131)	(7.71)	(.0108)	(8.92)	(.00032)
up-down	172	-15204	-.0002	-.25	.0149	-.63	-.00077**
	(417)	(11442)	(.0020)	(2.50)	(.0119)	(6.30)	(.00015)

Note: There are 3103 observations unless noted with superscripts as [a] 3102 observations, [b] 3101 observations, or [c] 3035 observations.
Estimates are not reported for *income* and *population*, but can be provided upon request.

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Estimated Effects of House Price Allowing for **Asymmetric** Effects

	Federal Grants Per Capita	Licenses and Permits Per Capita	Fines and Forfeitures Per Capita	Other Sources—Transfers Per Capita	Impact Fees Per Capita	Utility Services Per Capita
house price	12.57	51.69**	19.29	176.81	10.06	-84.64**
	(61.74)	(26.25)	(33.97)	(109.56)	(43.62)	(38.79)
hp · up	75.97	-27.95	19.57	-14.68	-14.96	56.51
	(76.08)	(24.40)	(15.82)	(89.72)	(45.71)	(42.76)
hp · pop	.45	.20	-.07	-2.18**	-.60*	-.63*
	(.49)	(.24)	(.29)	(.86)	(.35)	(.37)
hp · pop · up	.11	-.07	.04	.79	.20	.29
	(.35)	(.14)	(.06)	(.53)	(.22)	(.23)
up	-6580.13	2039.3	1684.65	-5565.25	951.33	7375.07
	(6324.15)	(1916.80)	(1305.44)	(8320.32)	(2951.93)	(6232.10)
R^2	.335	.767	.699	.620	.281	.620
City size = 50,000						
down	-9.73	61.92***	15.83	67.63	-20.02	-116.29***
	(56.18)	(21.25)	(23.34)	(93.78)	(40.87)	(38.23)
up	71.57	30.28**	37.26*	92.54*	-24.77***	-45.18**
	(65.68)	(5.71)	(15.76)	(49.05)	(9.73)	(9.66)
up-down	81.3	-31.64	21.44***	24.92	-4.74	71.11
	(35.38)	(20.77)	(5.50)	(83.07)	(33.52)	(44.36)

Elasticity of Average Assessed Value with Respect to House Price[a]

	Symmetric Effect	Asymmetric Effect
ln house price	.8455***	.7383***
	(.0392)[b]	(.0490)
ln house price · up		.1118***
		(.0385)
up		-.4539**
		(.1934)
R^2	0.902	0.905
Observations	3101	3101
elasticity	.8455***	
	(.0392)	
elasticity down		.7383***
		(.0330)
elasticity up		.8501***
		(.0564)
up-down		.1118***
		(.0384)

[a] All estimated equation include city fixed effects.

[b] Standard errors robust to heteroskedasticity and serial correlation are reported in parentheses.

, * indicate statistical significance at the 5% and 1% levels, respectively.

Explanations for why house price only affects revenue per capita if house price is rising:

- The estimated coefficient on house price in the utility service taxes model is 2.5 times larger if house price is moving downward

- House price only affects the average assessed value of homesteaded properties if house price is rising

- Property tax assessors increase the assessed value more if house price is rising

Pathways Whereby House Price Affects City Revenue Per Capita

		Symmetric Effect		Price Down		Price Up	
		Dollar Change	Percentage Change[a]	Dollar Change	Percentage Change	Dollar Change	Percentage Change
1	Non-SF Tax Base	235.6	0.0198	288.3	0.0242	244.2	0.0205
2	Homesteaded Parcels	-2.5	-.0002	-2.1	-.0002	-2.2	-.0002
3	Value of Homesteaded Parcels	379.6	0.0319	418.4	0.0352	412.2	0.0347
4	Non-Homesteaded Parcels	-8.1	-.0007	-12.5	-.0010	-8.1	-.0007
5	Value of Non-Homesteaded Parcels	368.5	0.0310	390.8	0.0329	385.9	0.0325
6	Millage Rate	-36.3	-.0030	-0.0	0.0000	-37.5	-.0031
7	Federal Grants Revenue	70.1	0.0059	-9.7	-.0008	71.6	0.0060
8	Licenses and Permits Revenue	31.0	0.0026	61.9	0.0052	30.3	0.0025
9	Fines and Forfeitures Revenue	37.0	0.0031	15.8	0.0013	37.3	0.0031
10	Other Sources—Transfers Revenue	84.8	0.0071	67.6	0.0057	92.5	0.0078
11	Impact Fees	-23.9	-.0020	-20.0	-.0017	-24.8	-.0021
12	Utility Service Taxes	-49.6	-.0042	-116.3	-.0098	-45.1	-.0038

[a] All percentage changes are calculated using the city mean total revenue per capita as the base.

Conclusions

- City revenues grew substantially up until the housing collapse. Increases in property taxes contributed mightily to this growth, but many other revenue sources increased as well
- Changes in house price play only a modest role in explaining changes in city revenues because
  1. an increase in house price causes a decline in the millage rate, which tends to offset increases in assessed values
  2. local property tax assessors smooth assessments, in that they fail to change fair market values to fully reflect increases or decreases in house price
  3. reduction in assessed values caused by a house price decline is somewhat offset by increases in non-ad valorem sources
  4. a provision of Florida's assessment cap law allows tax assessors to raise the assessments on homesteaded homes even when house price is falling, as long as assessed value is less than fair market value
- House price affects city revenues through numerous pathways

What is on our research agenda?

1. Repeat analysis for county governments.
   - $\sim \frac{1}{2}$ population lives in unincorporated areas in FL.
   - City and county governments operate differently, especially when county does not have a charter.
   - Only counties can adopt local option sales taxes.
   - The lion's share of property taxes goes to the county.

2. Re-run the models for different city/county sizes.

3. Explore the regressivity/progessivity of the tax structure.

4. Explore whether changes in house price affect expenditure allocations