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Soaring House Prices and Wages of Local Government Employees

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Local governments in Florida are concerned that the same soaring house prices that have boosted their revenue base have also increased the wages they have to pay to attract a qualified work force, especially relative to similar local governments in many other states where the housing boom has been less remarkable. The doubling of Florida house prices over the past six years that increased local property tax revenue raises concerns that a shortage of affordable housing will undermine their efforts to recruit and retain employees.

In this article, we note that the relevant determinant of how wages will change in the long run is the implicit rent of owner-occupied housing—which is theoretically equivalent to user cost of housing—and the actual rent of apartments and rented houses in an area. The price of owning a house differs from the monthly rent charged for living in it. It is even possible that the price of a house could rise while the rent charged for living in it falls. Similarly, at the same time that the price of buying a house rises, the economic opportunity cost of living in it—what the national income accountants call the cost of shelter or implicit rent—could fall. That has not happened in much of Florida, but it is true that both actual and implicit rents have far less than doubled. As a result, the effect of the doubling of house prices on wages is less than one might at first think. To estimate the effect, it is necessary to know what has happened to rent.

In this *Focus*, after studying the link between house prices and implicit rent, we present an estimate based on repeat data for 1,121 apartment complexes that, between the last half of 2000 and the first half of 2007 and before adjustment for inflation, apartment rents in Florida rose 27 percent. Over the same period, the national consumer price index rose

by 19 percent, indicating that inflation-adjusted rent in Florida during the most striking years of the housing boom rose by about seven percent overall. Using the formula for estimating the effect of rent on wages (which we develop later in the article), this suggests that the effect of the housing boom to date has been to raise real wages by approximately two percent. Of course, there are caveats regarding this estimate. First, some of the same forces that have increased the demand for owner-occupied houses, such as creative mortgages, have weakened the demand for apartments. Second, apartment rent probably responds to housing user cost with a substantial lag. Third, we are relying on advertised rents, not those actually paid. Nonetheless, we think this is the best estimate currently available.

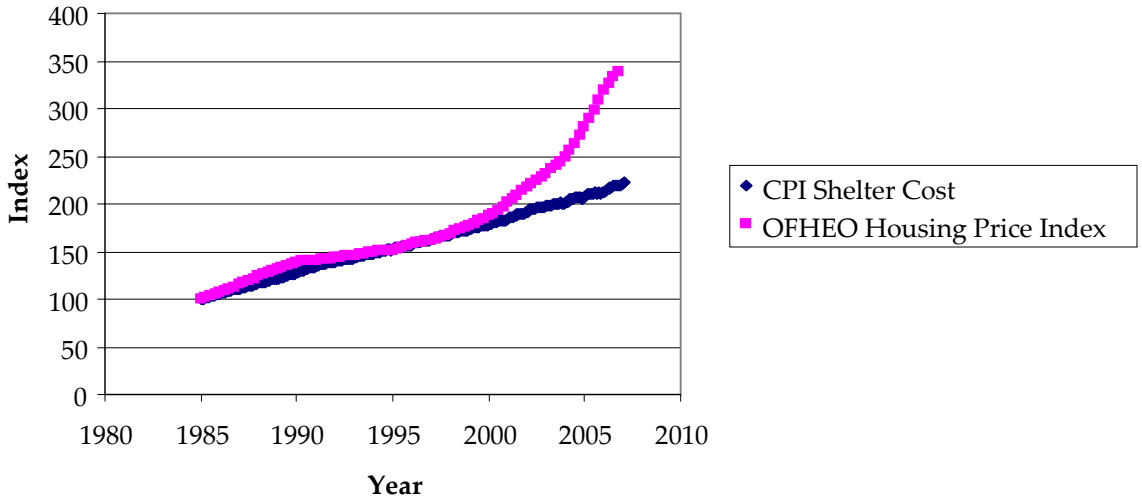
Rent Has Risen Less Than Home Prices

As previously noted, the price of homes in Florida has doubled over the past six years. However, during this span, the cost of renting homes has risen at a more measured pace. In forecasting changes in the price level, which is one determinant of wages in an area, only the price of obtaining shelter—i.e., either the cost of renting or the monthly opportunity cost of owning but *not* the price of housing—is relevant. Homes are financial assets; therefore, increases in home prices are akin to increases in the prices of other financial assets—like, say, corporate stocks. Such increases do not make it more costly to survive; they only indicate that it may now be more profitable to own that financial asset than it has been in the past. Because of this, the fact that rents have risen much more slowly in percentage terms than the price of housing has important implications for wages across the state of Florida.

In this *Focus*, we provide evidence that, while home prices have risen sharply since 2000, the cost of renting has only increased moderately. We then provide an explanation of recent changes in home prices and rents as well as an argument that even rising rent costs may not have the dramatic effect on wages that might otherwise be expected.

Between 1985 and 2000, the growth in home prices and rental costs tracked roughly together. However, since 2000, the increase in home prices has been much greater than the change in rents. To illustrate this, we plot the shelter cost component of the Consumer Price Index—which we use here as a proxy for rental costs—against the Office of Federal Housing Enterprise Oversight's (OFHEO) Housing Price Index, which measures the average price changes in repeat sales and refinancing of homes during each quarter. Figure 1 illustrates the tracking of the CPI shelter cost component against the OFHEO Housing Price Index since 1985, where the 1985Q1 values for both series are normalized to 100. The most recent data is for the fourth quarter of 2006.

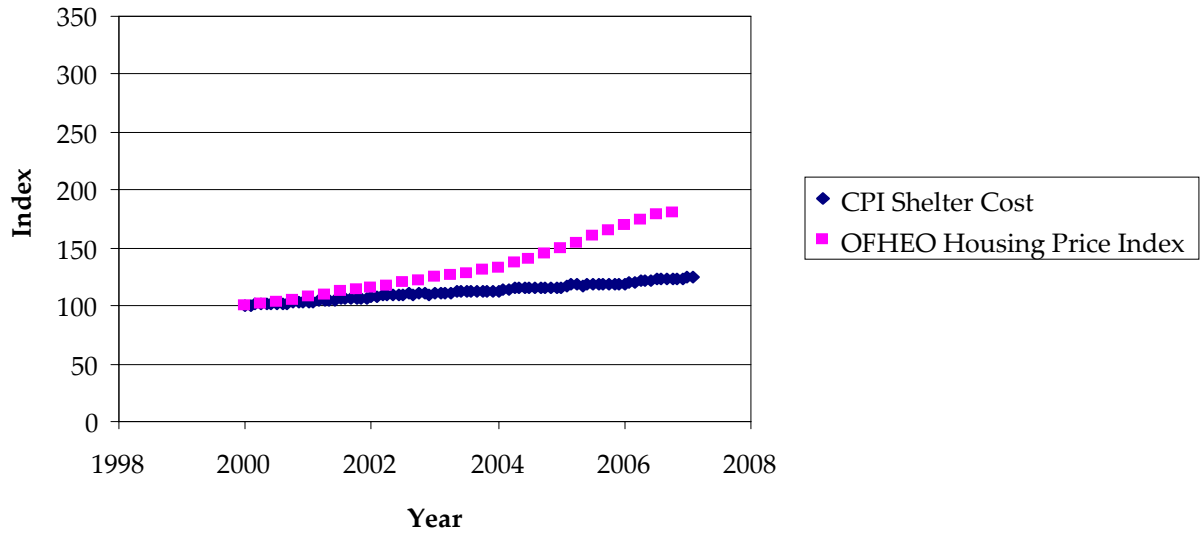
Figure 1. Shelter Cost vs. Housing Prices in the United States since 1985



Source: Economagic.com and U.S. Office of Federal Housing Enterprise Oversight, www.ofheo.gov (accessed May 10, 2007).

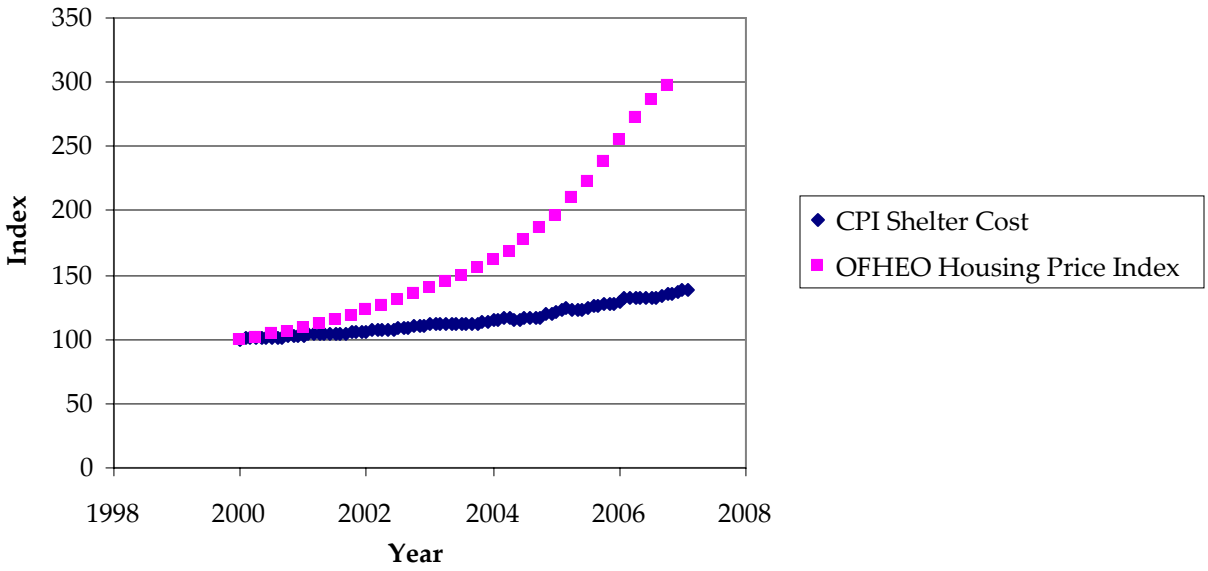
The split between the percentage growth of home prices and rental costs has not been uniform across the United States. In many places, especially many Florida cities, the difference between growth in the price of housing and growth in the cost of rent has been even more dramatic than the national average.

Figure 2. Shelter Cost vs. Housing Prices in the United States since 2000



Source: Economagic.com and U.S. Office of Federal Housing Enterprise Oversight, www.ofheo.gov (accessed May 10, 2007).

Figure 3. Shelter Cost vs. Housing Prices in Miami, FL, since 2000



Source: Economagic.com and U.S. Office of Federal Housing Enterprise Oversight, www.ofheo.gov (accessed May 10, 2007).

Miami provides an excellent case-in-point. Figure 2 illustrates the national data since 2000; this provides a comparison for Figure 3, which is restricted to the Miami metropolitan area. In both figures, the values for 2000Q1 are indexed to 100.

While the national OFHEO index has increased 75 percent since 2000, the index for Miami has increased almost 200 percent. Annualized, the national index has risen 8 percent per year, while the Miami index has increased an astonishing 15.7 percent per year. Yet over the same period, the percentage increase in shelter costs for Miami has been much less dramatic. In Miami, shelter costs have increased a little less than 39 percent, while national shelter costs have increased slightly more than 25 percent. Annualized, that is an increase of 4.7 percent per year for Miami versus an increase of 3.2 percent per year nationally.

The Link between Home Prices and Rents

In considering the recent trends of rents and housing prices, it is important to understand how these two concepts are related. The chief notion here is that of non-arbitrage. If United States Smelting, for example, could buy gold in Paris for €400 an ounce and the exchange rate is $1.30/€, they will not purchase gold in New York for more than $520 (since 400*1.3=520). And if they think the Paris price a year from today will be €450, they will use any extra funds to buy gold rather than investing those funds at five percent (since a price increase from 400 to 450

would represent an increase of 12.5 percent, which is greater than five percent). Of course, the market for homes is less efficient than the market for gold. Nonetheless, the principle of non-arbitrage serves as a useful reference, even though it does not apply perfectly.

For potential homebuyers in an efficient market, the cost of owning a home and the cost of renting a comparable home should be equivalent. If this were not the case, all participants in the housing market would either own their own homes or reside in rental units. A similar concept holds for landlords. If the price of a home were always greater than the benefits of renting it out, then all landlords would sell their overvalued properties and none would buy. Similarly, if the price of a home were always less than the benefits of renting it out, then all landlords would buy and none would sell. Since there are both buyers and sellers at any given time in the housing market, the cost of owning a property must be approximately equivalent to the benefits of renting it out.

In this way, homes can be thought of as simple financial instruments in which the discounted sum of expected rent payments is equivalent to the price. This relationship can be expressed by the following equation

$$P = \frac{R}{U},$$

where P is the home price, R is the periodic rent payment for that home, and U is a discount factor called the *user cost*. For practical purposes, the user cost should always hold some value between zero and one, so decreases in the user cost increase the spread between the price of housing and the cost of renting while increases in the user cost close that gap.

The user cost incorporates all of the financial incentives and disincentives of owning a home. Specifically, the user cost for an individual homeowner for each year is defined by the following

$$r = d + m + (1 - I)(i + p) - a,$$

where d is the depreciation of the home, m is the maintenance that the home requires, p is the property tax rate, I is the marginal income tax rate, i is the interest rate at which the homeowner could borrow or lend, and a is the property's appreciation.[1] Note that increases in depreciation, maintenance, the property tax rate, and the homeowner's interest rate increase the user cost. Conversely, increases in the capital gains for the homeowner decrease the user cost, as do increases in the marginal income tax rate since payments toward property taxes are deducted from taxable income.

Because of the link between rent and home prices, changes in the user cost must be responsible for relative changes between the two. The most obvious

[1] Poterba, James M., "Tax Subsidies to Owner-Occupied Housing: An Asset-Market Approach," *The Quarterly Journal of Economics*, 99 (November 1984): 729-752.

cause for the change in user cost since 2000 has been the decline in interest rates, which has decreased the opportunity cost to homeowners of having funds tied up in their homes. Because the money spent in the purchase of a home could otherwise be invested, presumably at the rate of interest, decreases in the interest rate lower the potential returns from other investments. Additionally, even though interest rates are approximately equivalent throughout the United States, the change in interest rates—in conjunction with the fact that different localities face different levels of home appreciation—may also explain why areas such as Miami have experienced a much larger percentage increase in home prices than has the average United States city. A simple numerical example illustrates this point.

Consider two cities. Assume that in both City A and City B interest rates and the rate of appreciation are the only relevant elements of the user cost. Assume further that, while interest rates are the same across both cities, the rate of appreciation in City A is fixed at three percent while the rate of appreciation in City B is fixed at one percent. Let rents for any house in either city be $12,000. Initially, let the interest rate be nine percent. The initial home prices in Cities A and B, represented by P_{A1} and P_{B1} respectively, are

$$P_{A1} = \frac{\$12{,}000}{9\% - 3\%} = \$200{,}000$$
$$P_{B1} = \frac{\$12{,}000}{9\% - 1\%} = \$150{,}000 .$$

If the interest rate were to decrease from nine percent to five percent, the new prices of homes in City A and City B (P_{A2} and P_{B2}, respectively) would be

$$P_{A2} = \frac{\$12{,}000}{5\% - 3\%} = \$600{,}000$$
$$P_{B2} = \frac{\$12{,}000}{5\% - 1\%} = \$300{,}000 .$$

Notice that even though the change in interest rates was the same for both cities, the percentage change in home prices for the two cities was not the same. City A experienced a jump in home prices of 200 percent while City B experienced only a 100 percent increase. If Miami consistently has a higher rate of appreciation than the national average, which seems reasonable, then it stands to reason that changes in the national interest rate would have a greater percentage impact on Miami home prices than those in the typical American city.

In the example, we assumed that the rates of appreciation remained the same within each respective city. An additional explanation as to why the percentage change in home prices in Florida has outpaced the national average might be that the rate of home appreciation is also increasing faster in this state than across the nation as a whole. This, in turn, could be due to several factors, such as unexpected increases in wealth and income inequality or unexpectedly large numbers of baby boomers retiring to Florida. (Note that, since the number of baby boomers retiring to Florida has

been predicted to increase for a number of years, the increase in housing appreciation as a result of these boomers should have already been incorporated into home prices. Only unexpectedly large increases should have an impact on current prices.) All of these factors would tend to increase the expected future demand for upscale homes, decreasing the user cost of owning them. Because of this, areas with large numbers of upscale homes would experience the largest percentage increases in average home price.

It is worth noting that, since the value of a housing structure is constrained by the cost of building the structure, most of the increase in home prices is due to increases in the value of land and not increases in value of the housing structure. Consider a $20,000 car parked on a lot worth $200,000, giving a total value for both lot and car of $220,000. If the price of the lot and car together increased to $320,000 while the price of similar cars was still $20,000, the $100,000 increase in price would surely be a result of an increase in the value of the land rather than an increase in the value of the car. In the same way, the value of housing structures in a competitive market can never increase to a value greater than the cost of building the structure, which has remained relatively stable in recent years.[2] Presumably, then, since the cost of building housing structures is approximately fixed, most increases in home prices are a result of increases in the value of land. Even in recent years, building costs have risen less than the value of the land.

Apartment Rent in Florida 2000 and 2007

A serious limitation of the CPI implicit rent component is that it is available within Florida for only one urban area—Miami—which may not be representative of the entire state. For that reason, we have estimated the increase in apartment rent throughout Florida between 2000 and 2007. The Bureau of Economic and Business Research had previously collected rent estimates for various types of units in 1,583 complexes in the second half of 2000 for the construction of the Florida Price Level Index. For this study, during March and April 2007 we collected current rent information for 1,121 of the same complexes. Of course, some of the rental complexes surveyed in 2000 have since been taken off the market, and many have been converted to condominiums.

Our results are in Table 1. "MSA" stands for Metropolitan Statistical Area. "Complexes" is the number of different apartment complexes, and "Units" is the number of types of units for which we have obtained data for both 2000 and 2007, distinguished by complex and, within a given complex, the number of bedrooms, number of bathrooms, square

[2] There are exceptional cases, such as structures that come to have artistic or historic value, but these are the exception rather than the rule.

Table 1. Changes in Apartment Rent, Florida, 2000H2 to 2007H1

MSA	Complexes	Units	Nominal (%)	Real (%)
Ft. Myers-Cape Coral	31	81	35	13
Ft. Walton Beach	21	50	32	11
Gainesville	77	209	26	6
Jacksonville	113	351	28	8
Lakeland-Winter Haven	14	66	27	7
Miami-Ft. Lauderdale, Miami Beach	211	668	32	11
Naples-Marco Island	16	45	26	6
Orlando-Kissimmee	195	640	24	4
Melbourne-Titusville-Palm Bay	23	60	28	8
Panama City-Lynn Haven	16	42	35	13
Pensacola-Ferry Pass-Brent	43	143	28	8
Sarasota-Bradenton-Venice	46	123	24	4
Sebastian-Vero Beach*	3	5	25	5
Tallahassee	75	218	20	1
Tampa-St. Petersburg-Clearwater	208	703	27	7
Florida	**1,121**	**3,534**	**27**	**7**

*Due to the small sample size (only five units), the reader should interpret the Sebastian-Vero Beach results with caution.

footage, and sometimes other features. "Nominal" is the change in nominal rent between 2000 and 2007, averaged across units, and "Real" is the change in rent adjusted for inflation, using the national CPI.

Table 1 suggests that the increases in apartment rent in Florida have been smallest in the middle of the state and largest in the coastal Panhandle and the most southern areas of the state. These results are partially confirmed by results from Federal Department of Housing and Urban Development's Fair Market Rent (FMR) datasets, which we have included as a check against our data, in Table 2.

Fair market rents are designed to be estimates of the 40th percentile gross rent in an area, excluding new or public housing. Accordingly, they include shelter rent along with the cost of all utilities other than telephones. HUD constructs these estimates by generating base year FMRs from the decennial census and then annually updating the base year via data from the American Housing Survey and telephone surveys. Where the FMR results conflict with our apartment rent results in the measure of the percentage change in rents among cities, we believe that our data are superior. For instance, the FMR data shows large real percentage decreases in rent for Naples, Orlando, and Tampa, where house prices have skyrocketed. This result does not seem to be

Table 2. Changes in Florida Fair Market Rents, 2001 to 2007 (percentage)

	3 Bedroom		4 Bedroom	
Area Designation	Nominal	Real	Nominal	Real
Ft. Myers-Cape Coral MSA	25	6	23	5
Ft. Walton Beach MSA	37	17	28	9
Gainesville MSA	27	8	11	-5
Jacksonville MSA	16	-1	19	2
Lakeland-Winter Haven MSA	24	6	33	14
Miami-Miami Beach-Kendall HMFA*	24	6	25	6
Naples MSA	7	-9	0	-15
Orlando MSA	12	-4	8	-8
Melbourne-Titusville-Palm Bay MSA	22	4	17	0
Panama City MSA	31	12	36	16
Pensacola MSA	27	9	31	12
Sarasota-Bradenton MSA	27	9	28	10
Tallahassee HMFA*	19	1	1	-13
Tampa-St. Petersburg-Clearwater MSA	13	-4	13	-4
Vero Beach-Sebastian MSA	17	0	7	-8

*HUD metro FMR area as defined by the *Federal Register* at http://www.huduser.org/datasets/fmr/fmr2007f/FY2007F_FR_Preamble.pdf.

Source: U.S. Department of Housing and Urban Development, www.huduser.org/datasets/fmr.html (accessed May 10, 2007).

consistent with newspaper reports of rents rising more rapidly than inflation. Additionally, it seems unlikely that, in cities like Gainesville and Tallahassee, the difference between the change in real rent for three-bedroom units and for four-bedroom units would be as large as it is (13 and 14 percent, respectively), again calling into question the validity of the FMR data. However, it may also be worth noting that our apartment rent data are not entirely analogous to the FMR data since we focus on the mean apartment rent in an area, while the FMR only reports the 40th percentile rent in each metropolitan area. For example, some of the larger discrepancies between the two datasets may be at least partially attributable to a change in the skewness of the distribution of rents, perhaps making the divergence between results not as large as would first appear. In any case, the FMR data are consistent with our main point—namely, that rent has risen far less than house prices.

We note that in Miami, our data indicate a 32 percent increase in apartment rent between 2000H2 and 2007H1, compared to a 39 percent increase in the shelter component of the CPI for that MSA from the year 2000 to 2006Q1. That the CPI figure would be higher for implicit rent may be simply due to sampling error or other data issues. The difference is quite plausible, however. First, apartment rent may take time to adjust. Second, as noted in the introduction to the section, the creative mortgage financing and house price

expectations that induced people to move into owner-occupied houses would have weakened the increase in demand for rental units.

Implications for Wages[3]

As noted previously, only the cost of renting, not the price of houses, is important in the determination of the consumer price level, which determines the level of wages. However, in this section we illustrate that even increases in the cost of renting have only a limited impact on the wages in an area.

First, controlling for skill and job characteristics, we can think of the wage level in an area as being determined by both the consumer price level and the level of amenities in that area. Because of this relationship, then, the *change* in the wage level must be determined by the *changes* in the consumer price level and the level of amenities. If we assume that, in each area, the level of amenities has remained approximately unchanged across the United States since 2000, we may conclude that the change in the wage level in an area is due almost entirely to changes in the consumer price level. For small changes, the percentage change in the wage level is roughly equal to the percentage change in the consumer price level. This is an important result—one that we will use in the next paragraph.

The total consumer price level in an area is a weighted average of several different components, including the price of shelter, the consumer price level of local goods and services, and the price level of tradables (that is, the price level of non-local goods that may be imported). Once again, changes in the price level must be a result of changes in its component parts. For our purposes, we can assume that the price of tradables has remained unchanged since 2000. We can further assume that changes in the price of local goods and services are equal to changes in the wage level. Therefore, the change in the price level in an area is determined by the change in the price of shelter and the change in the wage level. Remember from above, however, that the percentage change in the price level is equal to the percentage change in the wage level. This yields the result that changes in the wage level are a function of changes in the price of shelter. Mathematically, this is

$$\Delta W = [(\alpha+\beta\varrho)/(1-\beta\lambda)]\ \Delta R,$$

where α is the share of shelter in consumers' budgets, β is the budget share of local goods and services, ϱ is the share of land and structures in local firms' production costs, and λ is the share of local labor in local firms' production costs. The term $(\alpha+\beta\varrho)/(1-\beta\lambda)$ is the rent-to-wage impact coefficient, that translates an exogenously caused change in the cost of shelter or rent, ΔR, into a change in wages, ΔW.

If we now suppose, for example, that α is 0.2, β is 0.3, ϱ is 0.2 and λ is 0.5—that is, households spend 20 percent of their budgets on rent and 30 percent on

[3] See Appendix A for a more formal analysis.

local goods and services, while rent accounts for 20 percent and local labor for 50 percent of firms' costs—then we find that

$$\Delta W = 0.31\ \Delta R.$$

In other words, a one percent increase in the price of shelter only increases the wage level by about three-tenths of one percent. Miami has experienced a growth in the price of shelter of approximately 40 percent since 2000. On an annualized basis, this is a growth rate of about five percent per year. However, if our previous analysis is correct, then the real increase in the price of shelter has only been responsible for a 1.5 percent per year real increase in the Miami wage level.

Real apartment rents, as indicated in our earlier table, rose by 11 percent in Miami and by seven percent in Florida. This would indicate real wage gains attributable to the higher price of shelter of just over three percent in Miami and just over two percent in Florida. According to the consumer price index, the cost of shelter in Miami rose 40 percent over the seven years from March 2000 to March 2007, compared to 25 percent nationally and compared to a 20 percent increase in the national CPI. That suggests that the real price of shelter rose by about five percent nationally and 17 percent in Miami. Since the change in apartment rents was nominally 32 percent in Miami and 27 percent in Florida overall, we estimate that the increase in the CPI shelter cost for all of Florida might be perhaps 35 percent nominally, for perhaps a 12 to 13 percent real increase. Combining houses and apartments, we think the effect of Florida's housing boom on real wages, other things the same, should be to raise them by around four percent, compared with 1.5 percent nationally. Of course, some parts of the state experienced larger increases than others. If the wages make up roughly 75 percent of local government spending, then the effect of higher shelter costs would be to raise local government costs by approximately three percent. Of course, housing costs are only one determinant of the total cost of local government wages. More generally, Florida's local governments must match wages in other states and in the private sector.

Conclusion

Despite dramatic increases in home prices in Florida, apartment rent, the actual rent of tenant-occupied houses, and (assuming housing markets are reasonably efficient) the implicit rental cost of owner-occupied houses has increased only moderately in percentage terms since 2000. The difference in the percentage growth between home prices and the price of shelter has been caused by a decrease in the user cost, one result of falling interest rates and rising levels of home appreciation in certain areas of the country. We approximate the wage level as a function of the consumer price level and the level of amenities in an area. Since home prices are not a component of the price level, they have

no direct effect on wages; therefore, the dramatic increases in home prices since 2000 have raised wages in Florida less than one might expect intuitively. Even increases in the price of shelter have had only a limited impact on the wage level.

Acknowledgements

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Appendix A: An Illustrative Derivation of the Effect of Rent on Wages

As an illustrative approximation of the effect of changes in rent or shelter costs on local wages, we begin by assuming that both households' preferences or utility functions and firms' production technology fit the Cobb-Douglas model, a useful and frequently used first-order geometric Taylor's series approximation to the true preferences and production technology. We classify all goods into three categories: housing (H), local services (L), and transportable goods (T). We will assume that amenities (A) simply scale utility. We will measure amenities so that a ten percent increase in amenities provides the same utility gain as ten percent higher wages. That is, amenities enter multiplicatively in the utility function as the constant fraction of income the worker will give up to live in city *i* instead of the reference city.

On these assumptions, household utility in city *i* is $U_i = A_i H_i^{\alpha} L_i^{\beta} T_i^{\gamma}$ and the consumer price index for city *i*, P_i^u is constructed as a weighted geometric mean of prices in city *i* relative to the prices in a reference area, city 0. We assume that all households have the same skills and preferences, and move freely among cities. That implies that wages must adjust so that in equilibrium households have the same utility everywhere. Letting W_0 be the wage in the reference location in equilibrium, the wage W_i in city *i* at time *t* is:

$$W_{it}=W_{0t}P_{it}^u/A.$$

It follows that the log difference in wages in city *i* from time 0 to time 1 is:

$$\ln W_{i1}-\ln W_{i0} = \ln W_{01}-\ln W_{00} + \ln P_{i1}^u-\ln P_{i0}^u.$$

With perfectly competitive markets, α, β, and γ are the household budget shares of housing, local goods, and transportable goods. Similarly let ϱ, λ, and τ be the cost shares of land and structures (ϱ), labor (λ), and transportable goods (τ) in local production, also assumed to be perfectly competitive. Thus, ϱ, λ, and τ will be the weights in a producer price index, P_i^P, analogous to the consumer price index. The differential log change in local wages relative to the reference location is:

$$d\ln W_i-d\ln W_0=\alpha(d\ln R_i-d\ln R_0)+\beta(d\ln P_{Li}-d\ln P_{L0}),$$

or

$$d\ln W_i-d\ln W_0=\alpha(d\ln R_i-d\ln R_0)+\beta(d\ln P_{pc}-d\ln P_{p0}),$$

or

$$d\ln W_i-d\ln W_0=\alpha(d\ln R_i-d\ln R_0)+\beta(\varrho d\ln R_i+\lambda d\ln W_i-\varrho d\ln R_0-\lambda d\ln W_0).$$

Solving gives:

$$d\ln W_i-d\ln W_0 = [(\alpha+\beta\varrho)/(1-\beta\lambda)](d\ln R_i-d\ln R_0).$$

Suppose that rent is 20 percent of households' budgets, local goods are 30 percent of households' budgets, land and structures are 20 percent of firms' production costs, and local labor is 50 percent of firms' production costs. That

is, assume α is 0.2, β is 0.3, ϱ is 0.2 and λ is 0.5. In that case, $(\alpha+\beta\varrho)/(1-\beta\lambda)$, the rent-to-wage coefficient, would be 0.31, or approximately one-third. Though both these assumptions and the method used here are far from precise, they serve to illustrate that the percentage increase in wages caused by a given percentage increase in rent will be substantially less than one for one, and probably around a third.