Impact of Property Taxes and Public Education Outlays on Housing Costs: Recent Empirical Evidence

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ABSTRACT

This empirical study investigates the impact of property taxes, public education outlays, and other factors on interstate differentials in the cost of housing. While the literature on geographic cost-of-living differentials is well developed, the literature on geographic cost-of-housing differentials is much less so housing costs consist of the price of housing ***per se*** *for owners (including maintenance and repairs) or rental payments* ***per se*** *for renters. Relevance of this research is elevated by the fact that the cost of housing is the main driver of cost-of-living differences between states. OLS results imply that the cost of housing is positively a function of median family income, miles of shoreline, and the mean January temperature, and negatively a function of toxic waste releases and the presence of right-to-work laws. Finally, it is found that property taxes are capitalized into housing prices, thereby lowering those prices and the overall cost of housing, as it is narrowly defined, whereas there is modest evidence that public education outlays may also be capitalized into housing prices, thereby elevating the cost of house.*

INTRODUCTION

Determinants of geographic living-cost differential (L-CD's) in the U.S. has attracted the interest of a large number of researchers including Cebula (1980, 1989), Cebula & Todd (2004), Cobas (1978), Ostrosky (1983), McMahon (1991), Nord (2000), and Kurre (2003). The study of geographic L-CD's is of interest given that such differentials have consistently been found to be significant in explaining geographic mobility in the U.S. (Renas, 1978, 1983; Cebula, 1978, 1993; Cebula & Alexander, 2006; Ashby, 2007). Most of the published L-CD related research to date has tended to focus on states, metropolitan areas, or counties.

Less well developed is the literature on interstate housing-cost differentials *per se*. Based on the database adopted in this study, housing costs consists of two components: (1) the housing price (for homeowners), inclusive of home maintenance and repair costs, and (2) the housing price for renters, i.e., rent *per se*. Outlays on residential housing constitute approximately 40 percent of total expenditures by households. As Ashby (2007, p. 686) observes, "…housing…is the main driver of cost-of-living differences between states." Hence, improved knowledge of determinants of housing-cost differentials *per se* may shed at least indirect light on the underlying causes of interstate living-cost differentials. Accordingly, the objective of this study is to identify determinants of interstate differentials in the cost of housing (as defined). This study focuses on interstate housing-cost differentials for the year 2006.

THE CONTEXT

In this study, the average overall cost of housing in each state, which takes the form of an index with a mean value of 100.00, consists of two primary components. First, for property owners residing in their own homes, most fundamentally there is the price *per se* of housing (PH), which includes the cost of home repair and maintenance. Property taxes are expressly *excluded* from the computation of PH. For non-owners, the "price" of residential housing is reflected simply by their rental payments (RENT). Naturally, abstracting from cases of rent-controlled residential housing, residential rental payments tend to significantly reflect the underlying price (market value) of housing units being rented:

$$RENT = f\ (PH, \ldots),\ F_{PH} > 0 \quad (1)$$

It follows in turn that factors that influence PH should, to at least some degree, similarly influence the rental cost of residential housing, i.e., RENT. Stated somewhat differently, while certainly not synonymous, housing prices *per se* and rent paid for the use of housing units *per se* are likely to be influenced by similar sets of forces, be they fundamentally economic in nature, environmental in nature (e.g., either amenities or dis-amenities), or reflective of public policy in nature, such as property taxes and public education outlays. Clearly, whatever factors influence PH and/or RENT will of course affect COH, the overall average cost of housing.

The analysis adopts state-level data, with Washington, D.C. being excluded. To begin the development of the framework for the analysis, it is hypothesized that the higher the median family income (MFIj), the greater the overall demand for housing and hence the higher the overall level of housing prices and rents, *ceteris paribus*. Hence, the overall cost of housing in state j, COHj, is expected to be an increasing function of MFIj, *ceteris paribus.* In principle, this argument is consistent with previous research (Cebula & Todd, 2004; Cobas, 1978; Ostrosky, 1983; Kurre, 2003) that has found that the average overall price level in a regional economy responds positively to an increase in per capita income, the effects of which are transmitted to regional price levels through an increase in the overall demand for goods and services.

The housing prices (and rent levels) comprising the overall cost of housing, COH, are likely to be significantly influenced by environmental considerations. To begin, the roles of a more favorable climate and/or other positive environment amenities have been shown to be determinants of migration that may be capitalized in housing prices (Cebula, 1978; Cebula & Alexander, 2006). In this analysis, climate is proxied by the mean January temperature, JANTEMPj. This variable can be used to reflect warmer winter climates, i.e., climates with either warm or at least milder winters. Treating warmer winter temperatures as a desirable environmental characteristic, it is reasonable to expect that warmer winter (i.e., higher average January) temperatures presumably may be capitalized into housing prices and rents. Accordingly, COHj is expected to be positively related to JANTEMPj, *ceteris paribus.* Similarly, greater access to the coastal areas (COASTALj), measured in this study as the number of miles of coastal shoreline on the Atlantic Ocean, Gulf of Mexico, and Pacific Ocean, is generally regarded as a positive environmental amenity (Cebula & Alexander 2006). As such, it can also be expected to be capitalized into housing prices and rents. Consequently, COHj is hypothesized to be an increasing function of COASTALj, *ceteris paribus*.

Next, the effect of toxic chemical releases (TOXj), measured on a per square mile basis, on COHj is considered. This variable reflects pollution conditions in each state, and as an undesirable environmental feature, is also expected to be capitalized into both housing prices and, indirectly, into rents. In particular, higher levels of toxic chemical releases are thusly expected to reduce the demand for and hence the price of housing and rent levels, *ceteris paribus*. Similarly, the presence of a negative environmental condition such as hazardous waste sites (HAZARDj) would be regarded as a dis-amenity that would be capitalized into housing prices, such that COHj would also be a decreasing function of HAZARDj, *ceteris paribus*.

Yet another form of environmental condition is that of crime. A higher level of violent crime, $CRIM_{Ej}$, can reasonably be regarded as a form of negative environmental characteristic. As such, *ceteris paribus*, it would be expected to be capitalized into housing prices and rents, and it would act to lower housing demand. As a consequence, it follows that COHj is hypothesized to be a decreasing function of CRIMEj, ceteris *paribus*.

Section 14(b) of the Taft-Hartley Act provides that each state shall have the right to enact "right-to-work" laws, laws that provide workers/employees the legal right to refuse to join unions in their place of employment. By nature, states with right-to-work laws (RTWj) tend to be states with weaker labor union influences. Accordingly, as found in Cebula (1980), Ostrosky (1983) and Lacombe (2006, P. 402), it is argued that because of weaker labor union power, the unit costs of production are typically lower in states having right-to-work legislation. These lower labor costs also presumably apply to housing construction. Lower labor costs of housing construction in right-to-work states are in turn then hypothesized to be reflected in lower housing prices and, to at least some degree, in lower rents, *ceteris paribus*. Logically, it then follows that COHj is expected also to be a decreasing function of RTWj, *ceteris paribus.* Furthermore, in states with right-to-work laws, weaker labor unions might well also imply lower repair and maintenance costs for housing, i.e., possibly lower costs of carpentry, electrical repairs, and plumbing work. If true, this would reinforce the negative impact of RTWj on COHj.

Finally, there is the impact of government taxes and outlays on the cost of housing to consider. Based on Tiebout (1956) and Tullock (1971), it is expected that the impact of government policies such as property taxes and public education spending would be capitalized into housing prices. As Tiebout (1956, p. 418) hypothesizes, given the pattern of revenue and expenditure pattern "…the consumer-voter moves to that community whose local government best satisfies his set of preferences." Consumer-voters will, as Tullock (1971) also suggests, consider the bundle of taxes and local public goods when deciding where to live. Thus, a consumer-voter will capitalize the property tax (PROPTX) associated with a unit of housing into its price; similarly, a consumer-voter will capitalize the value of public goods and services associated with that unit of housing into its price.

In terms of the present study, then, the property tax will be capitalized into the cost of housing (which capitalization would *lower* the price of housing), whereas the government expenditures on, say, public education will also be capitalized into the cost of housing (which capitalization would tend to *raise* the price of housing). In particular, it is hypothesized in this study that COHj is a decreasing function of PROPTXj (measured here as the per capita property tax burden in state j), *ceteris paribus*, and an increasing function of PUBEDSPj (per capita public education outlays in state j), *ceteris paribus*.

Based upon the aforementioned arguments, the cost of housing in a state is modeled by:

COH = f (MFI, JANTEMP, COASTAL, TOX, HAZARD, CRIME, RTW, PROPTX, PUBEDSP), $f_{MFI} > 0$, $f_{JANTEMP} > 0$, $f_{COASTAL} > 0$, $f_{TOX} < 0$, $f_{HAZARD} < 0$, $f_{CRIME} < 0$, $f_{RTW} < 0$, $f_{PROPTX} < 0$, $f_{PUBEDSP} > 0$ (2)

EMPIRICAL MODEL AND FINDINGS

Based on the eclectic model developed above, the following reduced-form equation is estimated:

$COHj = a_0 + a_1\ MFLj + a_2\ JANTEMPj + a_3\ COASTALj + a_4\ TOXj + a_5\ HAZARDj + a_6\ CRIMEj + a_7\ RTWj + a_8\ PROPTXj + a_9\ PUBEDSPj + u$ (3)

where:

COHj = the overall cost of housing in state j in the first quarter of the year 2006, expressed as an index (the latter index has a mean value = 100.00);

MFIj = the median family income level in state j, 2004;

JANTEMPj = the mean January temperature in state j;

COASTALj = the number of miles of coastal shoreline in state j along the Atlantic Ocean, the Gulf of Mexico, and the Pacific Ocean;

TOXj = toxic chemical releases into the air, water, or land of state j, in thousands of pounds, divided by the total number of square miles in state j, 2004;

HAZARDj = the number of hazardous waste sites in state j, divided by the number of square miles in state j, 2004;

CRIMEj = the number of violent crimes in state j per 100,000 population, 2004;

RTWj = a binary variable indicating whether state j is a right-to-work state: RTWj = 1 for those states where right-to-work laws are in effect, and RTWj = 0 otherwise;

PROPTXj = per capita state plus local property tax level in state j in 2002; and

PUBEDSPj = per capita state plus local government spending on public education in state j, 2002.

Based on the arguments provided in the previous section of this study, it is expected that:

$a_1 > 0, a_2 > 0, a_3 > 0, a_4 < 0, a_5 < 0, a_6 < 0, a_7 < 0, a_8 < 0, a_9 > 0$ (4)

The date sources are as follow:

COH: ACCRA (2007); MFI, JANTEMP, COASTAL, TOX, HAZARD, CRIME, PROPTX, PUBEDSP: U.S. Census Bureau (2006, Tables, 680, 378, 345, 367, 297, 431, 431, 17);

RTW: U.S. Census Bureau (2005, Table 640).

Estimating equation (4) by OLS, adopting the White (1980) correction for heteroskedasticity, yields the following:

$$COHj = 64.27 + 0.0003^{**}\ MFIj\ \ 0.364^{**}\ JANTEMPj + 0.00039^{**}\ COASTALj - 4088.2^{**}\ TOXj - 4.08\ HAZARDj$$
(+3.29) (+4.58) (+2.73) (-4.01) (-1.33)

$$-\ 0.0057\ CRIMEj - 7.18^{**}\ RTWj - 0.00063^{*}\ PROPTXj + 0.0083\ PUBEDSPj$$
(-1.19) (-3.54) (-2.30) (+1.95)

$R^2 = 0.70$, adj$R^2 = 0.63$, F = 10.23** (6)

where terms in parentheses are t-values and ** indicates statistical significance at the one percent level whereas * indicates statistical significance at the five percent level.

In estimation (6), all nine of the estimated coefficients exhibit the expected signs, with five being statistically significant at the one percent level, one being significant at the five percent level, and one being significant at the six percent level. The coefficient of determination of 0.70 implies that the model explains roughly seven-tenths of the interstate variation in the cost of housing as defined. Finally, the F-statistic of 10.23 attests to the overall strength of the model.

In equation (6), the estimated coefficient on variable MFI is positive and significant at the one percent level. This finding seemingly implies that the higher the median family income, the greater is the demand for housing and hence the higher is the cost of housing. The coefficient on variable JANTEMP is positive and significant at the one percent level. This supports our hypothesis that the warmer the mean January temperature, the greater the cost of housing, since this amenity is capitalized into the price of housing. The estimated coefficient on the COASTAL variable is also positive and significant at the one percent level, implying that the greater the number of miles of shoreline (as defined), the greater the demand for housing. Alternatively stated, the number of miles of shoreline is regarded as an amenity, one that is capitalized into hosing prices and hence raises the cost of housing. The estimated coefficient on the variable TOX is negative and significant at the one percent level, lending support for our hypothesis that the higher the level of toxic emissions, the lower the cost of housing since this dis-amenity is capitalized into the price of housing. Although the coefficient on the HAZARD variable is negative, as expected, it fails to be significant at an acceptable level. Thus, this variable does not appear to be a factor in either the price of housing or the cost of housing. The estimated coefficient on the crime variable, CRIME, is negative, as hypothesized, but not significant at the ten percent level. This outcome implies that the higher levels of violent crime are not capitalized into the price of housing. Next, the estimated coefficient of the RTW variable is negative, as expected, and significant at the one percent level. This finding implies that right-to-work laws and thus weaker labor unions imply have lower unit labor costs. This in turn arguably reduces the cost of housing construction (and perhaps even the cost of housing repair and maintenance), which in turn reduces the cost of housing where right-to-work laws exist. The estimated coefficient on the property tax variable, PROPTX, is negative as hypothesized and statistically significant at the 2.5 percent level. Thus, as one would logically infer from the works by Tiebout (1956) and Tullock (1971), property taxes are capitalized into housing prices, with the result being that higher property tax levels reduce housing prices and hence reduce the cost of housing. Finally, the estimated coefficient on the PUBEDSP variable is positive, as hypothesized, and statistically significant at the six percent level. Clearly, since this variable is nearly significant at the five percent (i.e., at an "acceptable") level, it is reasonable to infer that there is at least modest support for the hypothesis that a higher level of state plus local public education spending per capita maybe capitalized into housing prices and hence lead to a higher cost of housing.

CONCLUSION

This analysis empirically finds that the cost of housing (as defined) is an increasing function of median family income, the mean January temperature, and the number of miles of shoreline on the Atlantic Ocean, Gulf of Mexico, and Pacific Ocean. In addition, the overall cost of housing appears to be a decreasing function of toxic chemical releases and the presence of right-to-work laws. Finally, the cost of housing appears to be a decreasing function of property taxation levels. That is, there is evidence that property taxes are capitalized into housing prices and thereby reduce the cost of housing *per se*. Furthermore, there is modest evidence that per capita public education spending is capitalized into housing prices and thereby raises the cost of housing *per se*.

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