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An Efficiency Comparison of City Managers and Elected Mayors*

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Abstract

Previous research has concluded that there are no efficiency differences between elected mayor-council (EMC) and council-manager (CM) city governments. However, the CM form has recently surpassed the EMC form to become the most popular U.S. city government. This paper provides an alternative method of testing the relative efficiency of the two forms of government. Relying on capitalization theory of local public goods, I develop a hedonic price model for Ohio metropolitan home sales. Results show that houses within a CM city have a pricing premium that can be attributed to the relative efficiency of the CM government.

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I. Introduction

Historically, the majority of U.S. city governments have adopted either an elected mayor-council (EMC) or council-manager (CM) form of government. Several economists and political scientists have attempted to find efficiency differences between the competing forms of city government. The hypothesized difference is based on the theory that a city manager has an efficiency advantage over a popularly elected mayor in providing local public goods because of the different incentive structures faced by the two city leaders. However, past studies that analyze common city government expenditures have found no significant differences in the two forms of government.[1]

The finding of no efficiency differences is surprising given the current trend of cities adopting the CM form of government. As reported by the International City/County Management Association (ICMA), the CM government is currently the fastest growing form of U.S. city government, which has recently made it the most popular form in U.S. cities. The city governments adopting the CM form have to expect some kind of benefits from their decision, or else, they would not have chosen the CM form.

The purpose of this paper is to use a different methodology to search for efficiency differences between the two forms of government, in part, to provide a possible explanation for the recent trend towards adopting the CM form of city government. In order to build upon the previous literature's use of common government expenditures and account for the total value of public goods provided, this paper relies on the theory that the provision of local public goods, and the manner in which they are

[1] The analysis of "common" governmental expenditures refers to the fact that the studies limited their analysis to only expenditures that comprise significant portions of almost all city spending, which generally included expenditures on police protection, fire protection, and refuse collection.

produced, is capitalized into housing prices. This alternative methodology, which captures the entire scope of the cities' public services capabilities, may help reveal any efficiency differences in the two forms of government, if they exist.

House-selling prices for 1991 home sales were analyzed for twenty-two cities located in the six largest metropolitan areas in Ohio. Specifically, house-selling prices were estimated using a log-linear hedonic technique, and results show that houses within a CM city have a pricing premium that can be attributed to the relative efficiency advantage of the CM form of government. Furthermore, houses within a metropolitan area that has a CM central-city government have a pricing premium that can also be attributed to the relative efficiency of the CM form of government.

The set up of this paper is as follows. Section-II will further characterize the two forms of city government, with emphasis on the roles of city managers and mayors. Section-III will present previous city government research, and highlight the current trend towards adopting the CM form of government in the United States and Ohio. Section-IV will set up the hedonic price model and describe the incorporated data. Section-V will outline the estimation results. Finally, Section-VI will present concluding remarks.

II. Characteristics of City Managers and Elected Mayors

The major distinction between the two forms of government is who controls the power to make decisions about city budgeting and daily government operations. Generally, the city manager in the CM form and the mayor in the EMC form control the day-to-day city operations. Typically, these two city officials have different occupational incentives and political motivations that will, in theory, influence the provision of local public goods.

The CM government consists of a city council, a city manager, and a ceremonial mayor. The city council, comprised of elected officials, hires a city manager that provides policy advice, conducts the daily city government operations, hires and fires city personnel, and is responsible for the city budget preparation. The mayor of the CM government is often selected from within the council members or is popularly elected, and is reserved for only ceremonial purposes with no administrative responsibilities.

The CM form of government was a product of the progressive government reform movement that started in the early 1900s in response to corruption and inefficiencies that were becoming apparent in major eastern U.S. cities.[2] As stated by White (1927), city managers have a deep obligation to conduct the affairs of the city with integrity and efficiency, without acting in a partisan manor. Clearly, the movement envisioned nonpartisan, political administrators that would efficiently run the daily operations of the city. City managers are typically hired based on their educational background, experience, and administrative ability, without regard to their political views, and they have incentive to act, as the name suggests, as managers of the city operations.

The city manager position was also envisioned as a way to ensure that public policies would be designed to promote long-term city growth and development. This can be seen in the fact that city managers are not legally limited in the number of years they can serve a given city. According to the ICMA, *State of the Profession Survey, 2000*, the average tenure of a city manager is 17.4 years. This prolonged tenure will allow the city manager to enact policies that promote long-term efficiency in the production of local public goods.

[2] According to the IMCA, the first recognized city manager position was instituted in 1908 by Staunton, Virginia, and the first large U.S. city to institute a city manager was Dayton, Ohio, in 1914.

In contrast to the ceremonial mayor in the CM form of government, the mayor in the EMC form has significant political authority. The EMC mayor is popularly elected and has the responsibility for day-to-day operations, hiring and firing department heads, and preparing and administering the city budget. The EMC government has an elected city council that performs some legislative duties; however, the authoritative mayor usually limits the council's political power. The EMC mayor's term of service varies in length at the discretion of each city's bylaws (usually two to four years), and the number of terms the mayor can serve may be limited according to the practices of the city.

This paper argues that the political skills that lead to a mayor's election do not necessarily correspond with the administrative abilities that will produce an efficient provision of local public goods. For example, Weingast, Shepsle, and Johnson (1981) have shown that politicians consistently overstate the benefits of a given project, in order to gain popular support for their programs. The altering of the cost-benefit accounting of government projects drives the political process away from efficiency, and this inefficient behavior is due to the fact that politicians are vote maximizers that only care about the issues that are currently relevant to their jurisdictions. In this respect, the CM government may prove to be more efficient than the EMC form because the city managers are not directly subject to the voting pressures that lead to the administrative inefficiencies.

Also, the fact that the average city manager's tenure is quite prolonged shows that they are removed from the "short-sighted" political pressures to temporarily appeal to voters. The prolonged service to a given city allows the city manager to direct the city towards long-term efficiency, growth, and development, which contrasts with the political motivation of mayors to produce short-term benefits with unclear future costs in

the face of re-election motives. Public choice theory recognizes that elected officials define their best interests in terms of re-election, which makes them more susceptible to pressure from groups that are able to influence election outcomes. Since a mayor's political service is usually limited to two to four years over one elected term, the mayor will have increasing re-election pressures that may move them more towards enacting projects that appease such special interest groups, regardless of economic efficiency.[3]

III. Previous City Government Research and the Trend Toward City Managers

Despite the hypothesized efficiency advantage of city managers, past studies have not conclusively shown that significant differences exist between the two forms of government. One of the first comparisons of the government forms was conducted by Booms (1966), which analyzes the determinants of per capita common expenditures for selected Ohio and Michigan cities. The author shows that CM cities have lower per capita public spending levels than EMC cities.[4] This result supports the hypothesis that CM governments are relatively more efficient than EMC forms.

Boom's (1966) original findings have not been supported by more recent empirical analyses. Deno and Mehay (1987) apply a median voter framework to a similar data set as the one used by Booms (1966), including observations only from Michigan and Ohio, and find no significant differences in common expenditures of the two forms of government. The authors then extend their analysis beyond the two states and analyze

[3] For further discussion on the influence of special interest groups and lobbying efforts on the behavior of politicians and the ability to bias public projects refer to Grossman and Helpman (2001).

[4] A difference in means test was used to compare the per-capita total city expenditures of the 22 Ohio cities analyzed in this paper, and the test showed that there is no statistical difference between the spending levels of the two forms of city government.

several randomly selected US cities, and again find no significant differences. [5] Modeling city government as a multi-product firm, Hayes and Chang (1990) show that there are no efficiency gains associated with the CM form of government. The authors analyze the provision of common public services offered by the two forms of city government and find no difference in relative productive efficiency. Likewise, Davis and Hayes (1993) construct efficiency measures for selected Illinois municipal police departments based on the costs of producing police protection services and the estimated output of police services. The authors show that the presence of city managers does not significantly impact the police department efficiency measures.

Duffy-Deno and Dalenberg (1990) provides evidence contrary to the popular finding that city form of government does not matter, by analyzing twenty-six cities' capital usage rates employed to produce local public goods. Although the authors do not directly test for efficiency differences, they show that EMC cities consistently have significantly higher capital-input usage rates than CM cities. The results are explained based on the argument that city managers may view capital and labor as simply inputs in a production function, while mayors may intend to use the inputs as political assets. Thus, the higher EMC capital-input usage rates are produced by the incentive of mayors to undertake more highly visible public works projects in order to influence public opinion, which may be undertaken in disregard to efficiency accounting criteria.

Despite the fact that previous studies have provided no conclusive evidence of a relative CM efficiency advantage, it is currently the fastest growing form of government

[5] Deno and Mehay (1987) also tested if the city form of government affects municipal wages and compensation levels for all municipal employees, and conclude that the city form of government does not affect labor compensation. Other studies have found similar results; see Ehrenberg and Goldstein (1975), Bartel and Lewin (1981), and O'Brien (1992, 1995).

in the United States. As shown in Table 1, between 1976 and 2001, the EMC form of government lost twenty-four percent of the share of U.S. cities and ten percent of the share of Ohio cities; while the CM form of government gained eighteen percent of the share of U.S. cities and ten percent of the share of Ohio cities. This movement toward the CM form of government has recently made it the most popular among U.S. cities.

[Insert Table 1 about here]

The city governments making the transition to a CM form and the cities adopting the CM form upon their incorporation have to expect to some kind of benefits from their choices, or else they would not adopt the CM government. The benefits received may be in the form of efficiency gains brought on by the presence of a city manager. Such efficiency gains may have gone undetected by earlier research because of the emphasis on analyzing only a limited set of common city government expenditures. As acknowledged by Hayes and Chang (1990), the efficiency differences may be captured in smaller city budget expenditure areas. Ultimately, the total value of all the public goods, along with the costs of providing them, needs to be analyzed. Accordingly, the value of local public goods, the taxes used to finance them, and any efficiency advantages to the CM form of government are capitalized into house-selling prices.

IV. Hedonic Price Model and Data Description

Generally, the hedonic price model estimates house-selling prices as a function of structural house characteristics, city characteristics, and governmental influences. More specifically, the house selling price in the hedonic model framework, adapted to include the city form of government influence, takes the following form:

$$P_H = P_H (S, C, G)$$

where P_H is the house-selling price, S is a vector of structural house characteristics, C is a vector of city characteristics, and G is a vector of city government influences.

The focus of the current analysis is on the influence that a city's form of government has on selling prices of homes in that jurisdiction. It is hypothesized that the differences in the provision of local public services may reveal efficiency differences between the two forms of city government, which the hedonic price estimation technique lends itself to directly testing. The hedonic price model analysis imbeds the theory that the value of all local public services, and the taxes used to finance them, is capitalized into house-selling prices.[6] Therefore, the net effect of the two local government functions is what is actually being capitalized into the house-selling prices.[7] In other words, the selling prices pick up the influence of the value of the public goods provided, net of the cost of the city property taxes used to finance them.

If the value of the public goods outweighs the cost of provision, then the net effect of the city government is positive, which shows the city government is operating efficiently.[8] A positive net effect would result in higher house-selling prices producing a pricing premuium. It is hypothesized that city managers will conduct the city government affairs more efficiently relative to the EMC form of government; so, if the relative efficiency advantages exist, they will show up as a pricing premium in the estimation of house selling prices.

[6] For relevant literature on the capitalization of local public services into house values refer to Oates (1969), Rosen and Fullerton (1977), Brueckner (1979), or Yinger (1982).
[7] It should be noted that state government influences are also capitalized into house-selling prices; however, these influences are held constant because all the home sales are from cities within Ohio.
[8] Likewise, if the costs of taxation outweigh the value of the public services, then the net effect of the government influence would be negative, implying that the government is operating inefficiently.

The house-selling prices and house structural characteristics are based on the data set used by Haurin and Brasington (1996, 2001) and Brasington (1999, 2000, 2001). The house prices are from homes sold in 1991 in twenty-two selected cities in the six largest Ohio metropolitan areas.[9] There was a total of 37,441 home sales used in the estimation process, and the mean deflated house-selling price was $69,312. Conveniently, the sample of twenty-two cities is split fifty-fifty between the two forms of government, with eleven cities having the CM form and eleven cities having the EMC form.[10] Generally, the house sales are somewhat evenly distributed between the two forms of government, with roughly 40 percent of the house sales occurring in CM cities and 60 percent occurring in EMC cities.

[Insert Table 2 about here]

Table 2 presents summary statistics, definitions, and sources for the dependent and independent variables used in the estimation process. The structural house characteristics and city characteristics were chosen to follow closely what has been used in previous hedonic price model analysis.

New to this paper, two CM dummy variables are included to capture both city and central-city effects. More specifically, all regression specifications included a CM city government dummy and a CM central-city government dummy to capture the separate

[9] Analysis of Ohio house sales is beneficial in order to directly compare to earlier studies such as Booms (1966) and Deno and Mehay (1987). The current sample of house selling prices includes homes that were located in the central cities, as well as, surrounding city. The six central cities include Akron, Cincinnati, Cleveland, Columbus, Dayton, and Toledo, while the surrounding cities, based on data availability, were Barberton, Brunswick, Cuyahoga Falls, Elyria, Fairborn, Fairfield, Gahanna, Hamilton, Kent, Lorain, Mentor, Middletown, North Olmsted, Reynoldsburg, Stow, and Westerville.

[10] Moreover, the six central cities are evenly spilt between the two forms of city government; Cincinnati, Dayton, and Toledo have the CM form of government, while Akron, Cleveland, and Columbus have the EMC form.

influences that each local government might exert on house values.[11] The central-city dummy is included because the performance of the central-city government should not only influence the selling prices of homes located in its borders, but also the selling prices of the homes located within the metropolitan area. This comes from the fact that many residents of the surrounding cities work or recreate in, or travel through, the central city. As demonstrated by the findings of Voith (1993) and Haughwout (1997), the provision of an infrastructure of central-city public goods produces benefits that extend beyond the central-city's borders and are captured in the increased house values of the surrounding suburban areas.

By testing if the CM dummy variables are significant after controlling for structural house characteristics and city-specific influences, the current study can provide evidence on whether the influence of the CM form of government is more highly valued in the housing market than the EMC form. Furthermore, any such capitalization will capture the difference between the two forms of government, and therefore, reflect the value that residents place on the relative efficiency of the CM form of government.

Several city-specific influences are controlled for in the estimation of each regression. There are three economic influences: property taxes, expenditures, and unemployment rates. General capitalization theory states that higher property tax rates result in lower house-selling prices, while greater public expenditures results in higher house-selling prices. Thus, the property tax rate is expected to carry a negative sign and

[11] The CM city government dummy variable is equal to one if the house is located in a city with the CM form of government and is used to test the relative efficiency advantage of being in a CM city over an EMC city. The CM central-city government dummy variable is equal to one if the house is located in a metropolitan area where the central city has a CM form of government, and this variable is used to test the relative efficiency advantage of being in a CM-run metropolitan area over an EMC-run metropolitan area. In general, the CM dummy variables will be significant and positive if city managers offer local public services that are valued more than those offered by EMC mayors, net of the tax burden for each form of government.

the total government expenditure is expected to carry a positive sign. The city unemployment rates are included to directly control for the level of job availability (capacity) in each city. The unemployment rate is expected to carry a negative sign because cities with lower unemployment rates, or higher job availability, are relatively more attractive to live and work in, which should increase house values.

Other city-specific influences included measurements of climate, arts availability, percent white, and distance to the central business district (CBD).[12] Climate goodness, indicating favorable weather, and arts availability, as an indicator of the quality of recreational opportunities, are both expected to positively influence house values. Racial compositions have been shown to affect house values, and the percent white residents is expected to positively influence house selling prices. Finally, the location of the house, relative to the CBD is expected to positively influence the house value.

Four outcome variables, measuring school quality, police protection, and pollution are included in various regressions to serve as robustness checks to the influence that CM governments have on the quality of public goods. The average passage rate of the State of Ohio 9th-grade proficiency test and the percent of students in advanced placement curriculum are included in selected regressions to control for school quality. Both indicators of school quality are expected to positively influences house-selling prices. Burglary and Larceny crime rates are chosen because they are a direct measure of the threat imposed on the protection of the private property of homeowners. The

[12] The climate goodness index and arts availability index are both at the metropolitan-area level, while the percent white and distance to the CBD are measured at the school-district level. Also, the measures of school quality and police protection to be introduced in the proceeding paragraph are reported at the school-district level. The smaller and more defined measurement area will better characterize the specific-area influences of schooling and policing that affect each house value, while still serving the purpose of controlling for such influences.

burglary-larceny crime rate should be negatively correlated with house-selling prices, showing that high crime areas have lower house-selling prices. Finally, the average added cancer risk from air pollutants is included as an indicator of city pollution levels, where more pollution is expected to reduce house values.

V. Estimation Results

The hedonic price function relates the house-selling price to the structural characteristics of the home, the city characteristics of the residence location, and the form of the city government. The log-linear hedonic price function was estimated using least squares regression analysis and takes the following functional form:

$$\ln P_{Hi} = \beta_0 + \sum_{m=1}^{M} \beta_m S_{m,i} + \sum_{n=1}^{N} \beta_n C_{n,i} + \beta_p G_{p,i} + \beta_q MA_{q,i} + \varepsilon_i$$

where, $\ln P_{Hi}$ is the natural log of the selling price for house *i*, $S_{m,i}$ is the measure of the m^{th} structural variable for house *i*, $C_{n,i}$ is the measure of the n^{th} city characteristic for the residence location of house *i*, $G_{p,i}$ is the city form of government for the residence location of house *i*, and $MA_{q,i}$ is the metro area central-city form of government for the residence of house i.

[Insert Table 3 about here]

The log-linear hedonic price estimates are presented in Table 3.[13] The city characteristics all had the expected signs and remained significant throughout the four specifications. Also, the outcome variables had the expected signs and remained

[13] Table 3 presents the estimates of the city characteristics and form of government dummy variables, and the house structural characteristics are presented in Appendix Table A1, to give more focus to the variables of interest in the main text. It should be noted that the house structural characteristics all have signs and significant levels that are supported in the hedonic house price literature.

significant in the regressions that they were included in; except the measure of pollution exposure was not found to exert a significant influence on the estimated selling prices.

The focus of this paper is primarily on the differences in the two major forms of city government. Thus, the variables that are of particular interest to test for relative efficiency differences are the two CM dummy variables. After controlling for city taxes and expenditures, along with other city characteristics and outcome variables, the two CM dummy variables remain significant and positive throughout the four regression specifications. The coefficient estimates for the CM dummy variables imply that there is a positive net effect of the CM form of government relative to the EMC form on house selling prices. In other words, city managers offer local public goods that are valued more than EMC mayors, net of the cost of providing the public goods. The results support the hypothesis that the presence of a city manager produces a relative efficiency advantage for the CM form of government over the EMC form.

In comparing the magnitude and significance of the two CM dummy variables, the central-city CM dummy exerts a stronger influence on the house-selling prices. This finding would imply that the central-city government form may matter more than the form of government of the surrounding cities. Also, this result supports the findings of Voith (1993) and Haughwout (1997) that the central-city's provision of public goods influences the house values of the surrounding suburban areas, and adds to their findings, in that, the results show that the central-city form of government also influences the house values of surrounding suburban areas.

The percent effect of the CM government's influence on house-selling prices cannot be directly interpreted by the coefficient estimates appearing in Table 3 because of

the semi-logarithmic nature of the hedonic regression technique. Following the approach of Halvorsen and Palmquist (1980), the percentage effect that the CM form has on house-selling prices can be calculated as follows:

$$\alpha = [\exp(\beta) - 1] * 100$$

where, α is the percent effect of the CM form, and β is the coefficient estimate of the council-manager dummy variable. Calculations of the percentage effects were performed for the four regression specifications, and are presented in Table 4.

[Insert Table 4 about here]

Looking at the calculated percent effects shows that the CM central-city government form does exert a stronger impact on house-selling prices then the CM city government. The CM central-city government impact is on average around 10.9%, while the CM city government impact is on average around 3.5%. These two dummy variables capture the separate effects of (1) a house being located in a CM city relative to an EMC city, and (2) a house being located in a CM-run metropolitan area relative to an EMC-run metropolitan area. However, they do not capture the combined effect of being in a CM city that is located in a CM-run metropolitan area. In order to capture the combined impact, the two coefficient estimates were combined and then used to calculate the percent effect (also presented in Table 4).[14] The combined effect of a house located in a CM city and CM-run metropolitan area averaged 14.8%.

The calculated percentage effects were used to calculate the marginal implicit price (pricing premium) of adopting a CM form of government. Calculations of the

[14] To get the combined percent effect the following calculation was used: $\alpha = [\exp(\beta_1 + \beta_2) - 1] * 100$, where β_1 is the coefficient estimate of the CM city dummy, and β_2 is the coefficient estimate of the CM central-city dummy.

marginal implicit price of the CM government, evaluated at the mean house-selling price ($69,312), are produced using the following formula and are also presented in Table 4.

$$\rho = \alpha \cdot \bar{P}_H$$

where, ρ is the marginal implicit price of the CM government, and $\bar{P}_H$ is the mean house-selling price of the sample.

The marginal implicit price of the CM government is essentially the pricing premium that home owners would be willing to pay to live in a house located in a CM city, or CM-run metropolitan area, relative to living in the same house in an EMC area. The implicit prices show that residents would, on average, pay about $2,400 more to own a house in a CM city and about $7,500 more to own a house in a CM-run metropolitan area, relative to owning a house in an EMC area. Also, the results show that residents would, on average, pay $10,300 to own a house in a CM city located in a CM-run metropolitan area. Again, the pricing premiums can be attributed to the fact that city managers offer a superior basket of local public goods relative to EMC mayors, net of the tax burden created to finance the production of the local public goods.

VI. Concluding Remarks

The majority of U.S. city governments have adopted either an EMC form of government or a CM form. Several studies have attempted to find efficiency differences between the two competing forms of city government. However, past studies have not conclusively shown differences in the two forms of city government exist, which is surprising given the current trend of U.S. cities adopting the CM form of government.

This paper uses an alternative method of testing for city government efficiency differences and shows that efficiency differences do exist between the two forms of government. More specifically, this alternative method relies on the theory that the provision of local public goods, and the manner in which they were produced, are capitalized into housing prices. Thus, if the CM form of government has a relative efficiency advantage in the provision of local public goods, it will show up as a house pricing premium. After controlling for structural-house and city-specific characteristics, results show that houses within a CM city, or CM-run metropolitan area, have a significant pricing premium that can be attributed to the relative efficiency of the CM form of government over the EMC form.

These results contribute to the literature in that they are the first results since Booms (1966) that point to significant efficiency differences in the two forms of city government. Also, the results strengthen the findings of Duffy-Deno and Dalenberg (1990) that the city form of government does matter. Furthermore, the efficiency advantage can be used to explain the current U.S. trend towards adopting the CM form of city government. Finally, the results that the central city form of government influences the house selling prices of surrounding areas supports the literature based on the idea that the offering of central-city public goods affects suburban house values.

Clearly, the debate on whether the city form of government matters should be re-opened. Further research on the two competing forms of government is needed, and such exercises would be quite fruitful given the findings of this research. The alternative method of testing employed in this paper suggests that there is still more ways to approach the analysis of the impact of city government forms.

Table 1
Percent of U.S. and Ohio City Governments Having Each Form of Government, 1976-2001

	1976	1981	1986	1991	1996	2001
U.S. Total						
Elected Mayor-Council	58%	57%	55%	53%	49%	34%
Council-Manager	32%	34%	35%	37%	42%	50%
Ohio Total						
Elected Mayor-Council	80%	79%	78%	76%	74%	70%
Council-Manager	20%	21%	22%	24%	26%	30%

Note: Percentages may not sum to 100 because of omitted forms of government.
Source: ICMA, *The Municipal Year Book*, (1976-1999).

Table 2
Summary Statistics, Definitions, and Sources for Variables

Variable (source)	Mean	St. Dev.
Dependent Variables		
House-Selling Price (a)	69,311.82	41,571.95
Natural Log of the House-Selling Price (computed)	10.97	0.61
City Characteristics		
Council-Manager City Dummy =1 if CM form (b)	0.44	0.50
Council-Manager Central City Dummy =1 if CM form (b)	0.41	0.49
Property Tax Millage Rate Net of Tax Reduction Factors (c)	51.89	6.48
Total City Government Expenditures in Ten Millions of Dollars (d)	366,713.85	201,874.90
Civilian Unemployment Rate (d)	7.29	1.93
Climate Goodness Index (e)	565.72	19.65
Arts availability Index (e)	1166.52	450.08
Percent White Residents (f)	79.52	17.34
Distance to the Central Business District (f)	7.86	6.24
Ohio 9th-Grade Proficiency Test Passage Rate (g)	33.86	18.49
Percent Advanced Placement Students (f)	8.66	7.84
Burglary and Larceny Crime Rate Per Thousand Population, 1991) (h)	7.77	23.55
Average Added Cancer Risk from Air Pollution Sources (i)	816.21	103.63
Structural House Characteristics		
Quarter Two Sales Dummy =1 if house sold in Q2 1991 (a)	0.30	0.46
Quarter Three Sales Dummy =1 if house sold in Q3 1991 (a)	0.28	0.45
Quarter Four Sales Dummy =1 if house sold in Q4 1991 (a)	0.24	0.43
Air Conditioning (Dummy =1 if the house has central air-conditioning) (a)	0.34	0.47
Fireplace (Dummy =1 if the house has a fireplace) (a)	0.37	0.48
Lot Size (Size of the lot in thousands of square feet) (a)	9.75	8.34
Age (Age of the house in years) (a)	45.16	23.98
House Size (Size of the house in thousands of square feet) (a)	1.43	0.49
Garage Size (Size of the garage in thousands of square feet) (a)	0.32	0.19
Full Bathrooms (Number of full bathrooms) (a)	1.27	0.48
Part Bathrooms (Number of partial bathrooms) (a)	0.31	0.48
Unenclosed Porches (Number of unenclosed porches) (a)	0.79	0.74
Enclosed Porches (Number of enclosed porches) (a)	0.16	0.39
Patio (Dummy =1 if the house has a patio) (a)	0.20	0.40
Deck (Dummy =1 if the house has a deck) (a)	0.10	0.30
Pool (Dummy =1 if the house has a pool) (a)	0.01	0.11

Sources: (a) Amerestate, *Pace Net Data Set*, (1991); (b) ICMA, *The Municipal Year Book*, (1991); (c) Ohio Department of Taxation, *Property Tax Millage Rates*, (1991); (d) U.S. Census, *County and City Data Book*, (1994); (e) Savageau and Boyer, *Places Rated Almanac*, Pentice Hall, New York, NY (1993); (f) U.S. Department of Education, National Center for Education Statistics, *School District Data Book*, Washington, DC (1994); (g) Ohio Department of Education, *Ohio 9th-Grade Proficiency Test Passage Rates* (1990-1991); (h) Office of Criminal Justice Services, State of Ohio, *Crime by County*, (1994); (i) Environmental defense and get active software, *Average Individual's Added Cancer Risk*, www.scorecard.org, (2003).

Table 3
Log-Linear Hedonic Estimates of Ohio Metro Area House-Selling Prices, 1991
37,441 Observed House Sales (Absolute value of t-stats)

	[a]	[b]	[c]	[d]
Form of Government				
Council-Manager City Government	0.0355**	0.0355**	0.0406***	0.0269**
	(2.54)	(2.54)	(2.94)	(1.93)
Council-Manager Central-City Government	0.1007***	0.1010***	0.0973***	0.1164***
	(6.61)	(6.89)	(6.67)	(7.89)
City Characteristics				
Property Tax Rate	-0.0012*	-0.0012**	-0.0010*	-0.0047***
	(1.69)	(2.05)	(1.82)	(8.49)
Total Government Expenditures ($10,000,000)	0.1784***	0.1790***	0.1795***	0.2761***
	(10.55)	(13.32)	(13.35)	(20.99)
Civilian Unemployment Rate	-0.0223***	-0.0224***	-0.0216***	-0.0299***
	(11.25)	(12.62)	(12.35)	(17.43)
Climate Goodness Index	0.0007***	0.0007***	0.0008***	0.0008***
	(4.26)	(4.68)	(5.17)	(5.25)
Arts Availability Index	0.0001***	0.0001***	0.0001***	0.0001***
	(12.02)	(12.38)	(12.47)	(11.61)
Percent White Residents	0.0029***	0.0029***	0.0029***	0.0074***
	(13.23)	(13.25)	(13.29)	(49.05)
Distance to the Central Business District	-0.0047***	-0.0047***	-0.0049***	-0.0024***
	(7.24)	(7.54)	(7.82)	(3.88)
9^{th}-Grade Proficiency	0.0054***	0.0054***	0.0054***	
	(22.89)	(22.91)	(22.93)	
Percent Advanced Placement Students	0.0018***	0.0018***	0.0018***	
	(5.82)	(5.83)	(5.86)	
Burglary and Larceny Crime Rate	-0.0002***	-0.0002***		
	(2.67)	(2.68)		
Average Added Cancer Risk	0.0000			
	(0.06)			
Constant	9.0641***	9.0626***	9.0258***	8.6084***
	(98.92)	(102.49)	(103.32)	(98.99)
Quarter of Sale Dummy Variables [a]	YES	YES	YES	YES
Structural House Characteristics [a]	YES	YES	YES	YES
R-squared	0.65	0.65	0.65	0.64

Significance levels are represented by: *** 1%, ** 5%, * 10%

[a] The estimates of the Quarter of sale dummy variables and Structural House Characteristics are reported in Appendix Table A1.

Table 4
Percent Effect and Marginal Implicit Price of the Council-Manager Form of Government

$\bar{P}_H$ = \$69,312	[a]	[b]	[c]	[d]
Council-Manager City Government				
Percent Effect (α)	3.6%	3.6%	4.1%	2.7%
Implicit Price (ρ)	\$2,495	\$2,495	\$2,842	\$1,871
Council-Manager Central City Government				
Percent Effect (α)	10.6%	10.6%	10.2%	12.3%
Implicit Price (ρ)	\$7,347	\$7,347	\$7,070	\$8,525
Council Manager City and Central City Government				
Percent Effect (α)	14.6%	14.6%	14.8%	15.4%
Implicit Price (ρ)	\$10,120	\$10,120	\$10,258	\$10,674

Appendix Table A1
Log-Linear Hedonic Estimates of Ohio Metro Area House-Selling Prices, 1991
(Absolute value of t-stats)

	[a]	[b]	[c]	[d]
Quarter of Sale Dummy Variables				
Quarter Two	0.0663***	0.0663***	0.0663***	0.0657***
	(11.81)	(11.81)	(11.80)	(11.57)
Quarter Three	0.0664***	0.0664***	0.0662***	0.0665***
	(11.63)	(11.63)	(11.60)	(11.52)
Quarter Four	0.0654***	0.0654***	0.0654***	0.0643***
	(11.11)	(11.11)	(11.11)	(10.81)
Structural House Characteristics				
Air Conditioning	0.1052***	0.1052***	0.1052***	0.1146***
	(21.18)	(21.18)	(21.17)	(22.86)
Fireplace	0.1312***	0.1312***	0.1314***	0.1487***
	(27.29)	(27.29)	(27.34)	(30.84)
Lot Size (1,000 sq. ft.)	0.0113***	0.0113***	0.0113***	0.0129***
	(17.58)	(17.60)	(17.63)	(20.10)
Lot Size Squared	-0.0001***	-0.0001***	-0.0001***	-0.0001***
	(11.49)	(11.50)	(11.54)	(13.10)
Age	0.0023***	0.0023***	0.0023***	0.0035***
	(6.56)	(6.57)	(6.49)	(9.86)
Age Squared	-0.0001***	-0.0001***	-0.0001***	-0.0001***
	(25.31)	(25.32)	(25.25)	(28.19)
House Size (1,000 sq. ft.)	0.4779***	0.4779***	0.4773***	0.4681***
	(24.56)	(24.56)	(24.53)	(23.81)
House Size Squared	-0.0386***	-0.0386***	-0.0384***	-0.0302***
	(7.09)	(7.09)	(7.06)	(5.50)
Garage Size (1,000 sq. ft.)	0.7029***	0.7029***	0.7032***	0.7202***
	(27.32)	(27.34)	(27.35)	(27.71)
Garage Size Squared	-0.6579***	-0.6580***	-0.6579***	-0.6868***
	(16.86)	(16.86)	(16.86)	(17.41)
Full Bathrooms	0.0482***	0.0482***	0.0483***	0.0627***
	(8.63)	(8.63)	(8.65)	(11.14)
Part Bathrooms	0.0767***	0.0767***	0.0769***	0.0877***
	(15.74)	(15.76)	(15.81)	(17.93)
Unenclosed Porches	-0.0009	-0.0009	-0.0009	-0.0021
	(0.28)	(0.29)	(0.28)	(0.64)
Enclosed Porches	0.0045	0.0046	0.0046	0.0053
	(0.82)	(0.82)	(0.83)	(0.95)
Patio	0.0216***	0.0215***	0.0211***	0.0212***
	(3.89)	(3.91)	(3.83)	(3.82)
Deck	0.0816***	0.0816***	0.0816***	0.0867***
	(11.94)	(11.94)	(11.95)	(12.56)
Pool	0.0347**	0.0347**	0.0343**	0.0220
	(2.05)	(2.05)	(2.02)	(1.28)

Significance levels are represented by: *** 1%, ** 5%, * 10%

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