MUNICIPAL MONOPOLY POWER AND
THE SUPPLY OF
RESIDENTIAL DEVELOPMENT RIGHTS

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Bryant Collage

INTRODUCTION

While there has been much research on the motives and economic effects of zoning [Windsor, 1979; McKeehan, 1978; Hamilton, Mills and Purkey, 1975; Ohls, Weisberg, and White 1974; Mieszkowski, 1973; Buchanan and Goetz, 1972], other issues pertaining to zoning have received considerably less attention. One area in need of further exploration is the relation between community monopoly power and zoning policy restrictiveness. While the issues of municipal monopoly power and zoning policy restrictiveness each have been investigated independently, no study has integrated these two lines of inquiry.

Some studies [Hamilton, 1978; Fischel, 1986; and Rose, 1989] examine the relation between monopoly power and zoning policy within metropolitan land markets. The zoning behavior of individual communities, in isolation, is not considered. These studies examine the effect of monopoly power, proxied by various definitions of zoning authority concentration, on land or housing values — not zoning restrictiveness per se. It is hypothesized that a concentrated zoning authority (e.g., a single zoning authority with jurisdiction over an entire metropolitan housing market) is able to restrict the supply of land available for residential development and thereby increase the value of the existing housing stock. In most cases, the empirical results find a weak and often insignificant relationship between the measure of monopoly zoning power and land or housing values.

Other studies such as White [1975], McKeehan [1979] and Sonstelie and Gin [1982] view restrictive zoning practices as an exercise of monopoly power designed to enhance the welfare of the existing homeowners within an individual community. While each recognizes the importance of community monopoly power in promoting zoning restrictiveness, they make little systematic attempt to quantify any differences across communities. For example, Rolleston [1957] and McKeehan [1978] examine the different motivations underlying zoning policies within individual communities but fail to consider explicitly how differentiating community characteristics influence zoning restrictiveness.

This study attempts to synthesize these various strands of the zoning literature. The theoretical and empirical models incorporate a supply for residential development rights (RDRs) framework. In particular, it is hypothesized that communities with market power, as measured by community "distinctiveness", supply fewer RDRs, and thereby practice more restrictive zoning policies relative to communities...
THEORETICAL MODEL: A DEVELOPMENT RIGHTS APPROACH

In the absence of zoning laws, the owner of an acre of vacant land commands complete control over development and faces no constraints on allowable land use. Consequently, there is some maximum quantity of residential development rights determined by the supply of vacant land in the community. One way for a community to restrict the total number of RDRs is to implement constraints on lot size. For example, consider two communities, one with a one acre and one with a half acre lot size requirement. Communities with more restrictive one acre lots provide half as many RDRs relative to communities with half acre lot requirements, *ceteris paribus*. The large lot zoning requirement attempts to ensure that new entrants pay, in property tax, an amount equal to at least the marginal cost imposed on the community in added public service cost and reduced environmental quality.

Alternatively, the total number of RDRs can be restricted by limiting the number of parcels available for residential construction. The number of parcels available for development in a community depends on the number of vacant acres zoned for residential, rather than commercial or industrial, use and the lot size requirement. For a given required lot size, an allowable use zoning policy that restricts the supply of vacant land zoned for residential use also restricts the number of parcels available for development and thus the total number of RDRs. By limiting the amount of residential land available for new housing, the value of the existing housing stock increases, given a downward sloping demand.

It is assumed the community’s willingness to supply RDRs is determined by the utility-maximizing median-voter. As Edlefon [1976] notes, the utility maximization model can be recast in a framework where the median-voter, as a homeowner, maximizes the present value of his property. To maximize property values, the representative community restricts the number of RDRs supplied to the point where the marginal revenue from an additional RDR, in the form of additional property tax payments, equals the marginal cost imposed on the community in added public service cost and reduced environmental quality. However, communities with distinctive characteristics and hence a steeper downward-sloping demand for development rights supply fewer RDRs and implement a more restrictive zoning policy.\(^1\)

The reduction in the supply of RDRs attributable to a restrictive lot size or allowable use zoning policy generates a net gain or fiscal surplus that can be used to lower the effective tax rate or increase the quantity and/or quality of local public goods. In either case, the fiscal surplus leads to an increase in the value of the existing housing stock. The more restrictive the zoning ordinance, and consequently the relatively fewer residential development rights supplied, the greater the increase in the existing property values in a community, and the closer the median-voter comes to realizing his/her wealth maximization objective.

In sum, communities with more distinctive characteristics offer a reduced supply of RDRs since they have more to gain in terms of increased property values.
When seeking to identify specific factor constructs, special significance is attached to those variables with loadings greater than or equal to .39. The farther the factor loading from zero, the stronger is the relationship between the observed variable and the unobserved factor. For example, there is a positive and significant relationship between the variables Y, ED, WHIT, and Factor One. It seems reasonable to conclude that this factor represents demographic influence. Similarly, there is a negative and significant relationship between the variable POY and Factor One, suggesting that poverty, while important as a demographic influence, impacts negatively on Factor One. A similar interpretation of Columns 3 and 4 suggests that Factor Two can be interpreted as a measure of the spatial advantage of a given community, while Factor Three indicates a community's geographical advantage.

In sum, the factor analysis performed on eleven quantifiable measures that differentiate communities yields three distinct factors that represent demographic, spatial, and geographical uniqueness. A monopoly index for each factor can be determined using the factor loadings in Table 1 as weights. For the sample of Connecticut communities, the monopoly indices can be calculated as follows:

\[
\text{DEMOGRAPH} = .57Y + .56ED + .39WHIT - .81POV; \\
\text{SPATIAL} = (.76DNY + .86DCST + .50DCBD); \\
\text{GEOGRAPH} = .57PARK + .49DCBD + .42FOR. 
\]

These three monopoly indices will be used to test two hypotheses about restrictive zoning.

The first empirical test assesses the relation between the monopoly indices and the average size of a vacant lot zoned for residential purposes. Following the arguments advanced above, high values are expected to be associated with larger lot size requirements. Communities with more distinctive characteristics are expected to supply fewer RDs, ceteris paribus. The second test considers the implications of the monopoly indices for allowable use zoning decisions. Communities with high indices are expected to restrict the quantity of RDs by reducing the number of parcels zoned for residential use.

To test the two hypotheses, these reduced form equations are estimated:

\[
(1) \quad \text{VLOTS} = \alpha_1 + \alpha_1 \text{GROW} + \alpha_2 \text{NRTXB} + \alpha_3 \text{GRANT} + \alpha_4 \text{APPT} + \alpha_5 \text{POP} + \alpha_6 \text{OWN} + \alpha_7 \text{DEMO} + \alpha_8 \text{SPAT} + \alpha_9 \text{GEOG} + \alpha_{10} \text{ACRES} + \alpha_{11} \text{LOTS}; \\
(2) \quad \text{NRP} = \beta_1 + \beta_1 \text{GROW} + \beta_2 \text{NRTXB} + \beta_3 \text{GRANT} + \beta_4 \text{APPT} + \beta_5 \text{POP} + \beta_6 \text{OWN} + \beta_7 \text{DEMO} + \beta_8 \text{SPAT} + \beta_9 \text{GEOG} + \beta_{10} \text{ACRES}. 
\]

VLOTS equals the average lot size of vacant land zoned for residential use and NRP is the number of residential parcels available for development in 1970 for each town. The independent variables are defined and derived in Appendices A and B.

The independent variables are classified into three major categories. The first category includes variables relating to the marginal cost of providing residential development rights. Recall that communities, attempting to maximize property values on the behalf of the median-voter, restrict RDs to the point where marginal revenue equals marginal cost, \(MR=MC\). Thus, communities with more rapid population growth, GROW, larger nonresidential tax revenues, NRTXB, and less per capita state aid, GRANT, are subject to relatively higher marginal or opportunity costs of providing residential development rights. As a result they are more inclined to practice restrictive zoning and will supply fewer RDs.

The second category consists of public choice variables which influence lot size restrictiveness. Specifically, median-voter preferences are less binding and in turn, the supply of RDs is less restrictive when the zoning official is appointed rather than elected, the community population is larger, and the percentage of residents in the town living in owner-occupied housing is smaller.

The third category represents the variables of primary interest to this study, namely, the monopoly indices (DEMO, SPAT, and GEOG). It is expected that towns with a significant degree of monopoly power, as determined by the monopoly indices, supply fewer RDs as reflected in a larger lot size requirement on vacant land zoned for residential purposes or a reduced number of residential parcels available for housing construction.

The final two variables control for the land area of the town, ACRES, and the size of average residential lot in use, LOTS. The total number of acres in each community is included to control for the geographical size of each town; large communities may behave differently than smaller ones in zoning matters, though the exact behavioral difference is unknown. The average size of residential lots in use for each town, LOTS, is included in equation (1) to control for current patterns of residential land use. Communities preserve larger lot sizes by zoning vacant land in...
TABLE 2
Expected Signs of Coefficient Estimates

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Equation (1)</th>
<th>Equation (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marginal Cost Variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GROW</td>
<td>$a_{1} &gt; 0$</td>
<td>$b_{1} &lt; 0$</td>
</tr>
<tr>
<td>NETXN</td>
<td>$a_{1} &gt; 0$</td>
<td>$b_{1} &lt; 0$</td>
</tr>
<tr>
<td>GRANT</td>
<td>$a_{1} &lt; 0$</td>
<td>$b_{1} &gt; 0$</td>
</tr>
<tr>
<td>Public Choice Variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>APPT</td>
<td>$a_{2} &lt; 0$</td>
<td>$b_{2} &gt; 0$</td>
</tr>
<tr>
<td>POP</td>
<td>$a_{2} &lt; 0$</td>
<td>$b_{2} &gt; 0$</td>
</tr>
<tr>
<td>OWN</td>
<td>$a_{2} &gt; 0$</td>
<td>$b_{2} &lt; 0$</td>
</tr>
<tr>
<td>Monopoly Variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEMO</td>
<td>$a_{3} &gt; 0$</td>
<td>$b_{3} &lt; 0$</td>
</tr>
<tr>
<td>SPAT</td>
<td>$a_{3} &gt; 0$</td>
<td>$b_{3} &lt; 0$</td>
</tr>
<tr>
<td>GEOG</td>
<td>$a_{3} &gt; 0$</td>
<td>$b_{3} &lt; 0$</td>
</tr>
<tr>
<td>Control Variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACRE</td>
<td>$a_{4} = ?$</td>
<td>$b_{4} = ?$</td>
</tr>
<tr>
<td>LOTS</td>
<td>$a_{4} &gt; 0$</td>
<td>N/A</td>
</tr>
</tbody>
</table>

the same way. Table 2 summarizes the expected signs of the estimated coefficients within the context of the two equations.

EMPIRICAL RESULTS

Ordinary least squares is used to estimate equations (1) and (2) using a sample of 132 Connecticut communities. Table 3 presents the empirical results. White's (1980) technique fails to reject the null hypothesis of homoscedasticity. One-tailed tests are made for all of the coefficient estimates except those on ACRE. In each equation, a respectable proportion of the variance in the dependent variable (58 percent and 31 percent) is explained by the right hand side variables. Also, the F-statistic for each regression equation is highly significant allowing a rejection of the null hypothesis that the coefficients of all the explanatory variables are jointly zero.

The coefficients of the three marginal cost variables, GROW, NETXN, and GRANT, display the anticipated signs in both equations. Four of the six estimated coefficients are statistically significant at the 5 percent level or better. The empirical results are encouraging and provide preliminary support for the developmental rights framework outlined in the previous section. At this point it seems reasonable to conclude that population growth, nonresidential taxes and outside aid have a recognizable influence on the marginal cost of providing RDRs. When the marginal

TABLE 3
Empirical Results of Zoning Hypothesis

<table>
<thead>
<tr>
<th>INDEPENDENT</th>
<th>VLOTS</th>
<th>NRP</th>
</tr>
</thead>
<tbody>
<tr>
<td>VARIABLES</td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GROW</td>
<td>.158*</td>
<td>-.092</td>
</tr>
<tr>
<td></td>
<td>(.067)</td>
<td>(.085)</td>
</tr>
<tr>
<td>NETXN</td>
<td>.063</td>
<td>-.137*</td>
</tr>
<tr>
<td></td>
<td>(.063)</td>
<td>(.080)</td>
</tr>
<tr>
<td>GRANT</td>
<td>-.116*</td>
<td>.173*</td>
</tr>
<tr>
<td></td>
<td>(.066)</td>
<td>(.082)</td>
</tr>
<tr>
<td>APPT</td>
<td>.007</td>
<td>.020</td>
</tr>
<tr>
<td></td>
<td>(.064)</td>
<td>(.087)</td>
</tr>
<tr>
<td>POP</td>
<td>-.170*</td>
<td>-.042</td>
</tr>
<tr>
<td></td>
<td>(.096)</td>
<td>(.120)</td>
</tr>
<tr>
<td>OWN</td>
<td>.032</td>
<td>-.081</td>
</tr>
<tr>
<td></td>
<td>(.086)</td>
<td>(.108)</td>
</tr>
<tr>
<td>DEMO</td>
<td>.074</td>
<td>-.185*</td>
</tr>
<tr>
<td></td>
<td>(.076)</td>
<td>(.094)</td>
</tr>
<tr>
<td>SPAT</td>
<td>.221*</td>
<td>-.165*</td>
</tr>
<tr>
<td></td>
<td>(.091)</td>
<td>(.113)</td>
</tr>
<tr>
<td>GEOG</td>
<td>.214*</td>
<td>-.254*</td>
</tr>
<tr>
<td></td>
<td>(.109)</td>
<td>(.133)</td>
</tr>
<tr>
<td>ACRE</td>
<td>.199*</td>
<td>.477*</td>
</tr>
<tr>
<td></td>
<td>(.070)</td>
<td>(.080)</td>
</tr>
<tr>
<td>LOT</td>
<td>.414*</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>(.091)</td>
<td></td>
</tr>
<tr>
<td>CONSTANT</td>
<td>.263</td>
<td>.263</td>
</tr>
<tr>
<td></td>
<td>(.598)</td>
<td>(.733)</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>.58</td>
<td>.31</td>
</tr>
<tr>
<td>F</td>
<td>15.06*</td>
<td>5.49*</td>
</tr>
<tr>
<td>Observations</td>
<td>132</td>
<td>132</td>
</tr>
</tbody>
</table>

* Significant at the 5 percent level or better.

* Significant at the 10 percent level.
Standard errors of coefficients shown in parentheses.
cost associated with an additional RDR increases, fewer RDRs are supplied by the
local community. As a result, a smaller number of parcels are zoned for residential
development and a relatively larger lot size is required for vacant residential land.
The results for the public choice variables are somewhat discouraging. While
four of six estimated coefficients in the two equations have the predicted sign, only
that on POP is statistically significant in equation (1). This suggests that RDRs are
not restricted as much in communities with larger populations. In addition, it
appears that having an appointed zoning board and a large owner-occupied population
may have a greater influence on lot size requirements. Thus, either the
inclusion of variables  do not adequately capture the public choice characteristics or
the median-voter framework is not appropriate as a model of political decision
making.

Most importantly, the monopoly indices generally confirm the hypothesis that
communities with differentiated characteristics wield monopoly power to promote
the property value maximization objective of voters by restricting the quantity of
ZDRs supplied. In equation (1), the estimated coefficient on each index has the
expected sign and SPAT and GROG are significant at the 5 percent level or better. It
appears that communities with more distinctive spatial and geographically
characteristics implement larger lot size requirements. In equation (2), the indices
of municipal monopoly power provide strong confirmation of the allowable use
zoning hypothesis. All three coefficient estimates have the correct sign and are
significant at the 10 percent level or better. Thus the more unique a community is in
terms of demographic, spatial and geographically characteristics, the smaller the
number of residential parcels it supplies.

The parameter estimate on the variable reflecting total acreage, ACRES, is
positive and statistically significant in both equations. Apparently, communities
with more land area supply more RDRs. Lastly, in equation (1), the estimated
coefficient on average residential lot size, LOTS, has the predicted sign and is
statistically significant. This indicates that the current size of residential lots is a
strong determinant of the lot size required of future development.

SUMMARY AND CONCLUSIONS

This is the first study to examine empirically the relation between municipal
monopoly power and zoning restrictiveness. The analysis is explored in terms of the
supply of RDRs. The empirical results provide strong support for the argument that
more differentiated communities supply fewer RDRs. In five out of six cases, a
higher demographic, spatial or geographical index is statistically associated with a
more restrictive zoning policy. Specifically, more differentiated communities impose
larger lot size requirements and set aside a lower number of residential parcels for
new housing. Less differentiated communities, which have many close substitutes,
face weaker incentives to implement excessively restrictive land use controls.

The development rights approach apparently provides an accurate portrayal of the
zoning process. It is hypothesized that three variables, percent change in a

APPENDIX A
Definition of Variables

Dependent Variables
VLOTS: average size of vacant zoned residential land in 1970 for each town.
NRP: number of residential parcels available for development in 1970.
Marginal Cost Variables
GROW: percent change in the town’s population between 1960 and 1970 for each town.
NRTRX: per capita nonresidential property tax revenues in 1970 for each town.
GRANT: per capita state and federal educational aid in 1970 for each town.
Public Choice Variables
APPT: dummy variable equalling one in towns that have an appointed zoning
board, and zero for towns with an elected board.
POP: population in 1970 for each town.
OWN: percent of residents in the town living in owner-occupied housing in 1970 for each town.
Monopoly Variables
DEMO: demographic index of community uniqueness in 1970 for each town.
SPAT: spatial index of community uniqueness in 1970 for each town.
GROG: geographical index of community uniqueness in 1970 for each town.
Control Variables
ACRES: total number of acres of land for each town.
LOTS: average size of residential lots in use for each town.
APPENDIX B
Derivation of Variables

DNY: distance to NY, is the distance from each town in Connecticut to Greenwich plus 30 miles to New York City.

DCST: distance to the coast, is equal to the linear distance from each town to the nearest coast.

VLOTS: average size of vacant land zoned for residential use, and LOTS, the average size of residential lots in use, see McEachern (1979), Appendix C.

NRP: number of residential parcels available for development, equals the number of acres of vacant residential land divided by the average size of vacant zoned residential land, VLOTS.

NRTXB: per capita nonresidential property tax revenues, equals the value of developed commercial and industrial properties, x, effective tax rate divided by population.

APPENDIX C
Sources of Data

Appointed or elected planning and/or zoning commission: Connecticut Public Expenditure Council, Connecticut Public Expenditure Council Municipal Data Sheets: Planning and Zoning, January 1981.


Average size of vacant residential land, average size of residential lot size in use, number of acres of vacant residential land, number of acres of vacant commercial and industrial land, number of acres of vacant land and number of acres of developed commercial and industrial land: State of Connecticut, Office of Planning and Energy, Unpublished Zoning Data, 1970.

REFERENCES


RECENT CHANGES IN THE LABOR SUPPLY BEHAVIOR OF MARRIED COUPLES

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Rider College

In the past thirty years, there has been a dramatic change in women's labor market behavior. Women in general, and married women in particular, have been entering the labor force in large numbers and simultaneously increasing their attachment to the labor market [Smith, 1983; Smith and Ward, 1985; Killingsworth and Heckman, 1986]. Coupled with the increase in female participation has been the decline of male labor force participation, although among men, the changes have not been as dramatic and have been concentrated among older men [Poncev, 1966; Smith, 1983; Parsons, 1980]. These changes in the time spent in market work would be expected to have an impact on the amount of time allocated to other uses, namely home production and leisure. Due to the dramatic changes in married women's labor market commitment, the changes in the allocation of time would be expected to be most evident among married couples. In fact, recent surveys reveal that married men have dramatically increased the amount of time they spend in home production (Kuster and Stafford, 1991; Robinson, 1983; Jagger, 1965). In 1965, married men were responsible for about 13 percent of 48 hours per week of household work, but by 1985 that figure had more than doubled to 24 percent, or about 11.1 hours per week [Robinson, 1988].

During this same period, wives were decreasing the amount of time spent in work at home by about 30 percent, which is the equivalent of 9.2 hours per week [Robinson 1988]. The result of these changes is that married men and women are becoming more alike with regard to their uses and allocation of time.

This paper analyzes the changes in the labor supply behavior of married couples. The paper is empirical in nature, and its primary interest is to identify the changes over time in the relationship between several key variables that impact the labor supply decisions of households. The current research will focus on some of the questions that have concerned previous authors, namely, estimating the various wage elasticities of labor supply. The main contribution of this paper is its focus on changes over time.

Empirical research on the topic of labor supply has been extensive, and the study of family labor supply, in particular, has received a dear share of effort among economists [Ashenfelter and Heckman, 1974; Kneser, 1976; Wards and Woodland, 1976; 1977; Blundell and Walker, 1982; Lundberg, 1988]. In a majority of the previous family labor supply studies, the time period under consideration has been relatively short, and most have been cross-sectional analyses. The fact that these studies used a variety of samples and estimation techniques has prohibited an evaluation of the changes in family labor supply parameters over time. By using...