

Local Politics and the Demand for Public Education

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Summary. This paper expands on the school finance literature by using a political fragmentation index to calculate how political power affects educational spending in Virginia, USA. The methodology allows the comparison of different political voices relative to each other and the consideration of the role of the distribution of political power. Political fragmentation is considered across several different dimensions, including race, age, income and political parties. Using a demand for local public goods model, it is found that, along with traditional demand variables, the interest-group pressures dominated by the primary beneficiaries (teachers and students) increase educational spending while higher income and a larger percentage of African-Americans in the population reduce educational spending.

1. Introduction

School finance is highly controversial in the US because it affects two basic concerns of voters. First, school finance affects the resources that are available for the education of the voter's children and, secondly, school finance affects the extent of state and local taxation. While most voters support public financing for education, they do not agree on the quality of education that children should receive, or how the cost of public education should be allocated among the tax-payers.

Previous papers on school finance address how various groups of voters affect the level of educational spending—for example, see Meier and Smith (1994), Alesina *et al.* (1997), Poterba (1997), Downes (1996), Stevens and Mason (1996), Conlon and Kimenyi (1991) and Ladd and Murray (2001).

These studies focused on how single demographic influences, such as age or race, affected the demand for educational spending. This paper expands on the school finance literature by using a political fragmentation index to calculate how the distribution of political power affects educational spending. By this means, a comparison is made of the impact of various political voices relative to each other. Further, the results of this analysis allow predictions about future educational spending in an environment of changing political pressures.

This paper uses a traditional demand for public goods model to analyse how political and demographic factors affect the demand for educational spending. The investigation focuses on the Commonwealth of Virginia

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where municipalities and their associated school districts are either cities or counties, thus avoiding the question of overlapping jurisdictions. Determining the level of educational spending is in part a function of dichotomous political interests. How these interests 'play out' determines which preferences for education spending dominate the political scene. These spending choices, in turn, affect students' abilities to compete and succeed.

One possible motivation for the existence of differing demands for educational spending is that there seems to be variation in the 'return' on educational spending. For example, in Virginia, as in other states, there is great variation in scores on the Scholastic Aptitude Test (SAT) by demographic groups. Whites score higher than African Americans; students from higher-income families score higher than those from lower-income families; students whose parents attended college score higher than parents that stopped after high school; and private schools score higher than public schools.¹ Without trying to address the reasons for these differences (discrimination, White flight, culturally biased exams, etc.) it is postulated that these differences may be associated with differential support for any changes in educational spending. Seven demographic characteristics are considered in this paper: age; education of residents; the income distribution; political party affiliation; private school competition; public sector employment; and, race. Each is discussed in turn.

Elderly people may vote for less education because their children are grown and moved away, they cannot afford the property taxes, or they may prefer more spending on other public services that benefit them more directly. On the other hand, retired people may vote for more educational spending because of altruism towards the younger generation. Or, to broaden the tax-base, they may vote for more educational spending to attract and keep prime-age families with children in the area. Also, demand for local public goods depends on who votes and older individuals are more likely to vote than younger people.

Poterba (1997) finds that the greater the number of elderly in a community, the smaller the level of per student spending on education. With the ageing of the population, Poterba's study implies that the demand for education may decrease in the future. Ladd and Murray (2001) question the results of the Poterba study and find a smaller age effect using county-level rather than state-level data as Poterba had. They argue that the elderly may want more educational spending because of the possibility that property values will be higher in districts that spend more on education. In this study, the number of social security recipients in the city/county per 1000 population is used to account for the elderly.

Another age effect is that people in their prime working years are more likely to vote for education since they are also more likely to receive the benefits for their own children. Depending on family size, when there are more students there may also be more voting parents. Poterba (1997) also found that states with larger school-age populations had smaller per pupil expenditures. Less spending per student in states with more students may occur because of economies of scale or because tax-payers have an upper bound on spending on education.

Better-educated parents probably demand more education. This is because: better-educated parents place a greater priority on education; higher-income residents will have a greater demand for education because education is a normal good; and, according to Hodgkinson and Weitzman (1992), college-educated parents are also more likely to volunteer and donate. This translates into more active parent-teacher associations. To account for the effect of differences in education on spending per pupil, the percentage of the population with at least four years of college is included as an explanatory variable.

It is expected that higher-income residents will have a greater demand for education. In other words, for the median voter, spending for education is likely to be a normal good.

This effect is picked up by the inclusion of median income.

However, higher-income residents may be more likely to send their children to private schools.² Further, lower-income households, being less able to send their children to private schools, may have a greater demand for public education. Hence, two other variables are included to address the role of income distribution. The variables are: the percentage of families with income greater than \$75 000; and, the percentage of families with income less than \$15 000.

There are two complicating factors to consider when accessing the role of the income distribution. First, the income distribution also enters into school finance because the educational spending per pupil is usually greater in high-income school districts than in low-income school districts. Because of the inequalities that existed in school finance, since the 1970s state courts have often required more equalised funding across school districts in a state to make spending per pupil more equal (Berne and Stiefel, 1999; and Carr and Fuhrman, 1999). Secondly, politicians who represent jurisdictions with middle- and upper-income districts do not usually favour redistributing income from school districts in their area to poor districts. Nor do they usually favour increases in taxes to finance across-the-board spending increases. Also, politicians that represent middle- and upper-income districts are usually more numerous than representatives of poor districts. Hence, it is difficult to determine *a priori* the effect of the income distribution on educational spending.

Political party affiliation may affect the demand for education. If Democrats are more likely to vote for public services than are Republicans, then there will be a larger demand for education in districts with more Democrats. One problem with party affiliation in this study is that people's party affiliation was determined by their vote in the presidential election of 1992. The influence of Ross Perot may have complicated the presidential election and the role of party loyalties. However, Bush did win Virginia.

To incorporate the role of political parties, the percentage voting for President Clinton is included.³

Private and home schooling are substitutes for public schools. The degree to which parents seek alternatives to public schools may reduce the demand for public education.⁴ The percentage of school-age students going to private schools or home schools is included to account for this effect.

School teachers and school district employees usually prefer more spending on education. Dunne *et al.* (1997) find that school officials work very hard to maximise educational spending when there are bond referendum votes. To account for the role of teachers, the number of teachers in the city/county is included. Following the industry capture models associated with Stigler (1971), the more teachers there are in the workforce the more likely is it that the group can influence spending on education, or any other, public good.

Studies have found that there are not significant differences in the return to education by race (see, for example, Ashenfelter and Rouse, 2000). However, racial prejudices may affect the demand for education. Many White voters may feel that money spent to educate minority children would be wasted, either because minority schools or city officials are corrupt or because minority children are less educable than White children.⁵ Further, Alesina *et al.* (1997) find that in cities with greater ethnic differences (measured by a type of Herfindahl index) there is less spending on public goods, including education.⁶ Also, Conlon and Kimenyi (1991) suggest that higher-income White students try to avoid association with low-income Black students. To estimate the impact of race, the percentage of the population that is black is included.

The final political variable is associated with government employment. Federal government employees may be likely to support greater spending for education because the greater spending might increase teacher salaries and higher teacher salaries may help them to increase their salaries via changes in

collective bargaining which will probably be supported by other government workers.

2. Theoretical Background and Baseline Model

It is presumed that educational spending per student identifies the demand for educational spending. This is by far the most common demand-side measure for education.⁷ The demand for educational spending is modelled as emanating from a public choice process that determines the level of spending on education. Following a long-standing tradition in local public good demand estimation, it is posited that the private demand by the median voter is critical to the determination of the equilibrium of the public good as the vote of the median voter could change the level of spending. The cost of the educational services, the budget set and the preferences for educational spending are factors that are thought to influence the demand for educational spending. It is important not to include variables that would be associated with the supply or cost side of the delivery of education. Inclusion of cost-side factors would result in a misspecification of the demand function⁸ and would not allow the interpretation of the interest-group parameters as shift variables in the demand for education.

Besides the demographic variables discussed above, nine variables are assumed to be significant in determining the demand for educational spending per student. The first variable is the tax price, or marginal cost, of a dollar increase in educational spending. Because most local spending is financed by property taxes, the median value of housing is divided by the total value of all housing in the city/county. This is the tax share for the median family. Next, the resulting ratio is multiplied by the number of students as a dollar increase in spending is assumed to go to each student equally. Finally, this value is multiplied by the ratio of total property tax revenue from taxes on individual real property to total property tax revenue. This adjustment is made because the ability to raise property tax revenue from sources other than

homes varies widely across the Commonwealth.⁹ It is hypothesised that the coefficient associated with this variable will be negative.

As mentioned above, median income is included to determine if educational spending is a normal or an inferior good to the median voter. Population is included to account for changes in the demand for education associated with population changes. To account for the degree of crowding in cities/counties, the population density—population per square mile—is also included.

A dummy variable takes on the value of 1 if the municipality is a city and a value of 0 if it is a county. While it is likely in many parts of the country that counties would usually be associated, hence correlated, with less dense and smaller populations, there are some very densely populated counties, such as Fairfax county in Northern Virginia, and some very sparsely populated cities, such as Suffolk in the Hampton Roads area. Therefore it is felt that including all three of these variables is appropriate although they may not be appropriate for other areas of the country.

While most spending for education is financed by property tax revenue, municipalities in Virginia also raise revenue from a 1 per cent local option sales tax. Further, it is expected that revenue from the sales tax may positively affect the demand for education. This is because part of the sales tax revenue per capita going to the state government in Richmond is returned as state aid for, in part, education.

The final variable included in the baseline model is the local crime rate per 1000 population. This accounts for possible other fiscal stresses on municipal governments.

3. Empirical Results

The baseline model results are presented in Table 1. In Virginia, there are 37 independent cities and 94 counties yielding a sample cross section of 131.¹⁰ The primary data source was the *1994 County and City Data Book. The Superintendents Annual Report for Virginia* provided detailed information

Table 1. The baseline model

Variable	Coefficient	Standard error	<i>t</i> -statistic
Constant	4.410184	0.944689	4.668399***
Tax price	-0.023649	0.007519	-3.145404***
Median income	0.175168	0.056521	3.099186***
Population	-0.058969	0.016460	-3.582636***
City dummy	-0.120534	0.068388	-1.762505*
Sales tax	0.306946	0.109375	2.806365***
Crime	0.091691	0.028658	3.199460***
Population density	0.050965	0.018359	2.776038**
R^2	0.359400		
Adjusted R^2	0.322943		
<i>F</i> -statistic	9.858196***		

*** indicates significant at the 1 per cent level; ** indicates significant at the 5 per cent level; * indicates significant at the 10 per cent level.

for school-related variables. Variables are for the 1990/91 school year except for voting in the 1992 presidential election.

The model is estimated in log form so that parameter estimates may be interpreted as elasticities. This will further facilitate comparisons between equations to determine the strength of the political effects. White's test for heteroscedasticity was performed on the baseline model and the null hypothesis of no heteroscedasticity could not be rejected. Hence, the paper proceeds with OLS estimators. Parameter estimates of the baseline model are presented in Table 1.

Most of the estimation results are as expected. All variables are statistically significant at traditional risk levels. The tax price coefficient is negative and the tax price elasticity is inelastic (-0.024). Educational spending is a normal good. As population increases, there is less spending per student but, simultaneously, spending per pupil is higher in more densely populated areas—somewhat conflicting results. Higher per capita sales taxes are associated with greater spending for education. Cities, as indicated by the negative sign on the dummy variable, seem systematically to spend less than counties. It was expected that higher crime rates would be associated with less educational spending per capita but the reverse is true.

4. Role of Political Influences

To estimate the impact of political influences, two different estimation procedures were utilised. First, the political variables were introduced as levels to identify the impact on the demand for education from the size of the political groups; and, secondly, the fragmentation variables were introduced to concentrate on the role of the relative political power. The fragmentation variable measures the degree to which the political influence under investigation is divided. The hypothesis is that the greater the degree of fragmentation, the smaller will be the group's ability to obtain their desired level of spending for education.

Table 2 introduces the alternative political effects when they are added as independent variables. The impact of the particular political influence is estimated along with the variables from the baseline model.

Because the coefficient estimates are elasticities, their signs and magnitudes can be compared. It is found that five of the political variables have positive effects on educational spending. First, an increase in the number of social security recipients will increase the demand for educational spending. As discussed above, this finding is more consistent with the argument of Ladd and Murray (2001) rather than Poterba (1997). The coefficient associated with the Democratic

Table 2. Adding alternative political effects

Variable	Coefficient	Standard error	<i>t</i> -statistic
Constant	2.283038	1.386692	1.646391
Tax price	-0.017972	0.006377	-2.818107**
Median income	0.433852	0.109480	3.962835***
Population	0.186076	0.088297	2.107389**
City dummy	0.047087	0.062109	0.758146
Sales tax	0.108538	0.095692	1.134245
Crime	0.055722	0.026528	2.100463**
Population density	0.031173	0.019854	1.570140
Social security	0.060295	0.031256	1.929075*
Students	-0.235966	0.083281	-2.833386***
Four years of college	0.077001	0.039266	1.960981*
Income less than \$15 000	-0.011183	0.044929	-0.248912
Income greater than \$75 000	-0.085207	0.034133	-2.496353**
Democrats	0.296665	0.053305	5.565396***
Private schools	0.016271	0.017034	0.955232
Government employment	0.011207	0.006835	1.639616
Teachers	0.199589	0.079434	2.512634*
Percentage black	-0.023057	0.008672	-2.658882***
R^2	0.610122		
Adjusted R^2	0.550944		
F -statistic	10.30994		

*** indicates significant at the 1 per cent level; ** indicates significant at the 5 per cent level;

* indicates significant at the 10 per cent level.

Party has a positive relationship with an elasticity of 0.2967. Finally, increases in the number of individuals with four years of college, the number of government workers and the number of teachers will, consistent with interest-group theory, increase the demand for educational spending.

Three variables are found to have a negative association with educational spending. These are the percentage of the population with income greater than \$75 000 (-0.0852), the percentage of the population that is African American (-0.0231) and the absolute number of students (-0.2360).

All of the elasticities are inelastic. The percentage of people who voted Democratic has the largest elasticity and the percentage of African Americans has the smallest elasticity. These results suggest that a number of political influences have relatively small effects on educational spending.

The paper now turns to an alternative methodology that considers the impact of the degree of political fragmentation on the de-

mand for education spending. The fragmentation variable will incorporate information on the relative distribution of seven categories of political influence by considering the distribution of political power.

The likelihood that any given group of voters contains the median voter depends on two factors. The first factor is the number of groups there are with different interests and the second factor is the share of voters each group has. When there are more groups, the median voter is less likely to come from any given group. Likewise, when a group has a small share of voters, it is less likely to contain the median voter. When there are many different groups, each with a small share of voters, each group may not have much effect on educational spending. In other words, as the degree of political fragmentation increases, groups are less likely to contain the median voter and are also less likely to affect educational spending.

To measure the impact of political fragmentation on educational spending, the de-

gree of political fragmentation is defined as an index.

$$Frag_i^k = 1 - \sum_i (share_{ik})^2$$

where, $share_{ik}$ is the share of people who are members of group i and have political characteristic k . For example, if $share_{ik}$ was the share of the population in a county who were Democrats, k would be party affiliation and i would be Democrats. Or if $share_{ik}$ was the share of the population in a county who were college-educated, k would be education and i would be college-educated.

To illustrate how the number of groups affects this fragmentation index, assume there is one group of influence type k . There is a 100 per cent probability that the median voter will come from that one group. Therefore, $share_{ik} = 1$ and $Frag_{ik} = 0$. If there are 5 groups of influence type k and each group contains 20 per cent of the voters, then there is a 20 per cent chance that the median voter will come from any one of these groups and the fragmentation index is 0.8. This means that when there are more groups with equal shares, the fragmentation index is higher. For example, when there are 10 groups with equal shares, the fragmentation index is 0.9. When there are 100 groups with equal shares, the fragmentation index is 0.99.

When a group has a larger share of voters, the fragmentation index will be smaller. For example, assume that there are 10 groups of influence type k and that one group has 82 per cent of the voters and the other 9 groups equally share the remaining 18 per cent. In this case, $Frag_{ik} = 0.324$. This is smaller than when each group had 10 per cent of the voters and $Frag_{ik} = 0.9$.

A negative relationship is expected between the factor investigated and the level of spending on education. This is because as fragmentation decreases, the probability that there is greater political agreement increases. The definition of each of the political fragmentation variables is presented with the other variables in the Appendix.

Alesina *et al.* (1997) provide a useful example of how an increase in political frag-

mentation may lead to a reduction in the spending on public goods. 'Ebonics' is the term given to a non-standard Black English. A controversy concerning teaching Ebonics in California public schools was highly divisive across racial grounds. Many African Americans wanted Ebonics taught in public schools; Whites did not want to move away from the teaching of traditional English; Hispanics viewed Ebonics as a threat to funding for bilingual education; and Asian parents felt that there was already too much spent on bilingual education. The differing views lead to strong divisions as to how public funds should be spent for education and hence are likely to lead to less funding for education (Alesina *et al.*, 1997, p. 12).

Table 3 presents evidence that four of the seven political influence categories are statistically significant. Two fragmentation variables are negative and two are positive. The two negative coefficients are associated with race and public employment. These coefficients are consistent with the hypothesis suggested above that increased fragmentation decreases educational spending. This is because a lack of political cohesion suggests a lack of ability to agree on the level of educational spending. A somewhat surprising result is the positive and significant coefficient on the party fragmentation variable and the positive coefficient on the public-private school fragmentation variable. These results result may be due to our only having looked at the distribution of Democrats and Republicans or because once one party dominates, even by a small percentage, the level of the public good provided is determined by the dominant party, a type of median-voter result. A similar result may explain the sign on the public-private school fragmentation variable.

With the above specification, a few of the baseline model variables are now insignificant. However, most of the baseline variables do not change sign or statistical significance.

The results from the two methods for estimating the role of interest-groups on educational spending yield very similar results. In

Table 3. Including fragmentation variables

Variable	Coefficient	Standard error	<i>t</i> -statistic
Constant	6.018001	1.147947	5.242405***
Tax price	-0.022600	0.006857	-3.295854***
Median income	0.169626	0.085819	1.976554*
Population	-0.044826	0.015234	-2.942548***
City dummy	-0.052359	0.063993	-0.818192
Sales tax	0.140069	0.103091	1.358688
Crime	0.077493	0.028328	2.735571***
Population density	0.023892	0.017591	1.358135
Race fragmentation	-0.053588	0.014761	-3.630295***
Party fragmentation	0.533247	0.158354	3.367441***
Income fragmentation	-0.125713	0.402517	-0.312318
Parent education fragmentation	0.046654	0.040682	1.146803
Age fragmentation	0.330510	0.358783	0.921198
Employment fragmentation	-4.848930	1.781222	-2.722249***
Public-private school fragmentation	0.040246	0.019167	2.099721**
R^2	0.506769		
Adjusted R^2	0.446197		
F -statistic	8.366356***		

*** indicates significant at the 1 per cent level; ** indicates significant at the 5 per cent level; * indicates significant at the 10 per cent level.

the context of a traditional public choice model, differing political interests have the effect of altering the demand for spending on public education. The fragmentation analysis may be superior in that the both the existence of political influence and the distribution of political interests affect the demand for the public good.

5. Summary and Conclusions

This paper has investigated which political influences have the greatest impact on the level of educational spending in cities and counties in Virginia. Using a traditional public choice model, it has been found that the largest effect on increasing educational spending is the percentage voting Democratic followed by the number of students, the number of teachers and the percentage of government employment. Interest-group pressures dominated by the primary beneficiaries (teachers and students) seem to increase public spending. Higher income and a larger percentage of African Americans reduce the demand for educational spending. All of the elasticities are inelastic with the

percentage of people who voted Democratic having the largest elasticity and percentage of African Americans and government workers have the smallest elasticities.

One reason that the results are important is because the model predicts that current demographic changes may cause less education spending. In an attempt to increase efficiency in the delivery of public education, schools may strive for larger class sizes and substitute alternative learning techniques, such as computers or distance learning. These changes may reduce the number of teachers and hence remove some of the political pressure for increased educational spending. Increases in the percentage of the population that is African American and a widening income distribution may also cause less school spending. Hence, it is concluded that the trend seems to be that political influences may put downward pressure on educational spending in Virginia.

The role of political differences is also indicated by the results from the political fragmentation model. There, it has been demonstrated that increases in fragmentation do reduce the level of spending for the fac-

tors of age, public employment, race and income, but the effect is the opposite to that which was expected for political parties. These initial results are thought to be quite promising and suggest that a further investigation into the role of political fragmentation in the level of spending on other public goods may be warranted.

Notes

1. Statistics reported in the 13 September 2000 *Virginia Pilot and Ledger Star*, Norfolk, Va. Data from the College Board, 2000.
2. The reason we introduce private schools as a separate category in what follows is that income is not perfectly correlated with the percentage attending private schools. For example, Catholic schools attract students from relatively low-income households.
3. When we estimated the model and separately included the percentage of residents voting Republican and the percentage voting for Perot, but in separate regressions, it was found that the coefficients were very similar. Hence, it was decided to treat the two types of voter as one and focus on the percentage Democratic.
4. Meier and Smith (1994) find that private schools 'cream skim' the best students that may otherwise attend public schools.
5. Publications like *The Bell Curve* by Herrnstein and Murray (1994) may have been interpreted as saying that minority children are less educable and thus spending more money on them is wasteful.
6. Just because there is a lower demand for education in districts with a larger percentage of African American households is not necessarily evidence of racial discrimination. For example, if an African American is the median voter, less educational spending may be evidence of a lower taste or preference for education.
7. Falch and Rattso (1999) argue that there are three different outputs: the teacher-student ratio; spending unassociated with teachers; and, the ratio of students to the population. However, because of the simultaneity problem associated with the teacher-pupil being an input into the production of education and the difficulty of defining the tax price for a teacher-pupil ratio, we choose a traditional representation of a demand function for education. For a discussion of the production of education, rather than the demand for education, see Hanusek (2002).
8. The authors thank a reviewer for this point.

9. The authors thank a reviewer for suggesting this final tax price adjustment.
10. The Commonwealth of Virginia is somewhat different from most states in that cities, as defined here, are not within counties. Towns do exist within counties, but are not included as separate economic agents as education spending is provided at the county level for the towns.

References

- ALESINA, A., BAQIR, R. and EASTERLY, E. (1997) *Public goods and ethnic divisions*. Working Paper 6009, National Bureau of Economic Research, Cambridge, MA.
- ASHENFELTER, O. and ROUSE, C. (2000) Schooling, intelligence and income in America, reprinted in: K. J. ARROW, S. BOWLES and S. N. DURLOUF (Eds) *Meritocracy and Economic Inequality*, pp. 89–117. Princeton, NJ: Princeton University Press.
- BERGSTROM, T. C. and GOODMAN, R. P. (1973) Private demands for public goods, *American Economic Review*, 63(June), pp. 280–296.
- BERNE, R. and STIEFEL, L. (1999) Concepts of school finance equity: 1970 to the present, in: H. F. LADD, R. CHALK and J. S. HANSEN (Eds) *Equity and Adequacy in Education Finance: Issues and Perspectives*, pp. 7–33. Washington, DC: National Academy Press.
- BERNIER, L. L. and BINGHAM, R. D. (1989) Budgetary stress and urban fiscal management: a longitudinal perspective, in: T. N. CLARK, W. LYONS and M. R. FITZGERALD (Eds) *Research in Urban Policy*, Vol. 3, pp. 165–190. Greenwich, CT: JAI Press.
- BLAIR, J. P. (1991) *Urban and Regional Economics*. Homewood, IL: Irwin.
- BRADBURY, K. L. and LADD, H. F. (1985) Changes in the revenue raising capacity of U.S. cities, 1970–1982, *New England Economic Review*, March/April, pp. 20–37.
- CARR, M. C. and FUHRMAN, S. H. (1999) The politics of school finance in the 1990s, in: H. F. LADD, R. CHALK and J. S. HANSEN (Eds) *Equity and Adequacy in Education Finance: Issues and Perspectives*, pp. 136–174. Washington, DC: National Academy Press.
- COLBURN, C. B. (1992) The changing composition of income transfer programs: a public choice analysis, *Applied Economics*, 24, pp. 161–168.
- COLBURN, C. B. (1993) The role of fiscal stress indicators in the movement toward regionalism, *Virginia Social Science Journal*, March, pp. 31–42.
- CONLON, J. R. and KIMENYI, M. S. (1991) Attitudes toward race and poverty in the demand for private education: the case of Mississippi,

- Review of Black Political Economy*, 20(2), pp. 5–22.
- CORNES, R. and SANDLER, T. (1996) *The Theory of Externalities, Public Goods, and Club Goods*, Rev. edn. London: Cambridge University Press.
- DOLAN, D. A. (1990) Local government fragmentation: does it drive up the cost of government, *Urban Affairs Quarterly*, 26(1), pp. 28–45.
- DUNNE, S., REED, R. W. and WILBANKS, J. (1997) Endogenizing the median voter: public choice goes to school, *Public Choice*, 93(1–2), pp. 99–118.
- DOWNES, T. A. (1996) Do differences in heterogeneity and intergovernmental competition help explain variation in the private school share? Evidence from early California statehood, *Public Finance Quarterly*, 24(3), pp. 291–318.
- Executive Budget of the Commonwealth of Virginia 1992–1994 Fiscal Years* (1992) Staff of the Department of Planning and Budget, Richmond, Virginia.
- FALCH, T. and RATTSO, J. (1999) Local public choice of school spending: disaggregating the demand function for educational services, *Economics of Education Review*, 18, pp. 361–373.
- HANUSEK, E. A. (2002) *Publicly provided education*. Working Paper 8799, National Bureau of Economic Research, Cambridge, MA.
- HANUSEK, E. A. and SOMERS, J. A. (1999) *Schooling, inequality, and the impact of government, national bureau of economic research*. Working Paper 7450, Cambridge, MA.
- HERRNSTEIN, R. J. and MURRAY, C. (1994) *The Bell Curve: Intelligence and Class Structure in American Life*. New York: Free Press.
- HODGKINSON, V. A. and WEITZMAN, M. S. (1992) *Giving and Volunteering in the United States, Findings from a National Survey, 1992 edn*. Washington, DC: Independent Sector.
- KING, D. (1984) *Fiscal Tiers: The Economics of Multi-level Government*. London: George Allen and Unwin.
- LADD, H. and MURRAY, S. (2001) Intergenerational conflict reconsidered: county demographic structure and the demand for public education, *Economics of Education Review*, 20, pp. 343–357.
- LEVY, J. M. (1985) *Urban and Metropolitan Economics*. New York: McGraw-Hill Book Company.
- LOVELL, M. C. (1978) Spending for education: the exercise of public choice, *The Review of Economics and Statistics*, 60(4), pp. 487–495.
- MARQUETTE, J. F., BROOKS, S. C. and MARQUETTE, R. P. (1989) Reliability estimates for the national level fiscal austerity data, in: T. N. CLARK, W. LYONS and M. R. FITZGERALD (Eds) *Research in Urban Policy*, Vol. 3, pp. 191–213. Greenwich, CT: JAI Press.
- MCMILLAN, M. L. and AMOAKO-TUFFOUR, J. (1991) Demands for local public sector outputs in rural and urban municipalities, *American Journal of Agricultural Economics*, 73(2), pp. 313–325.
- MEIER, K. J. and SMITH, K. B. (1994) Representative democracy and representative bureaucracy: examining the top-down and bottom-up linkages, *Social Science Quarterly*, 75(4), pp. 790–814.
- MILLER, C. (1996) Demographics and spending for public education: a test of interest group influence, *Economics of Education Review*, 15, pp. 175–185.
- MOURITZEN, P. E. (1989) Dimensions of fiscal stress, in: T. N. CLARK, W. LYONS and M. R. FITZGERALD (Eds) *Research in Urban Policy*, Vol. 3, pp. 141–164. Greenwich, CT: JAI Press.
- MUELLER, D. C. (1989) *Public Choice II*. Cambridge: Cambridge University Press.
- MUNLEY, V. G. (1984) Has the median voter found a ballot box that he can control?, *Economic Inquiry*, 22, pp. 323–336.
- ORR, L. (1976) Income transfers as a public good, *American Economic Review*, 66, 359–371.
- PINDYCK, R. S. and RUBINFELD, D. L. (1981) *Econometric Models and Economic Forecasts*. New York: McGraw-Hill Book Company.
- POTERBA, J. M. (1997) Demographic structure and the political economy of public education, *Journal of Policy Analysis and Management*, 16(1), pp. 48–66.
- STEVENS, J. B. and MASON, R. (1996) Political markets, property tax referenda, and local school spending, *Public Choice*, 86(3–4), pp. 257–277.
- STIGLER, G. J. (1971) The theory of economic regulation, *Bell Journal of Economics and Management Science*, 2, pp. 3–21.
- US BUREAU OF THE CENSUS (1994) *County and City Data Book: 1994*. Washington, DC: US Government Printing Office.
- VIRGINIA ALLIANCE FOR PUBLIC SERVICE (1991) *Financing state government*. Paper prepared for *The State of Public Finance: Virginia and the Nation*, Richmond, Virginia November.
- VIRGINIA DEPARTMENT OF PUBLIC EDUCATION (1991) *The Superintendents Annual Report for Virginia: 1990–91*. Richmond, Virginia.
- WHITE, H. (1980) A heteroskedasticity-consistent covariance matrix and a direct test for heteroskedasticity, *Econometrica*, 48, 817–838.
- WILDASIN, D. E. (1986) *Urban Public Finance*. Chur: Harwood Academic Publishers.
- WONG, K. K. (1989) Toward a ‘political choice’ model in local policy making, in: T. N. CLARK, W. LYONS and M. R. FITZGERALD (Eds) *Research in Urban Policy*, Vol. 3, pp. 217–245. Greenwich, CT: JAI Press.

Appendix**Table A1.** Definition of variables

Dependent variable LE	Log of educational spending per student
Tax price	Log of tax price, defined as median property value divided by value of all property times number of students
Population	Log of population
Median income	Log of median income
City dummy	1 if municipality is a city, 0 if a county
Sales tax	Log of local sales tax revenue
Crime	Log of serious crimes per 1000 of the population
Pop. density	Log of the population density
Percent Black	Log of percentage of the population African-American
Government employment	Log of federal government employment
Democratic	Log of percentage voting democratic in 1992 presidential election
Income less than 15	Log of percentage of families with income less than \$15 000
Income greater than 75	Log of percentage of families with income greater than \$75 000
4 year college	Log of percentage of adults with 4 years of college
Private	Log of percentage of students not in public school, either private or home schooling
Social security	Log of social security recipients per 1000 of the population
Students	Log of the number of students
Teachers	Log of the number of teachers
Age fragmentation	Log of education fragmentation: less than high school education, high school education only, college degree
Income fragmentation	Log of income fragmentation: income less than \$15 000, \$15 000–\$25 000, \$25 000–\$35 000, \$35 000–\$50 000, \$50 000–\$75 000, greater than \$75 000
Race fragmentation	Log of racial fragmentation: Black, White
Party fragmentation	Log of party fragmentation: Republican/Independent, Democrat
Parent education frag	Log of education fragmentation: less than high school education, high school education, college degree
Employment frag	Log of employment fragmentation: public sector, private sector
Pub/priv school frag	Log of public and private schooling fragmentation: private/home school, public
