THE IMPACT OF POPULATION DECLINE ON COUNTY GOVERNMENT FINANCE: THE WEST VIRGINIA CASE

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I. INTRODUCTION

West Virginia lost 6.2 percent of its population from 1960 to 1970.[1] In the same period, individual county population change ranged from a decline of 29.0 percent to an increase of 17.2 percent; most counties lost a substantial portion of their residents. This environment is almost ideal for examination of the influence of population decline on local government finance. Not only can the results be useful for West Virginia and other areas currently experiencing population loss, but they can provide information for planning if continuing decline in national population growth spreads population loss to many other localities.

West Virginia local government organization is particularly suited for this work as school districts in the state coincide geographically with the counties. Few states have this matching, an advantage which makes possible the use of county-wide data in explaining school district finance.

This study analyzes in cross-section West Virginia county and school governments in 1967, the Census of Governments year, and examines the effect of population change over a ten-year period. The basic question examined is the following: in what fashion does population change (defined as the percentage change in county population from 1960 to 1970) influence per capita local expenditure and revenue? The overall fiscal influence estimate combines the effect on expenditure and revenue.[2]

COUNTY AND SCHOOL DISTRICT EXPENDITURE PATTERNS

Least squares regression analysis provides evidence of the influence of population change on per capita expenditure -- school, county, and school-county combined.[3] These equations include population change, variables relating to citizen demand characteristics, and a variable dealing with the potential budget (income, assessed value, etc.) of the government as explanatory elements Variables come from the 1967 Census of Governments, the 1967 Report of the West Virginia State Superintendent of Schools, the 1967-68 Report of the West Virginia Tax Commissioner, the 1968 Sales Management Survey of Buying Power, the 1964 Census of Agriculture, and the 1970 Census of Population. Variables other than population change remained in the equation if their T-value fell below 1.0 only if their lack of relationship was interesting. The regression results for major categories are in Table 1.

The county expenditure regression equations generally show low explanatory power. West Virginia county governments have limited responsibilities, largely because the rigid property tax ceiling limits the effective revenue base, and individual county peculiarities determine whether activities (parks, airports, etc.) are undertaken by the county, cities, or private or non-profit enterprise. Many county governments thus do not provide certain

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services supplied by other counties, even though the citizens of that county may not lack that service. These largely historical patterns cannot be captured in the equations, so the lack of complete success is not unexpected.

All counties engage in police and correction activities. The greater the percentage of population under 18, the greater the county police and correction activity: youths likely require special treatment by police and may be more likely to engage in activities needing police intervention. The percentage of households with income greater than $10,000, positively related to police and correction activity, encompasses both the effect of greater capacity to pay for the function and the effect of having more people with a taste for this activity. Population change is also significantly related to expanditure on this function: there is less than one chance in one hundred that the negative relationship occurred by chance alone. Counties experiencing substantial population loss from 1960 to 1970 have relatively higher per capita police and correction expenditure. This is evidence of a lag in the county decision process, that the county decisionmakers are supplying the service on the basis of prior population levels and are, in essence, serving people who no longer live in the county.

All counties likewise engage in public welfare activity, and state aid plays an important part in its financing. It is thus not surprising to find that the percent of county revenue from intergovernmental aid is a strong positive determinant. As substantial funds for public welfare come from the property tax, it is equally expected that per capita assessed values are strongly positively related. As urbanized areas likely are more aware of poverty problems, the positive (although weak) relationship between this function and the percent of the county urban in nature is not surprising. The weak negative relationship between population and public welfare expenditure indicates that there may be economies of size in this activity. Most important for the persent study is the insignificance of the population change variable for the level of public welfare expenditure. No lag in the government service process is apparent. Individuals leaving declining areas typically are the most likely to support themselves, leaving higher concentrations of welfare prone people in these areas. The absence of a significant positive relationship suggests that the welfare system may not be doing its job in West Virginia.

The last of the county expenditure subcategories relevant for West Virginia is county general function expenditure, the aggregation of general control, general public buildings, and financial administration expenditure. Each function encompasses activities not strictly allocable to any government function but shared by all governmental services. Variation in this grouping is closely related to population change and assessed value. Population density allows for the possibility that economies could emerge from having a more compact population to serve. The relationship found could appear to chance more than fifty percent of the time. Assessed value per capita is strongly positively related to general function expenditures, reflecting the influence of the size of the tax base. Population change is strongly negatively related. Again this is evidence of the lag in local government decisionmaking, just as one would suspect for a function not closely linked to the people served.

A regression was also fitted for county total expenditures. An anticapated, the per capita assessed value in the county is an important explanatory variable: the greater the tax base, the higher the total expenditure. This finding coincides with that of others examining total county expenditure behavior, as does the inability to explain much of the total variation. A second important determinant is the percent of the county population that resides in urbanized areas. The negative relationship with total county per capita expenditure obviously emerges because municipalities supply public services

in urbanized areas, relieving the county of the need to make expenditures. Finally, population change enters the equation negatively, but not significantly. In light of the mixed relationships previously noted, the absence of relationship to the total is not surprising.

West Virginia county school districts provide public education to all county residents. School district expenditures are almost five times those of the county general government, so it is particularly important to examine school expenditure. Fortunately, there is greater uniformity between counties and it is possible to explain more completely the variation in West Virginia school district total and subcategory expenditures.

School administrative expenditure is negatively related to the public school enrollment in the county, suggesting possible economies of large size for school administration. The negative relationship with the private and parochial school enrollment to public school enrollment ratio indicates that private provision of this educational activity does substitute for public provision, at least to some degree. Assessed value per capita is positively related to administrative expenditure, but there are more than fifty chances in one hundred that the relationship is random. The association is, however, in the expected direction. The variable of major current interest is population change. The results indicate a negative relationship between it and administrative expenditure: counties experiencing population decline have relatively higher administrative expenditure per capita than otherwise would be predicted. This again is evidence of the general governmental lag.

The explanatory power of the school instructional equation is high. As would be expected, instructional expenditure is higher in counties with greater portions of their population below eighteen years old and the private enrollment - public enrollment ratio is negatively related to instructional expenditure. Population density is positively related, a probable reflection of the additional instructional problems encountered is a more congested environment. Population change again is negatively related to the dependent variable: counties with declining population have relatively higher per capita expenditure for school instruction than counties with rising population.

Finally, all school expenditures were included in an equation. Effective buying income per household is negatively and significantly related to total expenditure. Although this result initially appears surprising, further consideration makes it seem less so. The counties with higher income are those in which private schools are predominately located. Hence, the higher income areas are more likely to have a significant portion of their educational activity undertaken by non-public means and the initially surprising result is thus explained. The percent of the population under eighteen is positively related, again for obvious reasons. And finally, population change is negatively, and significantly, related to total school expenditures, presumably the result of the decline lag mentioned previously.

As both school and county governments draw on the same local tax base, it is legitimate to examine aggregate school and county expenditure patterns in the county. This combined expenditure analysis is vital for the basic question being examined as these combined expenditures must be financed by the county and the behavior of this magnitude must be compared with that of county revenue to determine the fiscal influence of population change.

School-county noncapital expenditure excludes all capital outlays, both those expenditures financed by bond levies and those financed from regular revenues. Such as exclusion eliminates irregularities caused by bond elections and lumpiness induced by outlays for durable equipment. The variables

important for these expenditures are those that had been critical for the subcategories. Assessed value is positively related, as it includes information on the capacity of the county to pay for services. The percent of the population under eighteen years of age is positively related since it conveys differences in the clientele. Urbanization of the population is negatively related since it indicates the extent to which municipal governments are likely to provide services to county residents. And population change is negatively related, suggesting the existence of a response lag for school-county noncapital expenditures. School-county total expenditures follow the same pattern as noncapital expenditures. Only the urbanization variable does not appear. The total expenditure equation shows that there are ninety-five changes in one hundred that per capita expenditures are from $0.31 to $1.49 higher as a result of population loss being greater by one percentage point.

COUNTY AND SCHOOL DISTRICT REVENUE PATTERNS

County and school revenue in West Virginia primarily consists of intergovernmental revenue and property tax revenue. Neither revenue source is directly connected to the number of individuals in the locality. Outside decisionmakers largely determine the level of intergovernmental revenue and much of the property tax base remains, at least hypothetically, after the citizenry leaves. It is, hence, to be expected that revenue categories will lag in local governmental finance.

County intergovernmental revenue per capita varies substantially as a result of special programs selected by individual counties. Several general factors influence intergovernmental revenue in all counties. The rural-agriculture bias in many assistance programs causes higher intergovernmental revenue in counties with a larger percent of land in farms. This revenue is also higher in counties making a greater revenue effort, some evidence of a stimulative influence in the grant programs, and in counties with larger populations, although there is substantial possibility that this influence could have appeared by chance. Population change is negatively related to intergovernmental revenue per capita, evidence of the lag in government that has previously been suggested.

The explanatory power of the per capita county tax revenue equation is substantially higher than that for intergovernmental revenue. Two major determinants are local revenue effort and assessed property value per capita. Both are positively related to tax revenue for obvious reasons. Population change is negatively related, indicating the tendency for tax revenues to remain high even as county population declines. This effect emerges from failure of market values to respond to population change or from lags in the assessment-collection process.

County total revenue combines tax, intergovernmental, and other miscellaneous revenue and there are substantial variations in intercounty patterns. Some factors are of sufficient general importance to be significantly related to total revenue in the regression model. Assessed value per capita is positively related, for obvious reasons. The percent of land in farms is negatively related, although at a low level of significance, as a result of the favorable property tax rate applicable to farmland and equipment: a larger relative importance for farming means reduced local revenue potential. Population per housing unit is negatively related to total revenue: the greater the population per housing unit, the lower the quality and value of the housing stock. Not only does this provide an influence on the property tax base but also it reflects the overall affluence of the county. Finally, population change is negatively related to total revenue per capita, although the relationship quite likely could occur by chance alone.

The evidence for school revenue, both by category and in total, is strong and the explanatory results are good. School districts intergovernmental revenue from both the state and federal governments accounts for more than sixty percent of total school revenue. Several forces appear important for intergovernmental revenue. First, there is some redistribution to lower income areas, as shown by the positive coefficient for the percent of population in the county with effective buying income less than $3,000. Second, the larger counties and counties with lower density receive greater intergovernmental revenue per capita. Third, school districts in more urbanized counties receive lower grant revenue per capita, possibly as a result a rural governmental bias. Finally, the intergovernmental revenue equation contains the population change variable and the coefficient is negative and significantly different from zero. The governmental response lag -- or it may be a conscious government effort to minimize the problems of declining areas -- again appears as an important element.

The property tax provides substantial school revenue. Local revenue effort is an important determinant of these funds: as revenue effort rises, local source revenue and property tax revenue are higher. Population density is positively related as a result of its importance in determining the value of property. The percent of county households with effective buying incomes less than $3,000 is negatively associated: lower county tax capacity results in lower tax collections. Population change, as in other revenue equations, is negatively related to the dependent variable: school tax revenue per capita is higher in counties experiencing relatively greater population loss.

The equation for total revenue includes elements important to local source and intergovernmental revenue. Effective buying income per household is negatively related to school total revenue, as a result of redistributive elements in the aid system, but the level of significance is low because of opposite influences in the local tax structure. Local revenue effort is positively related for obvious reasons, but the level of significance is low as a result of countervailing effects in the aid system. The percent of land in farms is negatively related, primarily as a result of preferential tax treatment accorded agricultural activity. Population change is also negatively related, presenting further evidence of the overall lag in county finance.

Combined school-county revenue presents the overall revenue producing behavior of the county area. Equations were fitted to total revenue, property tax revenue, and intergovernmental revenue. The patterns appearing here differ little from those seen for individual unit revenues.

Redistributive elements in aid programs cause school-county intergovernmental revenue to be positively related to the percentage of households with less than $3,000 in effective buying income. This revenue is negatively related to local revenue effort, population density, and the percent of county land in farms. Most important for present purposes is the negative coefficient for population change. This revenue is negatively related to local revenue effort, population density, and the percent of county land in farms. Most important for present purposes is the negative coefficient for population change. There are fewer than five chances in one hundred that this relationship would appear by chance alone: governmental response is such that intergovernmental aid per capita is relatively higher in areas experiencing population loss.

Four variables are associated with almost seventy percent of the variation in school-county property tax revenue. Local revenue effort is positively associated with this revenue, as expected. Population density and the percent of the households with less than $3,000 effective buying income re-

present size of the tax base and capacity to pay local taxes and each is strongly related to property tax revenue in the manner predicted. Population change, as in other equations, is negatively related.

School-county total revenue combines property tax revenue, intergovernmental revenue, and some miscellaneous revenue sources. Its determinants are actually those of the component sources, but in aggregation some cross influences are netted out. Local revenue effort is positively associated: those counties raising greater revenue per dollar of income have higher per capita total revenue. The percent of county land in farms is negatively related. The favorable tax treatment for agricultural property outweighs the favoritism for agricultural areas in the governmental aid structure. Population is negatively related to total revenue, although the association is weak: more populous areas find it more difficult to generate revenue. Finally, the percent of population change is negatively related to total revenue. The coefficient for this equation gives an estimate of the total school-county revenue impact of population change: There are ninety-five chances in one hundred that the difference in per capita county-school revenues associated with a one percentage point difference in population change will be between $0.14 and $1.12.

NET FISCAL RESULTS OF POPULATION CHANGE

The preceding regression equations present the impact of population change on county and school revenue and expenditure. To discover the overall fiscal pressure that population change has created and can reasonably be expected to continue to produce, must be combined.[4]

The regression coefficients are midpoints of a range of possible impact values, so 95 percent confidence level intervals were constructed about each of these mean coefficients. The combination of an optimistic revenue estimate, the high limit of the 95 percent interval, and an optimistic expenditure estimate, the low limit of the interval, gives the most favorable possibility for net budgetary impact. A conservative estimate of the least favorable budget possibility uses the lower limit for revenue and the high limit for expenditure. The regression coefficients give the medium estimate.

Table 3 indicates several things. First, population change has no perceptible influences on county government finance. Although individual regressions on county totals typically produce negative relationships between population change and the totals, none of the coefficients are significantly different from zero.

Second, school district finance, on any but the most optimistic of assumptions, shows an overall deficit influence from population loss. For the medium estimate, a one percentage point difference in population loss for a county is associated with per capita school revenue higher by $0.50, but school per capita expenditures are higher by $0.62. Hence, the deficit is $0.12 for each person remaining in the county. A fiscal problem exists for those remaining, both present and future if current structure and behavior persist.

Third, a similar outlook holds for the combined school-county government. At the mean, a one percentage point difference in population loss for a county is associated with per capita school-county revenue higher by $0.68, but per capita school-county expenditures are higher by $0.90. The deficit is $0.22 for each person remaining in the county.

II. SUMMARY AND CONCLUDING OBSERVATIONS

The evidence suggests that population change influences West Virginia school and county finance. Most revenue categories indicate higher per capita revenue in counties experiencing population loss. Likewise, most expenditure categories show higher per capita expenditure in counties experiencing population loss. Both instances evidence a lagged response to population change. When the expenditure and revenue responses are netted out to establish overall fiscal impact, however, it must be concluded that present revenue and aid structures produce a fiscal deficit to be borne by the remaining population.

Most observers would conclude that this fiscal outcome is untenable. Even if the basic objective is to get people out of these declining areas, some action is desirbale as it must be noted that the local government provides primary and secondary public education. If these governments are financially unable to provide this service, the areas to which migrants go will immense health, education, and welfare problems. Some governmental response appears desirable.

Three options to correct this fiscal imbalance are available. Local governments could reduce per capita expenditure for local services. As West Virginia local expenditures fall far below national averages, such a strategy seems unwise. Local governments could increase local source revenue. Unfortunately, many would quickly reach the constitutional rate ceiling and expanded local service charges violate commonly held concepts of equity. The final option is expanded intergovernmental aid to the declining population counties. This strategy relies on state and federal decisionmakers. This most acceptable response to the predicted fiscal problems of these counties depends on agencies outside the counties, and which are unlikely to place high priority on the problems of these counties.

Table 1. School-County Expenditure Determinants: Cross-Section Evidence. 1967 Per Capita Data

County Police and Correction Expenditure

Variable	Coefficient	Standard Error
% Population Change	- 0.4546	0.00952
% Household with E. B. I. greater than $10, 000	0.03829	0.01489
% Population under 18	0.06159	0.02737

Constant = -0 63983 R^2 = .40263 F Value = 11.2333

County Public Welfare Expenditure

Variable	Coefficient	Standard Error
Aid/Total Revenue	15.34054	2.00341
Population	- 0.00001	0.00001
% Population Urban	0.01669	0.01386
Assessed Value Per Capita	0.00129	0.00039
% Population Change	- 0.01390	0.02353

Constant ' -3.18158 R^2 = .5886 F Value = 13.7347

County General Control, etc. Expenditure

Variable	Coefficient	Standard Error
% Population Change	- 0.05846	0.01899
Assessed Value Per Capita	0.00115	0.00036
Population Density	- 0.00180	0.00187

Constant = 1.91322 R^2 = .2580 F Value = 3.1735

County Total Expenditure

Variable	Coefficient	Standard Error
Assessed Value Per Capita	0.00792	0.00258
% Population Urban	- 0.12683	0.06975
% Population Change	- 0.09953	0.15253
% Population Non-white	- 0.33423	0.40661

Constant = 1.16361 R^2 = .2058 F Value 3.1735

School Administrative Expenditures

Variable	Coefficient	Standard Error
% Population Change	- 0.04397	0.01971
Total Assessed Value	0.00028	0.00038
Public School Enrollment	- 0.00007	0.00002
Private/Public Enrollment	-11.01030	4.60990

Constant = 3.55806 R^2 = .3391 F Value 6.2854

Table 1. School-County Expenditure Determinants: Cross-Section Evidence. 1967 Per Capita Data
Continued

School Instructional Expenditure

Variable	Coefficient	Standard Error
% Population Change	- 0.57848	0.08707
% Population Under 18	1.72240	0.28566
Population Density	0.04697	0.01302
Private/Public Enrollment	-105.43235	31.65796

Constant = 3.56193 R^2 = .7362 F Value = 32.4914

School Total Expenditure

Variable	Coefficient	Standard Error
% Population Change	- 0.62165	0.25552
% Population Under 18	3.80905	0.72140
Effective Buying Income Per Household	- 0.00245	0.00201

Constant = -3.60316 R^2 = .5303 F Value = 18.8162

School-County Non-Capital Expenditure

Variable	Coefficient	Standard Error
% Population Change	- 0.95467	0.19436
% Population Urban	- 0.25258	0.09090
% Population Under 18	2.64318	0.60772
Assessed Value Per Capita	0.00783	0.00328

Constant = 9.07492 R^2 = .6397 F Value = 20.8310

School-County Total Expenditure

Variable	Coefficient	Standard Error
% Population Change	- 0.90478	0.29531
% Population Under 18	4.14373	0.92653
Assessed Value Per Capita	0.00658	0.00479

Constant = -30.59371 R^2 = .4289 F Value = 12.5151

Table 2. School-County Revenue Determinants: Cross-Section Evidence. 1967 Per Capita Data

County Total Revenue

Variable	Coefficient	Standard Error
% Population Change	- 0.03054	0.17184
Population Per Housing Unit	-19.50101	8.40007
% Land in Farms	- 0.11041	0.10635
Assessed Value Per Capita	0.00406	0.00231

Constant = 69.96021 R^2 = .1536 F Value = 2.2236

County Intergovernmental Revenue

Variable	Coefficient	Standard Error
% Population Change	- 0.08624	0.05006
% Land in Farms	0.06236	0.02934
Population	0.00001	0.00001
Local Revenue Effort	0.05846	0.04529

Constant = -2.44341 R^2 = .0997 F Value = 1.3571

County Tax Revenue

Variable	Coefficient	Standard Error
% Population Change	-00.06569	0.02202
Local Revenue Effort	0.03458	0.02405
Total Assessed Value Per	0.00384	0.00037

Constant = -0.05614 R^2 = .7063 F Value = 40.0765

School Total Revenue

Variable	Coefficient	Standard Error
% Population Change	- 0.50285	0.23221
% Land in Farms	- 0.53448	0.11397
Local Revenue Effort	0.34943	0.18259
Effective Buying Income Per Household	- 0.34943	0.18259

Constant = 123.92307 R^2 = .6098 F Value = 19.146

School Intergovernmental Revenue

Variable	Coefficient	Standard Error
% Population Change	- 0.76630	0.17915
% Population Urban	- 0.30874	0.09847
% Household with Effective Buying Income less than $3,000	0.43923	0.28703
Land Area of County	0.00984	0.00757

Constant = 56.82572 R^2 = .71304 F Value = 30.4390

Table 2. School-County Revenue Determinants: Cross-Section Evidence. 1967 Per Capita Data Continued

School Property Tax Revenue

Variable	Coefficient	Standard Error
% Population Change	- 0.36296	0.12710
Population Density	0.02750	0.01283
% Households with EBI less than $3,000	- 0.98545	0.19990
Local Revenue Effort	0.64110	0.11470

Constant = 41.90747 R^2 = .6968 F Value = 28.4204

School-County Intergovernmental Revenue

Variable	Coefficient	Standard Error
% Population Change	- 0.43106	0.20803
% Households with EBI less than $3,000	0.79046	0.26778
% Land in Farms	- 0.37938	0.09699
Population Density	- 0.05157	0.01652
Local Revenue Effort	-.0.19920	0.15124

Constant = 72.46326 R^2 = .7737 F Value = 32.8162

School-County Property Tax Revenue

Variable	Coefficient	Standard Error
% Population Change	- 0.40700	0.14752
% Households with EBI less than $3,000	- 0.96423	0.23201
Local Revenue Effort	0.73304	0.13313
Population Density	0 04017	0.01489

Constant = 48.43958 R^2 = .6813 F Value = 26.1831

School-County Total Revenue

Variable	Coefficient	Standard Error
% Population Change	- 0.68310	0.27153
Local Revenue Effort	0.41085	0.24567
% Land in Farms	- 0.55432	0.15915
Population	- 0.00009	0.00007

Constant = 135.19428 R^2 = .4961 F Value = 12.0587

Table 3. Net Fiscal Influence of Population Change: Counties, Schools, and School-Counties. (Per capita difference for one percentage point difference in population loss)

	Present Mean Per Capita	-- Expenditure -- Conservative	Medium	Optimistic	Present Mean Per Capita	-- Revenue -- Conservative	Medium	Optimistic	-- Net -- Conservative	Medium	Optimistic
COUNTY[1]	$ 19.59	0	0	$ 0	$ 19.86	0	0	0	0	0	0
SCHOOL	$112.50	$1.13	$0.62	$0.11	$109.45	$0.04	$0.50	$0.96	$-1.09	$-0.12	$-0.85
SCHOOL-COUNTY	$132.09	$1.49	$0.90	$0.31	$129.32	$0.14	$0.68	$1.12	$-1.35	$-0.22	$+0.91

[1]Population change and per capita county total revenue and expenditure are negatively related, but the relationship discovered could have emerged by chance alone more than fifty times out of one hundred. Hence, it is not possible to conclude that the relationship does exist.

FOOTNOTES

[1]The 1950 to 1960 population loss was 7.2 percent. Up to that census period, the state as a whole had been gaining population.

[2]A review of the many studies of the determinants of state and local government expenditure may be found in Roy Bahl, "Studies on Determinants of Public Expenditures: A Review," in Selma Mushkin and John F. Cotton, Functional Federalism: Grants-in-Aid and PBB Systems. (New York: Praeger, 1969). None examine the basic issue examined in this paper.

[3]Tucker County was excluded because it did not report general county financial data in the 1967 Census of Governments.

[4]A similar analytic technique to the one used here appears in Phillip E. Vincent, Fiscal Impacts of Commuters on Core Cities with Varying Revenue Structures (Los Angeles: Institute of Government and Public Affairs, U.C.L.A. 1969).