DOCUMENT RESUME

ED 188 305 EA 012 754

AUTHOR Gensemer, Bruce L.
TITLE Gaining Equalization Leverage by Diverting Property Tax Revenues to the State Basic Aid Fund.
PUB DATE 18 Mar 80
NOTE 150p.; Paper presented at the Annual Meeting of the American Education Finance Association (San Diego, CA, March 16-18, 1980).

EDRS PRICE MF01/PC06 Plus Postage.
DESCRIPTORS Computer Programs; Educational Finance; Elementary Secondary Education; Equal Education; *Equalization Aid; *Finance Reform; Foundation Programs; Property Taxes; Resource Allocation; *State Aid; State School District Relationship
IDENTIFIERS *Ohio; *Ohio School Finance Simulation Program

ABSTRACT

Under Ohio's existing educational finance plan, the power of school districts to purchase the educational resources commensurate with each district's educational needs is far from equal. Consideration of four specific potential reforms, separately and in combination, indicates that greater equity can be obtained. If Ohio is to avoid substantial increases in the tax burden on voters, property tax diversion is the most plausible means of gaining equalization leverage in school finance. Property tax diversion would sharply reduce those inequities due to wealth disparities among districts, but it would tend to hurt central city districts. Introducing a poverty factor would bring substantial relief to high poverty districts. Introducing a cost factor would bring relief to districts that face high resource costs. A package of the four reforms would be extremely effective in enhancing equity in Ohio school finance, while also permitting a continued role for school district financial discretion. These reforms have been tested by use of a computer simulation. An appendix presents part of the user's manual for this simulation program, to provide the reader an opportunity to study the program's power and limitations. (Author/PGD)

Gaining Equalization Leverage by Diverting Property Tax Revenues to the State Basic Aid Fund

by

Bruce L. Gensemer

Professor of Economics

Kenyon College

Paper Presented at the

1980 Annual Conference of the

American Education Finance Association

March 18, 1980

San Diego, California

The research reported in this paper was performed while the author was Fellow in Economics and Public Finance at The Academy for Contemporary Problems, Columbus, Ohio.

Contents

I. Introduction

A. Purpose of the paper

The purpose of this paper is to evaluate several potential reforms in Ohio's system for distributing state basic aid to school districts. The analysis focusses on certain inequities in the existing distribution of operating revenues among districts and on the extent to which the reforms reduce these inequities. Four specific reforms are considered: (1) adoption of a foundation plan for distributing state basic aid; (2) diversion of some property tax revenues from school districts to the state's basic aid fund; (3) adoption of a poverty factor in the basic aid distribution formula; and (4) adoption of a cost of purchasing educational resources factor in the basic aid distribution formula. Among these four reforms, property tax diversion is the most novel and has the most significant impact on both school districts and taxpayers. For these reasons special stress will be placed on the analysis of property tax diversion.

B. General plan of the paper

Section II of the paper presents a standard for evaluating the equity of the distribution of operating revenues among school districts within a state. The existing distribution of revenues among Ohio school districts is found inequitable, and these inequities are explained.

Section III focusses on the key obstacle to any attempt by the state to alter significantly the distribution of revenues. This obstacle is

the lack of state financial leverage caused by the small role played by state basic aid in Ohio school district finance. Several alternative means of gaining leverage are presented and evaluated.

Section IV presents the reform options selected for empirical testing. The rationale for and expected impact of each reform are also presented.

Section V presents the empirical findings of the simulation studies of the reform options. The distributional impact of each reform and of various combinations of reforms is considered.

Section VI draws together the policy implications of the research. The findings are directly applicable to Ohio, but in most cases they would apply to other large industrial states as well.

C. Summary of findings

1. This study evaluates several school finance reforms in terms of their success in approaching the following equity standard:

   <u>Every public school district within the state should have equal power to purchase educational resources per unit of educational need.</u>

2. Ohio's existing school finance plan fails to meet or even approach the equity standard.

   a. Ohio school districts with little economic strength have relatively limited revenues with which to meet their educational needs. This observation applies to districts with modest wealth per pupil, with low levels of personal income among residents, and with little of the property tax base accounted for by business property. Although state aid recognizes some of these disparities among districts, equalization efforts by the state have fallen far short.

b. Ohio school districts with high proportions of economically disadvantaged pupils have special needs for educational resources that have not been adequately satisfied. State and federal grants for poverty-related programs have failed to match the extra expenditures needed in high-poverty school districts.

c. Ohio school districts located in counties having a relatively high all-industry wage level are forced to pay relatively high salaries, so these districts need more revenues than other districts in order to purchase comparable educational resources. At present, state aid fails to compensate for these higher personnel costs, so the districts in high-wage counties suffer from a reduced power to purchase educational resources.

d. The sixteen central city school districts in Ohio tend to suffer from high poverty incidence, high cost of purchasing educational resources, and a modest average income level of residents. These districts are thus the principal victims of the existing inequities in Ohio's school finance system.

3. The State of Ohio currently lack leverage to alter significantly the distribution of total operating revenues among its school districts. This lack of leverage is due to the modest share of district revenues contributed by state unrestricted aid. Improved equity thus requires an increased role for state unrestricted aid to districts.

4. If Ohio is to avoid substantial increases in the tax burden on voters, property tax diversion is the most plausible means of gaining equali-

zation leverage in school finance. When a portion of district property tax revenue is diverted to the state basic aid fund, the state can then distribute these revenues among districts according to educational need.

5. Four school finance reforms are presented and evaluated. Each reform is designed to reduce or eliminate some of the existing inequities in Ohio school finance.

   a. The first reform is to replace Ohio's existing guaranteed yield plan for distributing state basic aid with a foundation plan. The essential difference between these plans is that the level of basic aid is unaffected by district tax effort in a foundation plan, whereas it is varied as a reward for district tax effort in the guaranteed yield plan. The guaranteed yield plan's reward for tax effort feature is inconsistent with the equity standard presented above, since it sends basic aid to districts in response to a factor unrelated to the educational need in the districts.

   b. The second reform is to adopt property tax diversion, and its attraction is that it permits a substantial reduction in the existing financial inequities among districts without raising the overall level of state-local taxes. Several alternative versions of property tax diversion are considered.

   c. The third reform is to adopt a poverty factor in the formula for distributing state basic aid to school districts. This poverty factor reflects the poverty incidence in each district, and is designed to target basic aid toward districts where the poverty incidence generates special educational needs.

d. The fourth reform consists of introducing a cost factor into the basic aid distribution formula. The cost factor reflects the variation among districts in their costs of hiring personnel, and the factor is designed to channel basic aid toward districts with relatively high costs. Only with relatively high revenues can the districts in high-cost areas succeed in having purchasing power per unit of need equal to what other districts have.

e. The most plausible strategy to achieve greater equity is to adopt a reform package that includes these four specific reforms.

6. Empirical tests of the specific reforms and of various reform combinations yield the following conclusions:

a. Property tax diversion sharply reduces inequities due to wealth disparities among districts, but it also tends to hurt central city and other districts that suffer from high poverty incidence and high costs.

b. The poverty factor succeeds in bringing substantial relief to high-poverty districts, without any harmful side effects.

c. The cost factor succeeds in bringing substantial relief to high-cost districts, although it interferes to some extent with efforts to reduce inequities based on wealth disparities.

d. The foundation plan is somewhat more equitable than the present guaranteed yield plan, but the advantage is modest, so this reform is less significant than the others.

e. The package of the four reforms is extremely effective in enhancing equity in Ohio school finance, while also permitting a continued role for school district financial discretion.

f. Adopting only property tax diversion (without poverty and cost factors) would be a serious mistake, since problems of central city districts would be exacerbated.

g. Adopting only a cost factor (without tax diversion and a poverty factor) would be a serious mistake, since this would channel unnecessary state aid to affluent suburban school districts.

h. Adopting only a poverty factor would be helpful, and should be considered even if the other reform options are rejected.

i. The package of the four reforms would succeed in retaining its distributional effects over time, unlike many previous equalization efforts.

j. Upon the adoption of property tax diversion, transitional guarantees to adversely-affected districts could be provided so as to ease the transition for these districts without significant loss of equalization.

k. Property tax diversion could be designed so as to have no immediate effect on taxpayers, if this is desired.

l. Property tax diversion would be likely to affect voter behavior eventually, but for some districts it would be difficult to predict whether millage rates would eventually rise or fall.

II. Existing inequities in Ohio's school finance system

A. An equity standard

This paper is concerned with the distribution of operating revenues among Ohio school districts. In particular, we shall consider inequities in the existing distribution of operating revenues and the effects of reforms designed to eliminate these inequities. An inequitable distribution of revenues is not the only problem in Ohio's school finance system, but the other problems are not addressed here. For instance, we shall ignore the claim that the overall level of funding is insufficient. We shall also avoid any consideration of the adequacy of the administration and teaching in school districts. Our analysis begins with a discussion of the concept of equity.

The standard of equity used in this study is based on the proposition that education of children through high chool should be primarily a responsibility of state government. The state government should insure a fair distribution of educational resources throughout all areas of the state. Actions of the individual school districts and the federal government should not be permitted to interfere with the goals of state government for its educational system. The rationale for having school districts with elected boards of education is that each community has special educational needs and that local officials know best how to respond to these needs. State government should assign to the school districts the responsibility for deciding what specific resources to employ and programs to operate, within the general objectives of the state and within the constraint of the distribution of revenues considered most appropriate for the state as whole.

This conception of state responsibility for public education implies the following definition of equity:

> Every public school district within the state should have equal power to purchase educational resources per unit of educational need.

This equity standard requires several comments. First, equality is stressed. The standard would be violated if districts with relatively great economic strength were able to purchase more educational resources than other districts with the same educational needs. Second, the standard calls for equality in the "power to purchase educational resources," not in "revenues." The power to purchase educational resources depends on both the revenues available and the cost of the educational resources. If costs of purchasing educational resources vary among districts, then revenues should also vary so as to offset the cost variations and equalize the power to purchase educational resources. Third, the standard calls for equality "per unit of educational need," not "per pupil." If different pupils have quantitatively different levels of need for educational resources, this variation should be accounted for in the revenue distribution. Districts with relatively substantial proportions of pupils having special educational needs should receive relatively high revenues per pupil so as to equalize the power to purchase educational resources per unit of educational need. Fourth, the standard applies to the whole school program, not just to the distribution of state aid. The standard would be violated even if state aid were distributed equally as long as local tax revenues or federal aid were distributed in such a way that overall operating revenues were

unequal. In summary, then, this equity standard requires that the distribution of total operating revenue among school districts within the state be such that the power to purchase educational resources per unit of educational need is equal.

The particular inequities presented in this paper are the most significant ones uncovered in our multiple regression studies of Ohio school districts. The methodology and detailed findings of these studies are available elsewhere.[1]

B. Unfair disadvantage suffered by districts with little economic strength

The economic strength of a school district is affected significantly by the district's property wealth per pupil, the personal incomes of the district's residents, and the fraction of the district's property wealth consisting of business property. Districts with low property wealth per pupil, low personal incomes, or little business property are at a serious disadvantage in generating local tax revenues. Our previous research has shown the impact of district economic strength on the distribution of operating revenues among Ohio school districts.

The role of property wealth per pupil can be seen by reference to Table 1. Based on statistical analysis of Ohio school districts during 1978, Table 1 shows that districts with greater property wealth per pupil received much more total operating revenue per pupil than did poorer districts.[2] The righthand column summarizes this relationship by showing that for each additional $10,000 in property wealth per pupil a district would tend to receive an additional $112 in operating revenue per pupil. The table also shows that state aid favors less

Table 1

Revenues in Four Hypothetical School Districts that Differ Only in Their Property Wealth per Pupil*

Category of Operating Revenue per FTE Pupil	1978 Operating Revenue Per Pupil in Each of Four Hypothetical Districts, at These Levels of Property Wealth per Pupil:				Increase in Revenue per Pupil for Each $10,000 Increase in Wealth per Pupil
	$12,000	$22,000	$32,000	$42,000	
Local Tax Revenue	$ 487	$ 631	$ 775	$ 919	$ + 144
State Aid	657	626	595	564	- 31
Federal Aid	82	81	80	79	- 1
Total Revenue	$ 1,226	$ 1,338	$ 1,450	$ 1,562	$ + 112

*These figures are based on partial correlation coefficients estimated in a multiple regression analysis of Ohio's 616 school districts. See Gensemer and Remke, An Empirical Analysis of Ohio School Finance Problems.

wealthy districts, but the distribution of state aid fails to fully offset the distribution of local tax revenue. As a result, Ohio school districts with relatively low property wealth per pupil tend, other things equal, to hire fewer teachers and classified personnel per thousand pupils, and to pay lower salaries.[3] These findings suggest that variations in property wealth per pupil among Ohio school districts have caused an inequity in Ohio school finance that state aid has failed to overcome.

The role of personal income can be seen in Table 2.[4] Districts with a relatively low level of family income obtain less local tax revenue than do the more affluent districts. For each additional $2,000 in the district's mean family income level, its operating revenue per pupil tends to rise by $58. In this case state aid does nothing to reduce the financial disadvantage of districts with low levels of personal income. As a result, the relatively low-income districts in Ohio tend, other things equal, to hire fewer teachers and certified specialists per thousand pupils and to pay lower salaries than do other districts.[5] Thus the variation in personal income among Ohio school districts creates an inequity in Ohio's finance system.

The third aspect of district economic strength is the proportion of property wealth consisting of business property. Ohio schools rely on a property tax that applies to various classes of real and tangible personal property. "Business" property refers to all property except for residential and agricultural real estate. Ohio school districts with relatively high proportions of business property tend to vote higher millage for school operation than do other districts,

Table 2

Revenues in Four Hypothetical School Districts that Differ Only in Their Mean Family Income*

Category of Operating Revenue per FTE Pupil	1978 Operating Revenue Per Pupil in Each of Four Hypothetical Districts, at These Levels of 1969 Mean Family Income:				Increase in Revenue per Pupil for Each $2,000 Increase in Mean Family Income
	$ 9,500	$11,500	$13,500	$15,500	
Local Tax Revenue	$ 688	$ 746	$ 804	$ 862	$ + 58
State Aid	595	595	595	595	0
Federal Aid	80	80	80	80	0
Total Revenue	$ 1,363	$ 1,421	$ 1,479	$ 1,537	$ + 58

*These figures are based on partial correlation coefficients estimated in a multiple regression analysis of Ohio's 616 school districts. See Gensemer and Remke, An Empirical Analysis of Ohio School Finance Problems.

other things being equal.[6] Presumably, voters are more willing to approve millage where a large portion of the tax base is business property since much of the share of the tax paid by business is likely to be borne by persons living outside the school district. This tendency to want to "export" part of the tax burden is significant in Ohio. A district with 75% of its property classed "business" tends to levy 3.5 more mills for current school operation than does a district with only 25% of its property classed "business."[7] The proportion of property classed "business" varies from 8% to 94% among Ohio school districts, and this produces an inequity in Ohio's school finance system.

In summary, all three elements of district economic strength create significant variations among Ohio school districts in their levels of operating revenues and purchases of educational resources. This situation violates the equity standard presented above.

C. Unfair disadvantage suffered by districts facing special problems

Statistical analysis has revealed two other problems that have led to inequitable treatment of Ohio school districts. One problem concerns the special need for educational resources in districts having many economically disadvantaged pupils. The other problem concerns the wide variation among districts in the cost of purchasing comparable educational resources. Failure to address these problems by providing a sufficient level of compensating operating revenues causes the equity standard to be violated.

We turn first to the special need for educational resources in districts with a high poverty incidence. Poverty has a pervasive effect on those school districts where the poverty incidence is significant. The higher the incidence of poverty, the more teachers, certified

specialists, and classified personnel per thousand pupils are hired by school districts.[8] In addition, school districts with high poverty concentrations are forced to pay salary premiums in order to retain adequate personnel. This demand for a "combat" pay premium by the staff tends to raise spending in these districts by much more than the direct cost of remedial and compensatory education programs. In Ohio in 1978, districts with 35% of their pupils receiving welfare tended to hire 26.4% more staff per thousand pupils and pay 17.6% higher staff salaries than did districts with no poverty-level pupils. The result was that operating expenditures in the districts with a 35% poverty incidence tended to be 21.5% higher than in the zero-poverty districts, other things being equal.[9]

Both state and federal aid programs recognize the special needs of poor pupils. In Ohio the extra categorical revenues targeted to the high-poverty districts are significant. These additional state and federal revenues are partially offset by the tendency of relatively impoverished districts to sustain lower millage rates than other districts. The net result, however, is that the impoverished districts have higher total operating revenues than do other districts. For instance, the districts with a 35% poverty incidence in 1978 tended to receive 6.1% more operating revenue per pupil than did the zero-poverty districts.[10]

Notice that the special expenditure demands on districts with a high poverty incidence are <u>not</u> matched by equally higher operating revenues. Where an especially high incidence of poverty tended to raise spending by 21.5%, it tended to raise revenues by only 6.1%. This creates a budget squeeze on districts with high poverty concentrations

that is largely absent in other districts. The budget squeeze requires that some of the identified needs for educational resources go unmet in the impoverished districts. This violates the equity standard.

The final source of inequity that we shall consider is related to our finding that there is wide variation among Ohio school districts in the costs of purchasing educational resources. In particular, labor costs vary from one local labor market to another, and labor costs comprise about 80% of total school district expenditures. Districts located in counties where the all-industry average weekly wage is relatively high are forced to pay relatively high salaries to attract and retain an adequate staff. The county is assumed to correspond approximately to the local labor market, so all districts in a given county face the same level of labor costs. Actual salaries paid by a school district are affected by both this cost of purchasing labor services and also the economic strength of the district and other factors that influence its demand for educational resources. We are concerned here only with the cost of purchasing educational resources in the county, since this is the factor beyond the control of the school districts. Districts in high-wage areas must pay relatively high salaries so they need more revenue than other districts in order to purchase the same educational services. In Ohio the districts in high-wage areas have tended to respond in two ways. They have paid salaries significantly higher than in lower-wage areas and they have also maintained significantly lower staff-to-pupil ratios.[11] Despite their efforts to economize on the use of personnel, the districts in high-wage areas still tend to spend significantly more per pupil than do the districts

in lower-wage areas, other things being equal.[12] The districts in high-wage areas also attempt to offset their cost disadvantage by levying more millage than other districts. State aid in Ohio also tends to favor the districts with relatively high costs, but only to a very modest extent. The result is that the districts facing relatively high costs receive more revenue per pupil than do other districts, but this differential is not sufficient to offset their higher levels of spending.[13] This implies that districts in high cost areas suffer a special budget squeeze despite their efforts to avoid this by economizing on staff size and by levying relatively high tax millage. Since these districts have less power to purchase educational resources than other districts, the equity standard is violated.

D. Distribution of these disadvantages among classes of school districts

It is often useful to classify school districts by the sorts of communities they serve. We have classified Ohio's 616 school districts into four such groups: 16 central city districts; 152 satellite city (or suburban) districts; 88 independent city districts; and 360 rural districts. The first two classes are located in metropolitan areas. The independent city districts serve non-metropolitan area cities of 5,000 to 49,000 population, while the rural districts do not contain cities of over 5,000 population.

The financial disadvantages related to lack of economic strength, poverty incidence, and cost of purchasing educational resources are not evenly spread among these four classes of school districts. Table 3 presents several important demographic and economic characteristics of Ohio school districts, and shows how they affect each class of district.[14]

Table 3

School District Characteristics that Tend to Distinguish the Four Classes of Ohio Districts

District Characteristics	Pupil-Weighted Mean Value, 1978, by District Class				
	Central City School Districts (n=16)	Satellite City School Districts (n=152)	Independent City School Districts (n=88)	Rural School Districts (n=360)	All Districts (n=616)
I. Demographic Features:					
1. District Enrollment	32,052	4,464	3,627	1,723	3,366
2. % of Population Urban	99.5	88.8	76.3	15.4	68.6
3. Pupils per Square Mile	817.2	388.8	134.4	33.4	356.5
4. % Enrollment Change, '74-'78	-13.7	-8.5	-8.2	-2.8	-8.1
5. Change in % Minority Enrollment, '74-'78	+3.5	+1.7	+0.3	+0.1	+1.5
II. Poverty Incidence:					
6. % of Pupils on ADC, 1978	29.6	4.7	8.4	5.5	11.6
7. % of Pupils on ADC, 1979	29.8	4.6	8.1	5.2	11.5
8. % of Pupils Attending a School with a Poverty % of:					
(a) Over 30%	62.0	5.7	12.1	10.0	21.9
(b) Over 50%	32.2	1.4	2.3	1.4	9.1
III. Cost of Resources ($)					
9. County Average Weekly Wages	244.43	239.23	200.69	203.22	234.26
IV. District Economic Strength ($)					
10. Property Value per Pupil	33,484	35,998	31,376	27,472	3[illegible],270
11. Mean Family Income	12,258	14,590	11,581	10,691	12,627
12. District "Economic Strength" Measure	21,699	33,613	25,108	20,317	25,262
V Purchasing Power of Revenues per Unit of Need, By Source ($):					
13. Local Tax Revenue	564.12	730.55	605.44	485.48	603.46
14. Total State Aid	421.05	447.54	473.32	533.70	464.27
(a) Basic Aid	192.30	268.75	293.35	327.34	263.53
(b) Categorical Aid	191.43	122196	139.13	172.45	157.90
(c) Rollback Reimbursement	37.33	55.82	40.84	33.92	42.83
15. Federal Aid	97.18	38.60	56.60	54.08	62.42
16. Total Revenue, All Sources	1,082.35	1,216.69	1,135.36	1,073.26	1,130.15

The rural districts have the least economic strength (section IV), while central city districts are by far the most adversely affected by high poverty incidence (section II). Cost of purchasing educational resources is significantly higher in the two groups of metropolitan area districts than elsewhere (section III). In previous research we have estimated purchasing power per unit of educational need for Ohio school districts in 1978 by adjusting actual operating revenues per pupil by the cost of educational resources and the poverty incidence in each district. The resulting figures are shown in section V, item 16 of Table 3. The lowest levels of purchasing power per unit of need are found in the rural and central city districts, while the highest level is in the satellite districts. Thus Ohio's failure to attain the equity standard involves a systematic (though probably unintended) bias against central city and rural districts and in favor of the satellite city districts.

E. Implications of these inequities

We have seen that Ohio's current system of school finance violates the equity standard due to a failure to cope with variations among districts in economic strength, in poverty incidence, and in the cost of purchasing educational resources. Each of these inequities represents a challenge: total operating revenues should be redistributed among districts so as to eliminate the unfair disadvantage suffered by some districts.

It might be argued that the equity problem has been overstated by looking at each inequity separately. There are districts that suffer the disadvantage of high costs while enjoying the advantage of high

personal incomes or property wealth. It is true that for some districts the advantages and disadvantages approximately cancel out, but this is not the norm in Ohio. About one third of Ohio pupils reside in districts whose disadvantages far outweigh their advantages under the existing finance system.

The nature of the inequities cited implies the need for an improved distribution of state unrestricted aid. The inequities involve a general financial squeeze in certain school districts, not a need for more specific programs for specific pupils. For this reason state categorical, or earmarked, aid would not be well suited to relieve these equity problems. Instead, the challenge is to redistribute state unrestricted aid among Ohio school districts so as to eliminate the existing inequities.

III. The need for state leverage

A. Existing lack of state leverage

In order to eliminate inequities in the existing school finance system, the state government must have the financial leverage to alter the distribution of operating revenues among districts. The state's financial leverage depends on both the state aid distribution formula and the share of operating revenues accounted for by state aid. Ohio lacks financial leverage over the distribution of operating revenues due to the small role of state aid in the overall revenue system. As a result, substantial state efforts to aid less wealthy districts have very little impact on the distribution of total operating revenues.

The shares of total operating revenue from each source are shown for Ohio school districts in 1978 in Table 4. The bottom row of the table indicates that 53.3% of all operating revenue in the state is raised from local property taxes. By contrast, unrestricted state aid comprises only 24.4% of the total. The remainder, 22.3%, consists of an array of state and federal government categorical grants that are earmarked for specific programs. Table 4 also shows how operating revenues are distributed among districts of varying property wealth per pupil. Ohio's 616 school districts were ranked from high to low property wealth per pupil, then divided into five groups, or quintiles, so that each quintile contains districts with 20% of the state's pupils. The table shows the average operating revenue per pupil for each quintile of districts, by revenue source. For instance, the property-rich districts in the highest quintile raised an average of $1,165 per pupil

Table 4

T[illegible] Distribution of 1978 Operating Revenue per Pupil by Revenue Source Amor[illegible] Quintiles of Property Wealth per Pupil

Property Wealth Per Pupil Quintiles	Percentage of Ohio Pupils in the Quintile (%)	Actual Operating Revenue per Pupil, 1978, by Revenue Source			
		Local Tax Revenue Per Pupil ($)	Unrestricted State Aid Per Pupil* ($)	Categorical State & Federal Aid Per Pupil ($)	Total Operating Revenue Per Pupil ($)
Highest	20.0	1,165	191	323	1,679
Second	20.0	865	297	354	1,517
Third	20.0	805	357	364	1,527
Fourth	20.0	599	397	283	1,279
Lowest	20.0	413	520	284	1,216
All Districts	100.0	770	3[illegible]	322	1,444
(Percentage of Total Revenue)			(24.4%)	(22.3%)	(100.0%)

*Unrestricted aid in Ohio includes both "basic aid" and Disadvantaged Pupil Impact Aid (DPIA).

from local taxes, while the lowest quintile raised only $413 per pupil from this source. By contrast, state unrestricted aid per pupil very clearly favored the districts with lower property wealth per pupil, averaging only $191 in the highest quintile but $520 in the lowest quintile. Categorical state and federal grants as a group appear to favor the higher wealth quintiles, but this relationship is not strong. The overall result is seen in the righthand column, where total operating revenue per pupil varies from $1,679 in the wealthiest quintile down to $1,216 in the poorest quintile. Districts with modest property wealth are thus at a serious disadvantage compared to wealthier districts, despite the state's equalization efforts through its unrestricted aid program. The small share of revenues from unrestricted state aid compared to the share from local taxes simply results in little state financial leverage over the overall revenue distribution.

This contention is supported by the history of Ohio school finance from 1975 through 1978. During this period the state government increased substantially its unrestricted aid to districts, and the largest increases were targeted on property-poor districts. Despite these efforts, the distribution total operating revenues became increasingly skewed in favor of the wealthier districts during this period.[15] The reason for this was that local tax revenues grew, due almost entirely to inflation of property values. Since local tax revenue per pupil is highest in the wealthiest districts, the growth in this revenue source tended to counteract the distributional effects of growing state unrestricted aid. Since local tax revenues were more than double the size of state unrestricted aid, overall revenue inequality increased slightly over this three-year period.[16]

State unrestricted aid lacked the leverage to reduce wealth disparities among Ohio school districts, and this lack of leverage has placed Ohio on an equalization treadmill.

B. Alternative ways to gain distributional leverage

We shall examine four ways by which Ohio could gain leverage over the distribution of operating revenue and hence escape its equalization treadmill. They are: (1) a reduction in categorical state aid in order to finance more unrestricted state aid; (2) a dramatic increase in state unrestricted aid financed by new state taxes; (3) a simultaneous increase in state taxes and reduction in local school property taxes; and (4) diversion of some school district property tax revenues to the state for use as unrestricted state aid.

1. Reduction in categorical state aid

Most of the categorical aid received by Ohio school districts comes from the state; federal categorical grants represent less than 6% of total operating revenues. If all state categorical aid were eliminated and these funds were used for unrestricted state aid, this program could enjoy a 68% increase in funding without any new taxes. The share of district operating revenue accounted for by unrestricted state aid could rise from 24.4% to 41.1%. This would represent a substantial increase in equalization leverage.

This way of increasing the state's leverage is not politically feasible, however. Moreover, it is a questionable policy on equity grounds. The state's categorical programs are designed in most cases to help districts cope with the special needs of handicapped, economically

disadvantaged, and vocational pupils. Most would argue that these needs are real and that the state has a responsibility to help districts meet them. The many supporters of categorical aid would claim that it would be unfair to pursue equalization objectives at the expense of handicapped pupils. These considerations suggest that state leverage should not be increased by this means.

2. Tax-financed increase in unrestricted state aid

In recent years there have been several prominent proposals in Ohio to raise the rates of state taxes in order to increase sharply the funding of state unrestricted aid to school districts. The question to be considered here is whether such a sharp increase in state unrestricted aid without altering the local tax revenues of districts could substantially redistribute revenues toward Ohio's financially disadvantaged districts.

We have developed a computer model to simulate the effects of various school finance policies, and our simulations indicate that this policy of simply raising the level of state unrestricted aid has very little impact on the overall distribution of revenues among districts. Even rather dramatic increases in state aid prove to reduce inequities only slightly. The reason is that continued heavy reliance on local property tax revenue at the district level continues to dominate the overall revenue picture even when state unrestricted aid is increased greatly. This policy simply fails to gain the leverage needed for the state to accomplish substantial equity improvements.

This conclusion is based on our simulation of sharp increases in Ohio's unrestricted aid over a three-year period between 1978 and 1981. The overall district revenue increases that could result are shown in Table 5. The table presents the actual school district operating revenues in 1978 by source, and also presents three alternative revenue levels for 1981. The lowest of the three projections for 1981 assumes that state unrestricted aid will total $1177 million, which is at least $100 million above the level provided for in current legislation. Attaining this level of unrestricted state aid in 1981 would mean that this component of aid had grown by an average of over 17% per year since 1978. This is a rapid rate of increase of state aid by historical standards. The middle projection assumes $1671 million in state unrestricted aid, which implies an average growth in this revenue source of 32% per year since 1978. The highest projection assumes $2,171 million in state unrestricted aid, implying an average growth rate of 44% per year since 1978. This highest level projection would require at least $1 billion more from the state's general revenue fund than is currently projected to be available for state unrestricted aid in 1981. Higher state taxes would clearly be required to raise this additional revenue.

Table 5 also presents projections for local tax revenue and categorical grants that appear realistic, given current law.[17] Since all of the three projected levels of state unrestricted aid are much higher than current funding authority would permit, they all increase the share of state unrestricted aid in the overall finance

Table 5

Three Alternative Levels of Unrestricted State Aid in 1981

	1978 Actual Revenues		1981 Projected Revenues with State Unrestricted Aid of					
			$1,171 mill.		$1,671 mill.		$2,171 mill.	
	Revenue in $mill.	% of Total	Revenue in $mill.	% of Total	Revenue in $mill.	% of Total	Revenue in $mill.	% of Total
1. Unrestricted State Aid	730	24.4	1,171	29.6	1,671	37.5	2,171	43.8
2. Categorical State and Federal Aid	668	22.3	903	22.8	903	20.3	903	18.2
3. Local Tax Revenue	1,597	53.3	1,880	47.6	1,880	42.2	1,880	38.0
4. Total Operating Revenue	2,994	100.0	3,953	100.0	4,453	100.0	4,953	100.0

system. This share could rise from 24.4% in 1978 to either 29.6%, 37.5%, or 43.8%, depending on the projection chosen. Another implication of these projections is that they permit rapid increases in overall operating revenue per pupil in Ohio school districts. The average annual growth in total operating revenue per pupil between 1978 and 1981 would be 13.5%, 18.0%, or 22.2%, depending on the alternative chosen. There may be a serious question as to whether such large increases in overall funding are appropriate, but that issue will not be examined here.

The modest distributional effects of these sharp state aid increases are shown in Table 6. This table shows that in 1978 the wealthiest quintile of school districts contained 20% of Ohio pupils but captured 23.3% of all operating revenues. By contrast, the poorest quintile of districts captured only 16.8% of the total operating revenues. Under the three projections the share captured by the poorest quintile would rise only modestly to 17.0%, 17.2%, or 17.4% in 1981. It should be understood that the three 1981 projections all assume essentially the same state unrestricted aid formula as currently used. If the distribution formula were altered substantially, slightly more equalization could be achieved than is shown in Table 6.

The chief obstacle to reducing inequities in the distribution of operating revenue is the continued heavy reliance on local tax revenue. Without a provision to alter the role of local tax revenue, the sharp increases in state aid examined here simply fail to gain much distributional leverage.

Table 6

The Distributional Effects of Three Alternative Levels of Unrestricted State Aid in 1981 Among Quintiles of Property Wealth per Pupil

Property Wealth Per Pupil Quintiles	Percentage of Ohio Pupils in the Quintile (%)	Operating Revenue in the Quintile as a Percentage of Statewide Operating Revenue			
		in 1978 (actual) (%)	in 1981 with Unrestricted State Aid Equal to		
			$1,171 mill. (%)	$1,671 mill. (%)	$2,171 mill. (%)
Highest	20.0	23.3	22.9	22.6	22.4
Second	20.0	21.0	21.0	20.9	20.9
Third	20.0	21.2	21.3	21.3	21.2
Fourth	20.0	17.7	17.9	18.0	18.1
Lowest	20.0	16.8	17.0	17.2	17.4
All Districts	100.0	100.0	100.0	100.0	100.0

3. Simultaneous increase in state aid and reduction in local property taxes

This third proposal involves a major restructuring of taxes. State tax rates would be raised to fund additional state unrestricted aid to districts while the local property tax rates would be substantially reduced. One result would be to alter sharply the sources of school district revenue, cutting the local tax revenue source while raising state aid. Without doubt this proposal gains the leverage needed to produce substantial equity gains.

Although this proposal succeeds in gaining the desired distributional leverage, it also poses difficulties. First, a major restructuring of state and local taxes could have a significant impact on equity among groups of taxpayers and on the tax climate for business. The new state tax revenues would probably be generated by raising the rates of the state personal income tax, raising the rates and/or coverage of the state sales tax, or raising the rates of the state corporate income tax. The reduced property tax rates would benefit both individuals and businesses, since about half of this tax base is business property. The net effects of these changes would depend on which state taxes were raised, but it is possible that there would be a net shift of the tax burden away from businesses and toward high-income individuals. Complex issues of tax policy would be raised, and controversy and uncertainty would abound. A second difficulty would be the likelihood that new state tax revenues would be shared between elementary-secondary education and other state services. This suggests that for every additional dollar provided

in state aid to school districts the state might well need to raise its tax revenues by $2 or $3.

Returning attention to school districts, an important feature of this proposal is the continuation of some local property tax revenues for districts. This protects the districts from completely losing control of their levels of financing. Those districts that desire superior programs could still have them if they are willing to approve property tax millage. Of course, this means that some disparities among districts would persist. Districts with great concentration of business property wealth could continue to finance superior school programs with only a very modest property tax millage rate.

4. Property tax diversion

This last proposal, like the prior one, is designed to simultaneously increase state unrestricted aid and reduce local tax revenue. The difference is that in this case the tax structure is retained as it is. No new state taxes are required, and the property tax rates are not reduced. Instead, a portion of the property tax revenues currently levied and retained by school districts would be diverted into the fund for state unrestricted aid. Taxpayers would not be directly affected, since they would pay the property tax just as before. Some of the property tax revenues levied for current school operation would simply be redirected. The tax revenues of other local governments would not be diverted, nor would those school levies for bond issues and debt retirement.

Property tax diversion would produce great leverage over the distribution of operating revenues among districts. Table 7 shows the extent to which the relative shares of local tax revenue and state unrestricted aid would be altered by property tax diversion. This table presents figures for two alternative tax diversion plans: in one plan the tax revenues from tangible personal business property are diverted to the state; the other plan involves diverting the tax revenues from all business property to the state. In both cases it is assumed that all tax rates in all districts remain unchanged after tax diversion, so that the total operating revenue available to Ohio school districts remains constant. Tax diversion raises the share of revenues being distributed through state unrestricted aid from the actual 1978 level of 24.4% to either 44.1% or 54.7%, depending on whether tax revenues on business property are partially or fully diverted. Corresponding to this is a sharp reduction in the local tax revenue share from 53.3% to either 33.6% or 24.0%.

The principal advantage of tax diversion is that it gives state government the leverage needed to redistribute revenues among districts without imposing new state taxes. In addition, tax diversion need not alter the patterns of tax liability among different groups of taxpayers, as would occur if state taxes were raised while property taxes were lowered. Another advantage of property tax diversion is that if all or some business property is subject to diversion, the greatest source of disparity among districts is directly eliminated. Business property is more unevenly distributed among Ohio school districts than is residential property. Equalization

Table 7

The Impact of Property Tax Diversion on the Sources of School District Operating Revenue

School District Revenue Source	Percentage Share Accounted for by Each Revenue Source		
	1978 Actual (%)	1978 With Diversion to State Basic Aid Fund of Tax Revenues from	
		Tangible Personal Property (%)	All Business Property (%)
1. Local Tax Revenue	53.3	33.6	24.0
2. Unrestricted State Aid	24.4	44.1	54.7
3. Categorical State and Federal Aid	22.3	22.3	21.3
4. Total Operating Revenue	100.0	100.0	100.0

among districts can thus be enhanced in two ways: the local tax revenues retained by the districts after tax diversion would be relatively evenly distributed among districts; and the diverted tax revenues would permit a substantial increase in the one state aid program that has always been designed to reduce inequities.

Similar to the third proposal, property tax diversion permits a continuation of state categorical aid at present levels. It also permits a reduced but still substantial role for local tax revenue. Districts would retain the tax revenues on residential property, and so districts that want a superior school program could have it by approving sufficient property tax millage. Thus the financial discretion of school districts would be reduced but not eliminated under the property tax diversion proposal.

We have considered four proposals by which the state could gain leverage over the distribution of revenues among districts. All four proposals would meet great political resistance, since they would involve reducing the levels funding in some districts. The proposal to reduce categorical aid seems most doomed to failure, however, and perhaps for good reason. The most orthodox proposal is the plan for a tax-financed increase in state aid, but we find that this fails to achieve the needed leverage despite a dramatic cost. The proposal for change in the tax structure by raising state taxes while also reducing property taxes is much more effective in producing leverage for the state, but raises serious issues of taxpayer equity. The property tax diversion proposal seems to be the least unattractive of the four since it gains great dis-

tributional leverage for the state while not requiring that the overall level of taxes be raised and not requiring a major redistribution of the tax burden. This relative attractiveness of property tax diversion renders it worthy of detailed consideration as a potential reform option.

IV. Reform Options

In this section we describe the four specific reforms whose effects we have empirically tested. The basic rationale of each reform is presented here also. These four reforms were chosen for study because of their apparent potential to deal effectively with the existing inequities in Ohio's school finance system. The first two, adopting a foundation plan and property tax diversion, are designed to reduce the disparities among school district programs caused by variations in district economic strength. The third, adopting a poverty factor, seeks to focus additional state aid in districts where a high incidence of poverty requires a relatively high level of spending. The fourth reform is the introduction of a cost factor, and this reform distributes state aid so as to offset the relatively high cost of purchasing educational resources borne by some districts.

A. Adopt a foundation plan

The essence of this reform is to replace Ohio's current guaranteed yield plan for distributing "basic" state aid with a foundation plan. An important additional element of this reform is that it provides an opportunity to eliminate the various no-loss guarantees received by many Ohio school districts under the existing plan.

Ohio's basic aid program is designed to distribute non-earmarked funds to school districts as a supplement to locally-raised tax revenues. This program is also the primary means by which the state has sought to achieve equity in school finance. The basic structure of a formula for distributing basic aid is therefore an important equity consideration.

For this reason we shall examine the rationale of each of these two alternative distribution plans.

It has been traditional in Ohio, as in most other states, for individual school districts to raise a substantial share of their operating revenues from local taxes. Although full state assumption of school financing has been adopted in Hawaii and approached or considered in several other states, there is little support for full state assumption in Ohio. As a result, the viable alternative plans for distributing state revenues to school districts in Ohio are essentially two: a guaranteed yield plan and a foundation plan. There are, of course, an infinite number of variations available within each of these general plans for distributing state basic aid. Ohio relied on variations of a foundation plan until 1975, when the state adopted the present guaranteed yield plan.

The essential similarity between these two plans is that each is designed to supplement local tax revenues so as to offset differences among districts in economic strength. The essential difference between the plans is that the level of basic aid is unaffected by district tax effort in a foundation plan, whereas it is varied as a reward for district tax effort in the guaranteed yield plan. Under both plans districts are required to make a minimum tax effort in order to participate in the state basic aid plan. Under the foundation plan, participating districts are guaranteed a "foundation" level of combined state-local revenues per pupil. If a district wishes to spend more than the foundation level it may raise local taxes to do so, but receives no additional state basic aid for its extra tax effort. Under a guaranteed yield plan the state guarantees a level of combined state-local yield for each mill of district property tax

rate. Districts with above-minimum tax rates receive additional state basic aid sufficient to guarantee the yield on the additional mills of tax.

Which of these plans is more equitable? The answer to this question depends largely on how one defines equity. The choice of an equity standard in turn depends largely on whether one considers public education to be basically a local or a state responsibility.

1. Stress on local responsibility

If one believes that public education is essentially a local matter, then state aid can be seen as a financial supplement designed to enable districts to do <u>their</u> jobs more adequately. In this view, state aid should not inhibit school district financial autonomy. Local voters should determine the overall level of financing of public schools by their votes on local property taxes for school support.

Most advocates of this view are aware, however, that district property wealth varies greatly among districts and contend that it would be unfair to both voters and school children in poor districts to ignore the wealth variations. The equity standard that this contention suggests is called "fiscal neutrality," which holds that for each school district in the state, the total school revenues per unit of educational need should not depend on the economic strength of the district.[18] This fiscal neutrality standard of equity implies that districts making the same tax effort but having different levels of economic strength should receive state basic aid so as to permit them an <u>equal</u> level of state-local revenue per unit of need. It would also be considered equitable for a district whose tax effort is relatively low to be left with a relatively low level of combined revenue per unit of need.

The guaranteed yield plan currently employed in Ohio is designed to achieve the fiscal neutrality standard of equity. Previous research in Ohio has shown, however, that during the first three years under the guaranteed yield plan, Ohio neither achieved nor even moved in the direction of fiscal neutrality.[19] In addition, Ohio's guaranteed yeild plan also fails to provide a significant incentive for school districts to raise their school tax rates.[20] Finally, Ohio's official measure of tax effort has been shown to be defective, so the present basic aid formula fails to reward the districts according to their actual tax efforts.[21] These findings indicate that the current plan has failed to achieve its own equity and incentive objectives, but it is possible that a different version of a guaranteed yield plan would perform much better in these respects.

2. Stress on state responsibility

If one believes that public education is essentially a state responsibility, then the role of state aid to school districts is seen quite differently. In this view, the overall level of school funding should be determined by the state legislature, and the funds should be targeted to the needs of pupils regardless of where in the state the pupils reside. The role of individual school districts is to determine the specific manner in which funds are allocated, taking local conditions into account. The local district is also expected to raise a portion of the school revenues, but local voter behavior is not suppose to determine the level of basic school services provided in the district. The only role for district financial autonomy is that districts with especially great voter support for supplemental school programs may levy

additional taxes. The statewide funding level is supposed to be "adequate," so that only a small number of very affluent districts would choose to supplement the statewide funding level.

Advocates of this view stress that since the public education system is a state responsibility, the needs of pupils should be handled equally throughout the state. This is a needs-oriented equity standard, and it is the one presented earlier in this paper: every public school district within the state should have equal power to purchase educational resources per unit of educational need. State aid to school districts should be determined by the needs of pupils in the districts, not by irrelevant factors such as district tax effort. (Some proponents of this needs-oriented equity standard even question whether "district tax effort" is a meaningful concept. They argue that it is individual taxpayers that make tax efforts, not the district as a separate entity. The school district is simply an aggregation of persons who are making various levels of tax efforts.)

The foundation plan for distributing state basic aid is consistent with the needs-oriented equity standard. It would thus be reasonable for those who stress the state's responsibility for public education and favor a needs-oriented equity standard to prefer a foundation plan. Just as with a guaranteed yield plan, however, a foundation plan can in reality fail to achieve its equity goals. Ohio's foundation plan that was abandoned formally in 1975 had in fact been eroded by such an array of guarantees that by 1975 not one of Ohio's 616 school districts received the level of basic aid called for by the foundation formula. It was also widely agreed at the time that Ohio's foundation plan was not needs-oriented and not equitable.

Recent experience in Ohio suggests, then, that neither type of state basic aid plan is certain to achieve its equity objectives. One may even wonder whether the equity objectives have been treated in a somewhat cynical manner by the Ohio General Assembly. Be that as it may, the two plans are significantly different in emphasis, at least when adopted in a relatively pure form. Therefore, in future debates over which plan to adopt it would be appropriate to debate also the differing views of the state's responsibility for public education and the differing equity standards.

The equity standard adopted for this paper is consistent with a foundation plan but not with a guaranteed yield plan, since the standard stresses state responsibility for the financing levels of the various school districts. The guaranteed yield plan's state aid reward for tax effort violates our equity standard by sending basic aid to districts in response to a factor unrelated to the educational need in the district. For this reason one of the reforms chosen for empirical examination is the adoption of a foundation plan.

B. Adopt property tax diversion

The rationale for diverting some property tax revenues from school districts to the state's basic aid fund is that this permits a substantial reduction in the existing financial inequities without raising the overall level of state-local taxes. By diverting property tax revenue to the state the disadvantage suffered by districts with modest wealth and modest personal income would be reduced as local tax revenues were partly replaced by state unrestricted aid. While the local tax revenues are dependent on the district's economic strength, unrestricted state aid can

be distributed according to the district's need for educational resources. Thus property tax diversion should be able to reduce inequities caused by the disparities among districts in property wealth per pupil, personal incomes, and the proportion of property owned by businesses.

There are, however, several alternative versions of property tax diversion. First, the taxes that are diverted to the state could be those levied on certain classes of property. Alternatively, the state could divert a certain uniform percentage of each district's property tax revenues, or it could divert the revenue from a certain uniform number of mills on each district's whole property tax base. If it were decided to divert the revenues from certain classes of property, there would be at least three plausible options: (1) divert tax revenues from all tangible personal property; (2) divert tax revenues from all tangible personal and real business property but not from residential and agricultural real property; or (3) divert tax revenues from all property except residential real property. Another option would be to divert all district property tax revenue to the state, but this implies full assumption of school financing by the state--an unrealistic notion in Ohio.

If it is decided to divert revenues from certain classes or property, there are two quite different ways to set the tax rates applying to those classes of property subject to tax diversion. One alternative is to tax the diverted classes of property at a statewide uniform rate. If this is done, the uniform rate could be set so that total statewide revenues equal what they would have been under the various district rates levied before tax diversion. This would assure that the overall tax burden on owners

of the property subject to diversion would not be affected by tax diversion. Alternatively, the statewide rate could be set by the General Assembly or by a referendum. In either case, a uniform tax rate on the property subject diversion would alter the tax liabilities of most owners of these classes of property. Those located in districts whose millage rate had been below the new statewide rate would find their tax liabilities rising. Tax liabilities would fall for those in districts whose tax rates had been above the new statewide rate.

The second general way to set tax rates on the property subject to tax diversion is to retain in every district the tax rate that had been levied before diversion. This would mean, for instance, that a district that had been levying 40 mills before tax diversion would continue to levy 40 mills on <u>both</u> the property that is not subject to tax diversion and the property that is. It would also mean that Ohio taxpayers who own property subject to tax diversion would all be supporting the state basic aid fund but would be paying tax rates that vary from one district to the next.

This proposal to retain district-determined tax rates on the property subject to tax diversion raises an interesting issue of taxpayer equity. If all owners of property subject to tax diversion throughout the state were supporting the state's basic aid fund, shouldn't they all pay the same tax rate? It would appear that retaining district-determined rates on the property subject to tax diversion would violate a traditional standard of taxpayer equity.

Those who favor retaining the district-determined rates argue that taxpayer equity requires that all taxpayers in a school district pay

the same tax rate in support of public education, even if some of the revenues will be diverted to the state basi fund. Advocates also stress the fact that by retaining the district-determined rates, no taxpayers would have their tax liabilities altered by property tax diversion. This would presumably reduce much of the political opposition to tax diversion. In addition, this would eliminate the (probably remote) possibility that some business would be induced to relocate outside of Ohio in order to avoid an increase in its property tax burden.

Notice that the total revenues diverted into the state's basic aid fund would be the same whether the varying district tax rates were retained or a uniform statewide rate were applied to the property subject to tax d: ersion. The issue of uniform or district-determined rates, then, is an issue of the proper pattern of liability among taxpayers rather than an issue of the proper level or distribution of state aid to school districts.

There are also several ways to implement a property tax diversion plan. One way would be to adopt the new plan and simply put it fully into effect at once. Although some districts would suffer a reduction in total operating revenue per pupil, they would not be given even temporary special aid. Another way would be to adopt the plan but include provision of a permanent no-loss guarantee to those districts that would otherwise suffer a decline in total operating revenues. This no-loss guarantee could be specified in terms of total operating revenue or in terms of operating revenue per pupil. In the latter case, a district with declining enrollment would be permanently guaranteed no reduction in operating revenue per pupil below the pre-diversion level, but total operating revenue could fall with enrollment.

A third way of implementing property tax diversion would be to offer temporary, transitional aid to districts adversely affected by property tax diversion. The rationale for this is that while these districts do not deserve special treatment on a permanent basis they ought to be given time to adjust to their new financial constraints. Again, this temporary guarantee could be based on total revenue or on operating revenue per pupil. A plausible way to offer this transitional aid would be to guarantee that no district's operating revenue per pupil in the first year will fall below 90% of the pre-diversion level. This guarantee could automatically fall to 80% in the second year, 70% in the third year, etc.

There are, then, a wide array of options for structuring tax diversion, setting tax rates on the property subject to diversion, and implementing a tax diversion plan. Only some of these alternatives have been selected for empirical analysis, and only some of the more interesting findings will be reported in this paper. The two tax diversion structures studied are: "full" tax diversion of "business" property, defined as all classes of property except residential and agricultural real property; and "partial" tax diversion, in which only tangible personal business property is subject to tax diversion. In addition, the study includes two ways of setting tax rates on the property subject to diversion: a uniform statewide rate that yields the same total revenue as was generated from this property before diversion; and retention of the existing, district-determined tax rates. Finally, the study will consider implementing the tax diversion plan with (1) no guarantee for adversely affected districts, and (2) transitional guarantees based on a declining

percentage of the district's pre-diversion operating revenue per pupil.

C. Adopt a poverty factor

This reform proposal involves including a poverty factor within the formula for distributing state unrestricted aid to school districts. The poverty factor would reflect the poverty incidence in each school district, and would target more aid to districts with a high poverty incidence, other factors being equal. The rationale for a poverty factor is that it roughly measures the extra units of educational need in a district that result from the challenges of educating pupils in economically disadvantaged neighborhoods. It was argued earlier that since Ohio school districts with high poverty incidence are currently at a serious financial disadvantage, additional state unrestricted aid should be directed to these districts to reduce this inequity.

In principal, a poverty factor could take any of several alternative forms. Poverty could be measured in various ways, and the measure chosen could be weighted more or less heavily in the state aid formula. Only one poverty factor will be studied here, and the choice of it is based on estensive statistical research reported elsewhere.[22] The measure of poverty incidence chosen is the percentage of pupils in a district who receive welfare (more precisely, Aid to Dependent Children). Educators believe that in neighborhoods with many poor families, each pupil presents more need for educational services than does each pupil in other neighborhoods. In addition, districts with a high poverty incidence must pay a premium to attract and retain teachers and other school

personnel. These financial effects of poverty seem to depend upon the extent of the poverty in the school district. For instance, a district with a 3% poverty incidence appears not to suffer a discernable disadvantage when comp ed to a district with no poverty. The financial effects of poverty appear substantial in districts with over a 5% poverty incidence, however. Some districts have a poverty incidence so high that the nature of their problems seems more severe, in addition to their having more problems. For instance, a district with a 30% poverty incidence must pay a premium to its staff that is much more than double the premium paid by a district with a 15% poverty incidence.[23]

These observations suggest the need to measure a district's units of educational need by weighting its enrollment according to its poverty incidence, and to increase the weight for districts where the poverty incidence is especially high. The statistical evidence on the financial effects of poverty does not indicate precis ly what the weighting formula should be. The formula developed for this study is, however, quite defensible. It assigns three tiers of weights to disadvantaged pupils. Those disadvantaged pupils who fall below 5% of the district's total enrollment are assigned a weight of .0 each (i.e., they receive no extra or special weight compared to other pupils). Disadvantaged pupils between 5% and 15% of the district's total enrollment are assigned a weight of 1.5 each. Finally, disadvantaged pupils over 15% of the district's total enrollment are assigned a weight of 2.0 each.[24] This three-tier weighting formula is illustrated in Table 8. The poverty-weighted pupil enrollment is then adjusted in the usual manner to arrive at a full time equivalent enrollment, and this becomes the measure of each district's need for educational services.

Table 8

Illustration of the Three-tier Formula Used to Measure Poverty-weighted Pupil Enrollment

Enrollment Information	Five Hypothetical School Districts				
	A	B	C	D	E
Total Enrollment	100	100	100	100	100
Number of Disadvantaged Pupils	0	4	9	18	36
Percentage of Pupils Disadvantaged	0%	4%	9%	18%	36%
Poverty-weighted Pupil Enrollment	100	100	102	108	126

Note that no adjustment has been made for pupils with various sorts of physical and emotional handicaps. In principle the weighting formula should include these pupils, but we have chosen to avoid this complex task. It may be that only modest damage results from this omissic since the incidence of physical handicaps among districts is not an uneven as is the incidence of poverty. In addition, the largest special education program in Ohi(. that for the educable mentally retarded, is most widely used in those districts with a relatively high incidence of poverty.[25] For these reasons the measure of educational need used in this study gives special weight only to economically disadvantaged pupils.

This three-tier poverty factor serves to increase the number of weighted pupils, or units of educational need, assigned to districts in which the poverty incidence exceeds 5%. In a foundation plan for distributing unrestricted state aid, the state guarantees a foundation level of combined local tax revenue and unrestricted state aid per weighted pupil. Since the poverty factor increases the total of weighted pupils in the state, the foundation level would need to be adjusted downward upon introduction of this factor in order to remain within a iven budget for total unrestricted state aid. Thus the distribution of state unrestricted aid would alter in favor of high-poverty districts and against others.

Ohio currently distributes a modest level of state aid to poverty-impacted districts through its Disadvantaged [illegible] l Impact Aid (DPIA) program. The DPIA distribution formula is entirely separate from that for basic aid, and the DPIA program has been developed in an ad hoc fashion. If a poverty factor were adopted as part of the basic aid

formula it should replace DPIA. In our empirical analysis of the poverty factor we shall compare the actual pattern of revenues in 1978 to the pattern that would have resulted in 1978 by distributing all state unrestricted aid (the 1978 funds in both state basic aid and DPIA) by a foundation formula with a poverty factor.

D. Adopt a cost factor

This reform consists of introducing a cost factor into the formula by which unrestricted state aid is distributed. The cost factor would reflect the variation among districts in their cost of purchasing educational resources. A cost index would be calculated for each district, and the index would operate so as to channel more unrestricted state into districts with relatively high costs, other factors being equal.

The rationale for a cost factor is that districts facing high costs of purchasing educational resources need more revenues than do other districts in order to purchase the same quantity and quality of educational resources. As was argued, earlier, the most significant and variable cost for districts is the cost of personnel. Districts located in counties where the all-industry average weekly wage is relatively high must pay relatively high salaries in order to attract and retain an adequate staff. For example, a salary budget of $100,000 might permit the hiring of 8 teachers in a district where area wages are relatively low but might permit the hiring of only 6 or 7 teachers in a district where area wages are higher. For the districts to have an equal power to purchase educational resources, the district located in the high-wage area should have more revenues. The statistical evidence cited earlier has shown a significant cost disadvantage that has not been

fully offset by increased revenue in the districts facing high costs.

For each district, a cost index or factor is calculated as follows:

$$\left(\begin{matrix}\text{Cost}\\ \text{Factor}\end{matrix}\right) = \left[\left(\frac{\text{Average Wage in District's County}}{\text{Average Wage in 5 Lowest-Wage Counties}} - 1\right) \times \left(\frac{1}{n}\right)\right] + 1$$

where "n" can be varied to alter the strength of the cost factor. To illustrate, suppose a school district is located in a county where the all-industry average weekly wage is $240. Suppose also that the average wage in the five lowest-wage counties is $160. If the variable n is set equal to 1, the cost factor for this district would equal 1.5. This means that the cost of purchasing resources in this district is considered to be 50% greater than it is in the lowest-wage areas of the state. If the variable n were set at 2, the cost factor for this district would be only 1.25. This would imply that the district faces costs only 25% higher than faced by districts in low-wage areas. The value of n determines the strength of the cost factor, and it should be set so that the financial impact of high area wages on the district is properly weighted. The statistical evidence does not permit a precise determination of the proper weighting of the cost factor, so three alternative weightings have been examined in this study: (1) a weight of 25% (where n = 4, so 1/n = 1/4 = 25%); (2) a weight of 50% (where n = 2, so 1/n = 1/2 = 50%); and (3) a weight of 80% (where n = 1.25, so 1/n = 4/5 = 80%).

On theoretical grounds the most plausible weight is 80%, since area wages affect the salaries that a school district must pay and in most districts salaries represent about 80% of the total expenditure budget. Using a cost factor weighted at 80% strength, our hypothetical district cited above would be assigned a cost factor of 1.4. This implies that

since the wages in the area are 50% above the wages in the low-wage areas, this district's expenditure budget must be 40% above the budget of a district in a low-wage area in order to purchase equal educational resources.

E. The most plausible reform package

Although all four of the reforms and their variations have been studied empirically, it may be useful to indicate which combination of reforms appears most plausible on theoretical grounds before examining the empirical findings. The reform package that looks most responsive to the existing inequities in Ohio school finance is a foundation plan with full diversion of taxes from all business property to the state, with a three-tier poverty factor, with an 80% strength cost factor, and with transitional guarantees for adversely affected districts. In the next section we shall analyze the distributional effects of this reform package, but we will also study the effects of each individual reform separately and of other possible combinations of reforms.

V. Distributional Effects of the Reform Options

A. Method of testing the distributional effects

Past school finance reforms have not always had the effects intended. For this reason it is prudent to test the effects of a reform before enacting it. The reforms considered in this study have been tested by use of computer simulation. The basic purpose of this simulation is to determine how revenues would be distributed among school districts if various specific reforms were instituted. A simulation model has been constructed that permits a variety of specific changes in the distribution of state aid and a range of property tax diversion options. Data were initially gathered on the revenues of Ohio school districts for 1978 (1977-78 school year), and these data were later updated to 1979 and 1980. Since the 1978 data were the most complete and accurate available, the simulations reported here are all based on the 1978 data. The model does permit one to enter revenue and enrollment projections for future years, and this option has been used to simulate projections of the reforms from 1978 through 1981.

The computer simulation model, data, and program developed at The Academy for Contemporary Problems have been made available to the Education Review Committee of the Ohio General Assembly for its continuing analysis of school finance reform options. The Appendix of this report contains part of the Users' Manual for operation of the simulation program. This appendix offers the reader an opportunity to study the power and limitations of the simulation program.

The simulation program reports the total operating revenues (broken down by source) for every one of Ohio's 616 school districts under each alternative reform option. The program also facilitates analysis of the revenue effects by grouping districts in various ways and by showing the average revenue effects of the reform on each group of districts. For instance, in one analysis the districts are ranked from high to low property wealth per pupil and then divided into five groups, or quintiles. Each quintile contains districts with 20% of Ohio's pupils, and the first quintile includes the districts with the highest property wealth per pupil, etc. For each quintile the average revenue per pupil is simulated for the reform option under study, and this figure is compared to the actual 1978 figure for that quintile. This permits the analyst to determine how the reform option would affect the distribution of revenues among districts of varying property wealth per pupil. Quintile analysis is also used to study the pattern of revenues among districts according to the personal income of residents, the poverty incidence in the districts, and the cost of purchasing educational resources. In each of these cases the districts are ranked by the characteristic chosen (e.g. poverty incidence) and grouped into quintiles. In addition to quintiles, Ohio school districts have been divided into four classes based on the nature of the community served by the district. These classes are: central city; satellite city; independent city; and rural. The computer program reports the average revenue per pupil (broken down by revenue source) for each district class for each reform option.

The computer simulation program also calculates an index of inequality, and compares this index for each reform option with the actual level of

the index in 1978. This index is a statistic known as the coefficient of variation, and it is applied to the figures for purchasing power per unit of educational need for the districts. If a given reform option were to produce a completely equal level of purchasing power per unit of educational need in every district the index of inequality would be zero. This would indicate complete attainment of the equity standard. By comparing the index for the 1978 actual situation with its value under a simulated reform option one can determine to what extent the reform reduces the overall inequality in the distribution of purchasing power per unit of educational need.

For each reform option or reform combination studied, the distributional effects have been examined in terms of various quintile groupings, class of district, and the overall index of inequality.

B. Effects on the Distribution of School District Revenues

The effects of the reforms will be considered by first examining each reform separately. In each case the actual 1978 distribution of operating revenue will be compared with the distribution that would have occurred if only that one reform had been implemented in 1978. The reforms are assumed to generate no new revenues, so the only effects of the reforms are to change the way the 1978 revenues are distributed among school districts. After reviewing the effects of each reform separately, they will be combined in several ways and the combinations will be studied. Finally, several of the reform combinations will be projected into future years to determine whether revenue growth over time affects the distributional impact of the reforms.

1. A foundation plan

The primary reason for replacing the guaranteed yield plan with a foundation plan is to eliminate the state aid reward received by districts with relatively high millage rates. Since the primary determinant of a district's millage rate is the level of personal income of its residents,[26] adopting a foundation plan would eliminate the state aid reward that has gone mainly to Ohio's high-income school districts. This reform would succeed, then, to the extent that it reduced the unfair revenue advantage enjoyed by high-income districts over others.

Table 9 shows this effect. The table compares the actual distribution of 1978 operating revenue per pupil among personal income quintiles with the simulated distribution for the case where a "pure" foundation plan is used. For example, the table shows that the highest income quintile actually averaged $1,723 in operating revenue per pupil in 1978, compared to only $1,216 in the lowest income quintile, and compared to a state average operating revenue per pupil of $1,444.

For the present we shall focus attention on the column of Table 9 that shows the percentage change in revenue when a "pure" foundation plan is adopted <u>without</u> property tax diversion. This "pure" foundation plan is simply one with no guarantees for wealthy districts, and no poverty or cost factors in the formula. Notice that this reform does have the designed impact, since it reduces the operating revenue per pupil in the highest income quintile and raises revenue in the two lowest income quintiles. While the percentage changes are modest, adopting the foundation plan does serve to reduce the revenue disparity that is linked to variation in personal income levels among school districts.

Table 9

Effects of Adopting a Pure Foundation Plan on the Distribution of Total Operating Revenue per Pupil Among Personal Income Quintiles

Personal Income Quintiles	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Pure Foundation Plan:		
		Without Tax Diversion (%)	With Partial Tax Diversion (%)	With Full Tax Diversion (%)
Highest	1,723	-2	-4	-7
Second	1,598	0	-3	-6
Third	1,399	-1	-2	-2
Fourth	1,273	+1	+5	+7
Lowest	1,216	+3	+8	+12
All Districts	1,444	0	0	0

Table 10 shows the extent to which adopting a pure foundation plan reduces the wealth-related revenue disparity among Ohio school districts. The column that shows the impact of a foundation plan without tax diversion indicates that this reform would take revenue away from the wealthiest quintile and distribute this revenue to less wealthy districts. This effect of a foundation plan is clearly consistent with the equity standard, although the magnitude of the redistribution is quite modest.

It is important to check the side effects of each reform option. In the case of the foundation plan, the side effects are shown in Tables 11, 12, and 13. In Table 11 we observe the effect on the revenue distribution among quintiles of poverty incidence. The districts with the highest poverty incidence have the greatest need for operating revenues, and in 1978 they actually did receive substantially more revenue per pupil than did other districts ($1,664 compared to the state average of $1,444). Research has shown, however, that even more revenue is needed in poverty-impacted districts in order to fully satisfy their special needs for revenues.[27] The column in Table 11 that shows the impact of the foundation plan without tax diversion indicates that adopting a foundation plan is very slightly helpful to the districts with the highest poverty incidence. This side effect of the foundation plan would thus present no equity problem.

Another side effect of interest is the effect on districts with a relatively high cost of purchasing educational resources. Our measure of cost is the all-industry average weekly wage level in the district's principal county of location. Thus it is appropriate to examine the pattern of effect among quintiles of districts ranked by the county

Table 10

Effects of Adopting a Pure Foundation Plan on the Distribution of Total Operating Revenue per Pupil Among Property Wealth per Pupil Quintiles

Property Wealth per Pupil Quintiles	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Pure Foundation Plan:		
		Without Tax Diversion (%)	With Partial Tax Diversion (%)	With Full Tax Diversion (%)
Highest	1,679	-3	-10	-12
Second	1,517	+1	0	- 2
Third	1,527	+1	0	- 2
Fourth	1,279	+1	+ 6	+ 8
Lowest	1,216	0	+ 8	+12
All Districts	1,444	0	0	0

Table 11

Effects of Adopting a Pure Foundation Plan on the Distribution of Total Operating Revenue per Pupil Among Poverty Incidence Quintiles

Poverty Incidence Quintiles	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Pure Foundation Plan:		
		Without Tax Diversion (%)	With Partial Tax Diversion (%)	With Full Tax Diversion (%)
Highest	1,664	+1	-1	-4
Second	1,421	0	-1	-1
Third	1,331	0	+2	+4
Fourth	1,332	0	+2	+4
Lowest	1,467	-2	-2	-2
All Districts	1,444	0	0	0

weekly wage level. Table 12 presents this pattern. Notice that the districts located in counties with relatively high wages actually received relatively high revenue per pupil in 1978. Research shows, however, that the higher cost of purchasing educational resources in these districts is not fully offset by the higher revenue, so it would be desirable to observe even higher revenues in the highest wage quintiles. Notice that adopting a foundation plan (without tax diversion) has a slightly harmful side effect here. Revenues fall in the two highest wage quintiles while they rise in the lowest wage quintile. This appears to be an undesirable side effect of adopting a pure foundation plan.

Finally, Table 13 shows the effect of a foundation plan among the four classes of Ohio school districts. Since central city districts have been shown to suffer the most severe financial problems, it would be desirable for the reform to aid these districts. The table shows that adopting a foundation plan without tax diversion would be of modest help to central city districts, as well as to the non-metropolitan (independent city and rural) districts. This side effect of adopting a foundation plan, then, does not suggest an equity problem.

In summary, adopting a pure foundation plan would improve the equity of Ohio's school finance system. Revenue disparities based on unequal personal incomes and property wealth would be reduced, and the side effects of the reform are mostly minor and favorable. The magnitude of the changes is modest, however. Dramatic improvements in equity are not attainable if the only reform adopted is a pure foundation plan.

Table 12

Effects of Adopting a Pure Foundation Plan on the Distribution of Total Operating Revenue per Pupil Among County Weekly Wage Quintiles

County Weekly Wage Quintiles	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Pure Foundation Plan:		
		Without Tax Diversion (%)	With Partial Tax Diversion (%)	With Full Tax Diversion (%)
Highest	1,736	-2	-6	-9
Second	1,486	-1	-1	-2
Third	1,430	+1	+1	+1
Fourth	1,339	0	+2	+4
Lowest	1,209	+3	+8	+11
All Districts	1,444	0	0	0

Table 13

Effects of Adopting a Pure Foundation Plan on the Distribution of Total Operating Revenue per Pupil Among Four Classes of Ohio School Districts

District Class	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Pure Foundation Plan:		
		Without Tax Diversion (%)	With Partial Tax Diversion (%)	With Full Tax Diversion (%)
Central City Districts	1,641	+1	-1	-4
Satellite City Districts	1,539	-2	-4	-6
Independent City Districts	1,308	+1	+2	+4
Rural Districts	1,233	+2	+7	+11
All Districts	1,444	0	0	0

2. Property tax diversion

The primary purpose of tax diversion is to permit a sharp reduction in the revenue disparity among districts that is due to variations in district property wealth per pupil. Tax diversion will accomplish this purpose to the extent that it reduces the revenue advantage of the high-wealth quintiles of districts over the low-wealth quintiles. It will also be of interest to examine whether the choice of tax diversion alternative affects the distributional impact of diversion. Specifically, we will compare "full" property tax diversion, in which all business property tax revenues are diverted to the state, with "partial" tax diversion, in which only tangible personal business property tax revenue is so diverted.

The impact of tax diversion on wealth quintiles is shown in Table 10. Notice the very substantial impact of tax diversion, whether partial or full. Under full tax diversion, the highest wealth quintile would suffer a 12% decline in operating revenue per pupil, while the lowest wealth quintile would gain 1^%. Partial tax diversion also accomplishes substantial equalization, though less than is attained with full tax diversion. Table 9 shows that property tax diversion also reduces the revenue disparity due to variation in personal income. The hig ncome districts suffer substantial losses, permitting large revenue gains in the low-income districts. This is especially apparent in the case of full tax diversion, where the lowest income quintile enjoys a 12% increase in operating revenue per pupil.

Property tax diversion also has significant and harmful side effects. It tends to reduce revenues in districts facing high costs, in districts

with a high poverty incidence, and in central city districts. These side effects of property tax diversion can be seen in Tables 11, 12, and 13. The most serious problem is found in the districts located in high-wage counties, as is shown in Table 12. The highest wage quintile suffers a 9% reduction in revenue from full tax diversion, while the districts in the lowest wage counties gain 11%. This side effect is inconsistent with the equity standard, and its magnitude is significant. Table 11 shows that tax diversion also has an adverse side effect on poverty-impacted districts. The highest poverty quintile experiences a 4% revenue loss due to full tax diversion, although under partial tax diversion the loss is insignificant. Table 13 shows that tax diversion has an adverse side effect on central city districts, while offering substantial benefits to the non-metropolitan (independent city and rural) districts. Given the severity of current revenue problems in most central city districts, this side effect of property tax diversion can hardly be ignored.

In summary, property tax diversion does possess the leverage to produce a substantial change in the distribution of revenue among school districts. Furthermore, it succeeds in significantly reducing revenue disparities related to variations among districts in both wealth per pupil and personal income. Property tax diversion has adverse side effects, however, and the harm it brings to high cost, high poverty, and central city districts is serious. It appears that if property tax diversion were to be adopted, it should be accompanied by poverty and cost factors. To these factors we now turn.

3. Poverty factor

The primary purpose of introducing a poverty factor into the state's basic aid distribution formula is to redistribute state aid in favor of districts highly impacted by poverty. In Ohio poverty is extremely unevenly distributed among school districts, and as a result the highest poverty quintile averages 32.5% of their pupils classed as poor while the poverty incidence drops to 13.9% in the second poverty quintile and to 6.1% in the third. Given this distribution of poverty, it is appropriate to focus attention on the impact of adopting a poverty factor on the highest poverty quintile school districts. The poverty factor will serve its purpose to the extent that it helps the highest poverty quintile.

The primary impact of adopting the poverty factor is shown in Table 14. A comparison of the two righthand columns permits an assessment of the impact of the poverty factor. The highest poverty quintile does indeed gain. Total operating revenue per pupil for this group of districts rises 6% with a poverty factor while only 1% without it. It should be recalled that Ohio already grants unrestricted aid to poverty-impacted districts through its DPIA program. The righthand column shows the effect of replacing DPIA with a poverty factor in the basic aid formula, while the other columns reflect continued reliance on the DPIA program actually in effect in 1978. Clearly the poverty factor has a much more substantial positive effect on poverty-impacted districts than does the 1978 DPIA program.

The side effects of adopting a poverty factor are generally quite favorable. Table 15 shows the impact of the poverty factor on districts

Table 14

Effects of Adopting a Poverty Factor in a Foundation Plan on the Distribution of Total Operating Revenue per Pupil Among Poverty Incidence Quintiles

Poverty Incidence Quintiles	Poverty Incidence in Quintiles (% of Pupils Classed Poor)	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Foundation Plan (without tax diversion):	
			Without a Poverty Factor (%)	With a Poverty Factor (%)
Highest	32.53	1,664	+1	+6
Second	13.94	1,421	0	0
Third	6.12	1,331	0	-1
Fourth	3.55	1,332	0	-2
Lowest	1.56	1,467	-2	-4
All Districts	11.58	1,444	0	0

Table 15

Effects of Adopting a Poverty Factor in a Foundation Plan on the Distribution of Total Operating Revenue per Pupil Among County Weekly Wage Quintiles

County Weekly Wage Quintiles	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Foundation Plan (without tax diversion):	
		Without a Poverty Factor (%)	With a Poverty Factor (%)
Highest	1,736	-2	0
Second	1,486	-1	-1
Third	1,430	+1	+1
Fourth	1,339	0	-1
Lowest	1,209	+3	+1
All Districts	1,444	0	0

with relatively high costs of purchasing educational resources. The districts located in counties where the all-industry weekly wage level is highest face the highest costs, and these districts are in the highest wage quintile. Adopting the poverty factor is helpful to the highest cost districts, since they would suffer a revenue reduction of 2% with a foundation plan without a poverty factor but would suffer no reduction when the poverty factor is introduced. The reason for this favorable side effect is that most of the poverty-impacted districts are located in high-wage counties.

Another favorable side effect of the poverty factor is its impact on Ohio's central city school districts. This side effect is presented in Table 16. Note that whereas the central city districts would gain only 1% in operating revenue per pupil without a poverty factor, these districts would gain 5% with the poverty factor. Although Ohio's current DPIA program was designed o help central city districts, the poverty factor is a much more powerful means of distribut ng unrestricted state aid to these districts.

The side effect of a poverty factor on districts by varying wealth per pupil is trivial, as can be observed in Table 17. There is simply no significant tendency for the poverty factor to alter the distribution of revenues between the more and less wealthy districts. As a result, the poverty factor presents no unfavorable equalization side effects.

In summary, the poverty factor would significantly improve the equity of Ohio school finance. As a replacement for the current basic aid and DPIA programs, adopting a poverty factor in a foundation plan would enhance the position of the poverty-impacted districts. In addition,

Table 16

Effects of Adopting a Poverty Factor in a Foundation Plan on the Distribution of Total Operating Revenue per Pupil Among Four Classes of Ohio School Districts

District Class	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Foundation Plan (without tax diversion):	
		Without a Poverty Factor (%)	With a Poverty Factor (%)
Central City Districts	1,641	+1	+5
Satellite City Districts	1,539	-2	-4
Independent City Districts	1,308	+1	0
Rural Districts	1,233	+2	+1
All Districts	1,444	0	0

Table 17

Effects of Adopting a Poverty Factor in a Foundation Plan on the Distribution of Total Operating Revenue per Pupil Among Property Wealth per Pupil Quintiles

Property Wealth per Pupil Quintiles	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Foundation Plan (without a tax diversion):	
		Without a Poverty Factor (%)	With a Poverty Factor (%)
Highest	1,679	-3	-3
Second	1,517	+1	+2
Third	1,527	+1	+3
Fourth	1,279	+1	0
Lowest	1,216	0	-1
All Districts	1,444	0	0

the side effects of introducing the poverty factor are favorable in that both high-cost districts and central city districts are helped.

4. Cost factor

The purpose of introducing a cost factor into the state's basic aid formula is to channel sufficient additional aid to districts located in high-wage areas so as to permit them to attain a parity with other districts in purchasing power per unit of need. The weighting strength assigned to the cost factor determines how much additional state aid is focussed on the high-wage districts. As argued above, the most plausible weighting strength is 80%, but weights of 25% and 50% have been tested as well.

The primary impact of adopting a cost factor is shown in Table 18. This table groups the districts by wage quintiles and shows the impact of the cost factor at three alternative strengths. The cost factor succeeds in altering the distribution of total operating revenue per pupil in favor of the higher wage quintiles. For instance, the highest wage quintile would suffer a 2% reduction if a pure foundation plan were adopted but would gain 3% with the introduction of a 80%-strength cost factor. On the other hand, the introduction of an 80%-strength cost factor redistributes revenue away from the lowest-wage districts (in the lowest two wage quintiles). A comparison of the various strength levels confirms the expected pattern that the higher the strength of the cost factor the greater the revenue redistribution in favor of the higher-cost districts.

The side effects of adopting a cost factor are mixed. Favorable effects are experienced by poverty-impacted districts and central city

Table 18

Effects of Adopting a Cost Factor in a Foundation Plan on the Distribution of Total Operating Revenue per Pupil Among County Weekly Wage Quintiles

County Weekly Wage Quintiles	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Foundation Plan (without tax diversion):			
		With No Cost Factor (%)	With a 25%-Strength Cost Factor (%)	With a 50%- Strength Cost Factor (%)	With an 80%-Strength Cost Factor (%)
Highest	1,736	-2	0	+2	+3
Second	1,486	-1	0	+1	+2
Third	1,430	+1	+1	+2	+2
Fourth	1,339	0	-1	-2	-3
Lowest	1,209	+3	-1	-4	-7
All Districts	1,444	0	0	0	0

districts, as can be observed in Tables 19 and 20. In Table 19 we find that the districts in the highest poverty quintile are significantly helped by the introduction of the cost factor. In Table 20 we find that central city districts are significantly helped also, showing a revenue gain of 4% with the introduction of an 80%-strength cost factor compared to a gain of only 1% without a cost factor. Notice that satellite city districts are also helped by the cost factor while the non-metropolitan (independent city and rural) districts are hurt. This pattern of impact among the four district classes reflects the fact that area wages tend to be relatively higher in the metropolitan areas, in which both the central city and satellite city districts are located.

The final side effect of the cost factor is unfavorable to the equity standard, as is shown in Table 21. This table groups school districts by property wealth per pupil quintiles, and it shows that the introduction of a cost factor harms the least wealthy districts while helping the most wealthy. This tends to widen rather than narrow the wealth-generated disparity among school districts.

In summary, the cost factor succeeds in redistributing revenue in favor of districts located in high-wage areas. This favorable effect on high-cost districts is accompanied by favorable effects on poverty-impacted and on metropolitan area (central city and satellite city) districts. The one equity disadvantage of introducing a cost factor is that it tends to widen the disparity among high-wealth and low-wealth districts. This problem could presumably be solved by combining a cost factor with property tax diversion. The combined reforms would be expected to reduce wealth disparities on the one hand while helping

Table 19

Effects of Adopting a Cost Factor in a Foundation Plan on the Distribution of Total Operating Revenue per Pupil Among Poverty Incidence Quintiles

Poverty Incidence Quintiles	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Foundation Plan (without tax diversion):			
		With No Cost Factor (%)	With a 25%-Strength Cost Factor (%)	With a 50%-Strength Cost Factor (%)	With an 80%-Strength Cost Factor (%)
Highest	1,664	+1	+3	+4	+5
Second	1,421	0	0	-1	-2
Third	1,331	0	-1	-2	-3
Fourth	1,332	0	0	0	-1
Lowest	1,467	-2	-1	-1	-1
All Districts	1,444	0	0	0	0

Table 20

Effects of Adopting a Cost Factor in a Foundation Plan on the Distribution of Total Operating Revenue per Pupil Among Four Classes of Ohio School Districts

District Class	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Foundation Plan (without tax diversion):			
		With No Cost Factor (%)	With a 25%-Strength Cost Factor (%)	With a 50%-Strength Cost Factor (%)	With an 80%-Strength Cost Factor (%)
Central City Districts	1,641	+1	+2	+3	+4
Satellite City Districts	1,539	-2	-2	-1	0
Independent City Districts	1,308	+1	-1	-3	-4
Rural Districts	1,233	+2	+1	-1	-2
All Districts	1,444	0	0	0	0

Table 21

Effects of Adopting a Cost Factor in a Foundation Plan on the Distribution of Total Operating Revenue per Pupil Among Property Wealth per Pupil Quintiles

Property Wealth per Pupil Quintiles	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Foundation Plan (without tax diversion):			
		With No Cost Factor (%)	With a 25%-Strength Cost Factor (%)	With a 50%-Strength Cost Factor (%)	With a 80%-Strength Cost Factor (%)
Highest	1,679	-3	-2	-2	-1
Second	1,517	+1	+2	+2	+2
Third	1,527	-1	+2	+2	+2
Fourth	1,279	+1	0	0	-1
Lowest	1,216	0	-1	-2	-3
All Districts	1,444	0	0	0	0

high-cost districts as well. This suggests the need to examine the effect of reform combinations, and to this we now turn.

5. Reform combinations

The findings presented above indicate that each specific reform has side effects in addition to its primary or intended equity effect. It is difficult to predict how these various effects will interact when the reforms are combined. For this reason, several reform combinations have been simulated:

a. Actual 1978 total operating revenue per pupil;

b. Simulated 1978 revenue per pupil, with a foundation plan, no tax diversion, and no poverty or cost factor;

c. Simulated 1978 revenue per pupil, with a foundation plan, no tax diversion, and both a poverty and an 80%-strength cost factor;

d. Simulated 1978 revenue per pupil, with a foundation plan, partial tax diversion, and both a poverty and an 80%-strength cost factor; and

e. Simulated 1978 revenue per pupil, with a foundation plan, full tax diversion, and both a poverty and an 80%-strength cost factor.

Since several dimensions of inequity have been found in Ohio's current school finance system, each of the reform combinations must be evaluated with respect to these several dimensions. In order to test the power of the reform combinations to reduce disparities caused by variations in economic strength, the districts have been grouped by

wealth per pupil quintiles (Table 22) and by personal income quintiles (Table 23). The impact of the reform combinations on poverty-related inequities is shown by viewing poverty quintiles (Table 24), while their impact on cost-related inequities is shown by viewing county wage quintiles (Table 25). The effects of the various reform combinations on the four classes of districts are also presented (Table 26). Finally, the reform combinations will be compared with respect to the index of inequality, which measures the overall reduction in the disparity in purchasing power per unit of educational need (Table 27).

Turning first to the disparity among districts due to varying property wealth, Table 22 shows that tax diversion is the key to equalization in this dimension. Considering the two reform alternatives with no tax diversion, the lowest wealth quintile is not helped by a pure foundation plan and it suffers a 5% reduction in operating revenue per pupil when the poverty and cost factors are introduced. Only when tax diversion is also introduced is there a substantial redistribution of total operating revenue per pupil in favor of the lowest-wealth districts. It was argued earlier that the most plausible reform package would include a foundation plan with full tax diversion of business property tax revenues, a three-tier poverty factor, and an 80%-strength cost factor. This combination, shown in the righthand column, redistributes revenue from the highest wealth quintile to less wealthy districts.

Another disparity related to the economic strength of districts is based on varying levels of personal income. Table 23 shows the extent to which the reform combinations reduce the disparity between high- and low-income districts. The combination involving a foundation plan

Table 22

Effects of Various Reform Combinations on the Distribution of Total Operating Revenue per Pupil Among Property Wealth per Pupil Quintiles

Property Wealth per Pupil Quintiles	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Foundation Plan with:			
		No Tax Diversion and No Factors (%)	No Tax Diversion and Both Factors* (%)	Partial Tax Diversion and Both Factors* (%)	Full Tax Diversion and Both Factors* (%)
Highest	1,679	-3	-1	-8	-10
Second	1,517	+1	+3	+3	+1
Third	1,527	+1	+5	+4	+4
Fourth	1,279	+1	-3	+1	+3
Lowest	1,216	0	-5	+2	+5
All Districts	1,444	0	0	0	0

*These factors are poverty and cost adjustments that allocate additional state aid to districts with high poverty incidence or high cost of purchasing educational resources.

Table 23

Effects of Various Reform Combinations on the Distribution of Total Operating Revenue per Pupil Among Personal Income Quintiles

Personal Income Quintiles	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Foundation Plan with:			
		No Tax Diversion and No Factors (%)	No Tax Diversion and Both Factors* (%)	Partial Tax Diversion and Both Factors* (%)	Full Tax Diversion and Both Factors* (%)
Highest	1,723	-2	+3	+1	-1
Second	1,598	0	+6	+5	+3
Third	1,399	-1	-4	-6	-6
Fourth	1,273	+1	-3	0	+1
Lowest	1,216	+3	-4	-1	+2
All Districts	1,444	0	0	0	0

*These factors are poverty and cost adjustments that allocate additional state aid to districts with high poverty incidence or high cost of purchasing educational resources.

with no tax diversion but both factors is detrimental, since the revenue disadvantage of low income districts is increased rather than reduced. The alternative that proves most effective in reducing the income-related disparity is a pure foundation plan without tax diversion. The introduction of tax diversion tends to offset the detrimental effect of the poverty and cost factors, but only with full tax diversion is the detrimental effect essentially neutralized. The full tax diversion reform package, therefore, does succeed in helping the districts in the two lowest income quintiles, but this effect is modest.

The distributional effects of the reform combinations on high- and low-poverty districts are shown in Table 24. Poverty is very heavily concentrated in the highest poverty incidence quintile, so the effects of the reforms on this quintile are the major concern. The table shows that all three combinations involving the poverty and cost factors are extremely effective in shifting revenue to the highest poverty incidence quintile. While tax diversion per se does not help to generate this result, it also does not significantly dilute the effect of the poverty and cost factors.

The remaining inequity that has been identified is the inadequate revenue in districts facing a high cost of purchasing educational resources. These districts are located in high-wage counties, and the distributional effects of the reform combinations among county wage quintiles are presented in Table 25. The alternative that most effectively helps the high cost districts is the foundation plan with both factors but without tax diversion, since this alternative yields the largest revenue gain for the highest wage quintile. Tax diversion tends to partially

Table 24

Effects of Various Reform Combinations on the Distribution of Total Operating Revenue per Pupil Among Poverty Incidence Quintiles

Poverty Incidence Quintiles	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Foundation Plan with:			
		No Tax Diversion and No Factors (%)	No Tax Diversion and Both Factors* (%)	Partial Tax Diversion and Both Factors* (%)	Full Tax Diversion and Both Factors* (%)
Highest	1,664	+1	+10	+10	+9
Second	1,421	0	-2	-4	-4
Third	1,331	0	-4	-4	-3
Fourth	1,332	0	-3	-2	-1
Lowest	1,467	-2	-3	-3	-3
All Districts	1,444	0	0	0	0

*These factors are poverty and cost adjustments that allocate additional state aid to districts with high poverty incidence or high cost of purchasing educational resources.

Table 25

Effects of Various Reform Combinations on the Distribution of Total Operating Revenue per Pupil Among County Weekly Wage Quintiles

County Weekly Wage Quintiles	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Foundation Plan with:			
		No Tax Diversion and No Factors (%)	No Tax Diversion and Both Factors* (%)	Partial Tax Diversion and Both Factors* (%)	Full Tax Diversion and Both Factors* (%)
Highest	1,736	-2	+5	+2	0
Second	1,486	-1	+2	+3	+3
Third	1,430	+1	+2	+3	+3
Fourth	1,339	0	-5	-4	-3
Lowest	1,209	+3	-9	-6	-4
All Districts	1,444	0	0	0	0

*These factors are poverty and cost adjustments that allocate additional state aid to districts with high poverty incidence or high cost of purchasing educational resources.

offset the effect of the cost and poverty factors, but the full tax diversion combination is still superior to the actual 1978 distribution and to the pure foundation plan with no tax diversion. Under the reform featuring full tax diversion there is a tendency for revenue to be distributed from lower wage to higher wage quintiles, except for the highest quintile. In the highest wage quintile there are both wealthy suburban districts and poverty-impacted central city districts, and this reform package redistributes revenue from the wealthy to the poverty-impacted districts. The result is that the gains and losses of these districts in the highest wage quintile cancel out in the aggregate.

The distributional impact of the reform combinations on the four classes of districts is shown in Table 26. All of the reform options tend to redistribute revenue toward the central city districts at the expense of the satellite city districts. Introduction of the poverty and cost factors has a substantial positive impact on central city districts, while proving detrimental to the non-metropolitan (independent city and rural) districts. The introduction of tax diversion is most helpful to the rural districts. The reform combination featuring full tax diversion shows the net result of these various effects. Under this alternative, central city districts enjoy a gain in total operating revenue per pupil of 7%, and the rural districts experience a gain of 2%.

The overall power of the reform combinations to approach the equity standard is shown by an index of inequality in Table 27. This index is the best single measure of disparity among districts in their power to purchase educational resources per unit of ed. ational need.

Table 26

Effects of Various Reform Combinations on the Distribution of Total Operating Revenue per Pupil Among Four Classes of Ohio School Districts

District Class	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Change in Revenue per Pupil from 1978 Level Due to Adopting a Foundation Plan with:			
		No Tax Diversion and No Factors (%)	No Tax Diversion and Both Factors* (%)	Partial Tax Diversion and Both Factors* (%)	Full Tax Diversion and Both Factors* (%)
Central City Districts	1,641	+1	+9	+8	+7
Satellite City Districts	1,539	-2	-2	-3	-5
Independent City Districts	1,308	+1	-6	-6	-5
Rural Districts	1,233	+2	-4	-2	+2
All Districts	1,444	0	0	0	0

*These factors are poverty and cost adjustments that allocate additional state aid to districts with high poverty incidence or high cost of purchasing educational resources.

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The index is calculated in the following fashion:

(1) Calculate the purchasing power per unit of educational need for each district, as follows:

$$\left(\begin{matrix}\text{Purshasing Power per} \\ \text{Unit of Educational Need}\end{matrix}\right) = \left(\frac{\dfrac{\text{Operating Revenue}}{\text{Cost Index}}}{\text{Units of Educational Need}}\right)$$

--where the "cost index" is the 80%-strength cost factor as presented above.

--where "units of educational need" is district enrollment weighted by the three-tier poverty factor as presented above.

(2) Calculate the mean value of these purchasing power unit of educational need figures, and calculate the standard deviation around this mean. Then calculate the coefficient of variation, which equals the standard deviation divided by the mean.

(3) Multiply the coefficient of variation by 1000 to produce the "index of inequality." (This multiplication is done simply to render the coefficient more readable.)

The index of inequality for the actual distribution of revenue in 1978 was equal to 161. A reform that succeeded in eliminating all inequality in purchasing power per unit of educational need would reduce this index to zero. Table 27 shows that while none of the reform combinations eliminates all inequality, the two combinations including property tax diversion do sharply reduce inequality. When the 1978 operating revenues of Ohio school districts are distributed under the reform combination featuring full tax diversion, the index of inequality falls by 49.8%. The remaining inequality is due to the fact that under

Table 27

Equalization Effects of Various Reform Combinations as Measured by the Index of Inequality

Alternatives	Weighted Index of Inequality*	Percentage Change in Index from 1978 Actual Level
1. Actual 1978 Revenue Distribution	161	
2. Simulated 1978 Revenue Distribution with a Foundation Plan, and		
(a) No Tax Diversion and Both Factors	151	-6.1%
(b) Partial Tax Diversion and Both Factors	98	-39.1%
(c) Full Tax Diversion and Both Factors	81	-49.8%

*This index measures the variation among school districts in the power to purchase educational resources per unit of educational need. A value of zero would indicate strict equality among districts.

all of the reforms studied the school districts retain their discretion to supplement the foundation level program. In the simulations it was assumed that district-determined millage on residential and agricultural property is unaffected by tax diversion. This permits districts to continue to offer a program that is beyond what the foundation level supports, and some districts will undoubtedly desire to do this. If supplemental local tax revenues are permitted, as assumed here, strict equality among districts will never be attained.

In summary, the analysis of the reform combinations shows that adopting a combination of the reforms studied is superior to adopting any one of them in isolation. The detrimental side effects encountered in specific reform options are reduced in the reform combinations. The reform package with full tax diversion and both poverty and cost factors is far more effective on balance than are the alternatives. This broad reform package succeeds in sharply reducing the disadvantage suffered by districts having low property wealth and high poverty incidence. Central city districts are also substantially helped by this reform package. Adopting only part of this package would create difficulties. If only property tax diversion were introduced the central city districts would be seriously hurt. On the other hand, if only the poverty and cost factors were introduced very little equalization between high- and low-wealth districts could be accomplished.

6. Attaining and maintaining equity over time

It is appropriate to test the ability of the reforms to maintain their distributional effects over time. In the past, efforts by the General Assembly to increase the extent of equalization between rich and

poor districts have often been frustrated. This is the "equalization treadmill effect" mentioned above, in which the equalizing effect of rising state aid is offset by increases in the unequally-distributed local tax revenues. Would the reforms studied in this paper also be subject to the treadmill effect? In addition, if transitional guarantees were provided to districts adversely affected by property tax diversion, would these guarantees significantly dilute or delay the distributional effects of property tax diversion? In order to answer these questions we now turn to a dynamic analysis of the effects of the reforms over a three-year period.

A number of assumptions has been made in the projections of the reform effects over the period 1978-1981. First, we have assumed that local tax revenues would grow at a uniform average annual rate of 5.57% in all Ohio school districts. It has also been assumed that state and federal categorical aid to each Ohio school district will grow at an average annual rate of 10.6%. Finally, enrollments have been projected to decline in all districts at a uniform average annual rate of 3.32%. All three of these assumptions are likely to be quite accurate in the aggregate, but it is certain that many districts will deviate from the state average rate of change. The simplifying specification of uniform rates may not seriously distort the analysis, however. Recent computer projections using non-uniform rates of enrollment change display essentially the same distributional effects for the reforms as are shown by the projections based on uniform rates of enrollment change.

The key variables in the projections are the changes in state unrestricted aid to each district and the extent to which the districts'

local tax revenues are diverted to the state basic aid fund. The two sources of funds for state unrestricted aid are: (1) the appropriation by the General Assembly to state basic aid (and DPIA); and (2) property tax revenues diverted from school districts. The state appropriation is here assumed to grow from $730 million in 1978 to $876 million in 1979, to $1,015 million in 1980, and to $1,171 million in 1981. These figures are essentially accurate for 1978, 1979, and 1980, and represent an average annual growth in the state appropriation for unrestricted aid of 17.9%. The assumed growth of another 15.4% between 1980 and 1981 is consistent with recent trends but is much higher than the level contained in current legislation. At present, the 1981 appropriation appears to be only $1,050 million, or $120 million below our projection. We have retained the higher projection since it is common for the Ohio General Assembly to grant supplemental state aid just prior to the second school year in the state's biennium. If this pattern holds, our projection may prove quite accurate for 1981.

The simulation program permits one to allocate state unrestricted aid according to any of several property tax diversion plans and any of several aid distribution formulas. Tracing the effects of each of these plans over time allows one to test the tendency of the reformed revenue distribution to retain its new pattern over several years.

Attention in this dynamic analysis centers on the full reform package, consisting of the adoption of a foundation plan, with full diversion of taxes on business property, with poverty and cost factors in the unrestricted aid distribution formula, and with transitional guarantees to districts adversely affected by property tax diversion. The guarantees

simply insure that no district's total operating revenue per pupil falls below 90% of the base year (1978) level in the first year of reform (1979), or below 80% of the base year level in the second year, or below 70% in the third year, etc. For comparison, this full reform package will also be compared to the reform combination that features a foundation plan with poverty and cost factors but without any tax diversion.

The ability of the full reform package to retain its equalization impact can be observed in Table 28. This table shows the distributional effect of the reform package among districts of varying wealth per pupil. The significant redistribution of revenue from rich to poor districts can be observed in the percentage revenue gains in the first year of reform, 1979. In that year, operating revenue per pupil grows by only 7% in the highest wealth quintile, while it grows 22% in the lowest wealth quintile. But what happens after the first year of reform? Is the 1979 equalization gain reversed in subsequent years? The table shows that the distribution attained in 1979 is retained in 1980 and 1981, since in each of those years the percentage revenue per pupil gain is nearly uniform among all wealth quintiles. This indicates that property tax diversion does indeed permit the state to escape its equalization treadmill.

Turning attention to the four classes of districts, Table 29 shows the ability of the reform package to retain its distributional impact on central city and other districts. In the first year of reform (1979), the central city districts experience a 24% increase in total operating revenue per pupil, compared to the state average increase of 17%. Note that rural districts also enjoy a revenue gain above the state average, while the revenue gains

Table 28

The Full Reform Package:
the Distributional Effects over Time
Among Property Wealth per Pupil Quintiles

Property Wealth per Pupil Quintiles	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Increase over the Previous Year in Total Operating Revenue per Pupil Under the Full Reform Package		
		1979 (%)	1980 (%)	1981 (%)
Highest	1,679	7	11	11
Second	1,517	18	13	11
Third	1,527	20	13	11
Fourth	1,279	20	13	11
Lowest	1,216	22	13	11
All Districts	1,444	17	12	11

Table 29

The Full Reform Package:
the Distributional Effects over Time
Among Four Classes of Ohio School Districts

District Class	Actual 1978 Total Operating Revenue per Pupil ($)	Percentage Increase over the Previous Year in Total Operating Revenue per Pupil Under the Full Reform Package		
		1979 (%)	1980 (%)	1981 (%)
Central City Districts	1,641	24	13	11
Satellite City Districts	1,539	12	12	11
Independent City Districts	1,308	10	13	11
Rural Districts	1,233	19	12	11
All Districts	1,444	17	12	11

by satellite and independent city districts are below the state average. Thus during 1979 the relative shares of operating revenue are changing in favor of central city (and to a lesser extent rural) districts and against the other two classes. In the next two years, however, there is no further significant change in the distribution of revenue among the four classes districts, since percentage revenue gains in 1980 and 1981 are approximately uniform. Thus the distributional shape of the reform package is retained after the first year.

The overall measure of the equalizing power of reform is the index of inequality, which is shown in Table 30. The effects of the full reform package on the index of inequality are shown in the two righthand columns of Table 30. The index falls from 161 in 1978 to 88 in 1979, representing a 45.5% reduction in the disparity among Ohio school districts in their purchasing power per unit of educational need. This equalization is further strengthened in 1980 and 1981, as the index falls to 80 and 77, respectively.

This result can be compared with the equalization effect of the reform package without any property tax diversion, also shown in Table 30. The plan without tax diversion reduces the index of inequality from 161 to 144 in the first year, and to 133 in the third year. The overall equalization impact is clearly much weakened when property tax diversion is removed from the reform package. Notice however, that the equalization gain in 1979 that results from the reform package without tax diversion is followed by additional gains in 1980 and 1981.

The equalization impact of the transitional guarantees can be observed in Table 31. In the first year 98 school districts, containing

Table 30

Equalization Effects of Adopting a Foundation Plan with Both Poverty and Cost Factors

Year	Without Tax Diversion		With Tax Diversion (and Transitional Guarantee)	
	Weighted Index of Inequality*	Percentage Change in Index from 1978 Actual Level	Weighted Index of Inequality*	Percentage Change in Index from 1978 Actual Level
1. 1978 Actual	161		161	
2. 1979 Simulated	144	-10.8%	88	-45.5%
3. 1980 Simulated	139	-14.0%	80	-50.5%
4. 1981 Simulated	133	-17.5%	77	-52.0%

*This index measures the variation among school districts in the power to purchase educational resources per unit of educational need. A value of zero would indicate strict equality among districts.

13% of the state's pupils, suffer a decline in total operating revenue per pupil below the 1978 level as a result of adopting the full reform package. These adversely-affected districts are characterized by large concentrations of business property, the tax revenues from which are diverted to the state under the reform package. The guarantees do not prevent these revenue losses, but instead simply limit the maximum loss that an adversely-affected district can suffer. In the first year there are 31 districts that would suffer a revenue per pupil loss greater than 10%, so these districts are placed "on the guarantee," at a total cost of $17.4 million. Table 31 shows that revenue growth in 1980 and 1981 reduces the number of adversely-affected districts and reduces the number of "guarantee districts" from 31 to 8 to 2. Thus the transitional guarantees do phase out quickly.

The impact of the guarantees on equalization is shown in section B of Table 31. Projections of the reform package were made both without the guarantees and with them. Comparing the index of inequality for these pairs of projects, one can see that the guarantees do reduce the extent of equalization. The effect is both modest and temporary, however. The index of inequality is raised by a modest 10% in 1979 by placing 31 districts on guarantees, but by 1981 the index is virtually unaffected by the guarantees to the two remaining guarantee districts. The transitional guarantees do appear to succeed, then, in moderating the initial adverse impact of property tax diversion without seriously compromising the equity goal.

In closing this empirical analysis of the distributional impact of the reforms on Ohio school districts, we turn to the revenue shares

Table 31

Effects of Transitional Guarantees to Districts Adversely Affected by Property Tax Diversion

Item	Projection Years		
	1979	1980	1981
A. Adversely-affected districts			
1. Number of districts whose operating revenue per pupil falls below 1978 level	98	43	28
2. Percentage of state's pupils in the adversely-affected districts	13.1%	4.4%	2.5%
3. Maximum percentage loss in revenue per pupil below 1978 level permitted under guarantee	10%	20%	30%
4. Number of districts receiving a guarantee	31	8	2
5. Total cost of the guarantees to the state (in $millions)	17.4	2.7	0.7
B. Effect of guarantees on equalization			
1. Index of inequality			
(a) Without guarantees	80	79	77
(b) With guarantees	88	80	77
2. Percentage increase in index of inequality due to guarantees	10.0%	1.2%	0.2%

captured by the wealth quintiles. In Table 32 these revenue shares are shown both for the reform package (with and without tax diversion) and for Ohio's existing finance system. The four righthand columns show the distribution of revenue shares among wealth quintiles as projected for 1981, under four alternative plans. When compared with the revenue shares in 1978, the four plans in 1981 all show a more equal distribution of revenue among wealth quintiles than existed in 1978. For instance, the gap between the highest and lowest wealth quintiles was 6.5 in 1978 (23.2 minus 16.8), while the gap in 1981 is projected to be from 3.1 to 6.2, depending on the plan chosen.

Among the four plans projected for 1981, the most substantial equalization is attained under the full tax diversion reform package. This plan is substantially more equalizing than is the existing finance system, even when an additional $1 billion is pumped into unrestricted aid under the existing system. This indicates that a substantial infusion of new state aid is a poor substitute for property tax diversion in terms of its equity effects.

C. Effects of tax diversion on the distribution of tax liability among taxpayers

Focus of the analysis now turns from equity among pupils in different districts to equity among taxpayers. The thrust of this analysis will be to determine the immediate and eventual effects of property tax diversion on the tax liability of various groups of taxpayers.

1. Immediate effects of tax diversion on taxpayers

The immediate effects of tax diversion on taxpayers depend on how tax rates are to be set on the property that becomes subject to tax diversion.

Table 32

A Comparison of the Distributional Effects of Rising State Aid (1) Under Ohio's Existing Finance System and (2) Under the Reform Package: Showing Revenue Shares Among Property Wealth per Pupil Quintiles

Property Wealth per Pupil Quintiles	Percentage of Ohio Pupils in the Quintile	Operating Revenue in the Quintile as a Percentage of Statewide Operating Revenue				
		1973 (Actual)	1981 (Projected)			
			Under Ohio's Existing Finance System, with a State Appropriation for Unrestricted Aid of:		Under the Reform Package, with a $1,171 mill. State Appripriation for Unrestricted Aid,	
			$1,171 mill	$2,171 mill.	Without Tax Diversion	With Full Diversion
	(%)	(%)	(%)	(%)	(%)	(%)
H'ghest	20.0	23.3	22.9	22.4	22.5	20.8
Second	20.0	21.0	21.0	20.9	21.7	21.3
Third	20.0	21.2	21.3	21.2	22.2	21.9
Fourth	20.0	17.7	17.9	18.1	17.4	18.2
Lowest	20.0	16.8	17.0	17.4	16.3	17.7
All Districts	100.0	100.0	100.0	100.0	100.0	100.0

As explained above (pp. 35-37), there are two basic options: (1) apply district-determined tax rates to the property subject to tax diversion; or (2) apply a statewide uniform rate to the property subject to tax diversion. The first option is preferred by those who wish to minimize the immediate impact of tax diversion on taxpayers. Those who favor the second option stress that equity among taxpayers requires that all owners of property subject to tax diversion pay the same tax rate since their taxes are all going to support the state basic aid fund.

Turning first to the option of retaining district-determined rates on property subject to tax diversion, the immediate effect is obvious. Tax diversion would not alter the tax rate paid by any taxpayer anywhere in the state. This would be true no matter what classes of property were made subject tc tax diversion.

By contrast, the second option would immediately alter the tax liability of many businesses. Under this option a statewide uniform tax rate would be applied to the business property subject to diversion. In principle, this rate could be set at any level, but in our analysis it will be assumed that the rate is set so that the <u>total</u> taxes paid by the affected businesses is equal to what would have been paid at the varying, district-determined rates. In other words, the affected businesses will not experience any chage in their <u>aggregate</u> tax liability. The distribution of the tax burden will change, however, as the tax rate for each business is adjusted to th statewide level. The changes in the tax liability of a particular business will depend on whether the school district was levying an above-average or a below-average tax rate

prior to tax diversion. Taxpayers located in the low-tax districts will find their tax rates (and hence their tax liabilities) rising due to tax diversion, and conversely for taxpayers in high-tax districts.

The pattern of tax rates for current operation of schools is shown in Table 33 for Ohio school districts in 1978. For tax purposes property is divided into eight classes in Ohio, and this table shows the average tax rate applying to each property class in the bottom row. All eight classes are subject to the same tax rate in any single school district, but if a particular class of property class is mostly located in high-tax districts the average tax rate applied to that property class will be relatively high. An example of this is tangible personal property (business equipment and inventories), which is mostly located in high-tax districts and is therefore subject to a relatively high statewide average rate. At the other extreme are mineral and agricultural real property. These classes of property are predominantly located in low-tax districts, so the average tax rates on them are relatively low. Table 33 also displays the tax rates by class of school district. The consistent pattern here is that tax rates are relatively high in metropolitan areas (central and satellite city districts) and relatively low elsewhere.

The immediate impact of full property tax diversion on business taxpayers is shown in Table 34. Under full tax diversion, all classes of property except for residential and agricultural real would be subject to tax diversion and would pay a statewide uniform rate of 27.84 mills (in 1978). The table shows that residential and agricultural property owners would experience no change in tax liability, since the district-determined tax rates would continue to apply to them. The bottom row

Table 33

Actual Tax Rates for Current Operation of Ohio Schools in 1978
By Class of Property and by Class of District

	Effective Millage Rate for Current Operation of Schools, 1978							
	Non-business Property		Business Property					
			Real Property				Tangible Personal Property	
	Residential Real (mills)	Agricultural Real (mills)	Industrial Real (mills)	Commercial Real (mills)	Mineral Real (mills)	Public Utility Real (mills)	Public Utility Tangible Personal (mills)	Other Tangible Personal (mills)
Central City Districts	27.8	24.5*	25.9	25.6	23.0*	25.9	31.0	31.3
Satellite City Districts	28.4	25.7*	24.9	27.1	19.4*	24.4*	33.4	31.0
Independent City Districts	25.2	22.9	23.6	24.0	22.1*	24.0*	27.5	27.6
Rural Districts	23.0	21.2	21.2*	22.0*	21.1	20.0	24.8	25.9*
All Districts	26.5	21.8	24.5	25.6	21.1	23.5	28.6	29.7

*There is very little of this class of property in this class of districts, so the figure is not significant.

of Table 34 indicates that business owners of real property would tend on the average to pay higher taxes, while business owners of tangible personal property would tend to pay lower taxes. The largest increases in tax liability would apply to business real property located in rural and independent city districts. At the other extreme, substantial tax reductions would be enjoyed by businesses with tangible personal property located in metropolitan areas. The righthand column of Table 34 shows that, on the average, business property located in central and satellite cities would enjoy a lower property tax burden while the opposite would apply to businesses located in non-metropolitan areas. Businesses located in rural school districts have in the past enjoyed the lowest tax rates, so adjusting their rates to the state average raises their tax liability sharply. It should be noted that some businesses have properties in several different districts and that many businesses have substantial amounts of both real and tangible personal property. In these cases, the net change in the tax liability of the firm as a whole may be rather small.

The immediate effects of partial tax diversion on taxpayers are much more modest, as can be seen in Table 35. The only taxpayers affected by partial tax diversion are owners of tangible personal property. Among these property owners, the tax burden is shifted away from personal property in metropolitan areas and is shifted most sharply toward public utility personal property located in rural districts. Public utility firms typically serve wide areas, however, so they pay taxes on personal property located in a variety of urban and rural districts. As a result, most public utility firms would experience only a very modest net change in their tax liability.

Table 34

Impact of Full Diversion of Business Property Taxes, at a Uniform Statewide Rate, on the Liability of Ohio Taxpayers, by Class of Property and by Class of District, 1978

District Class	Percentage Change in Tax Liability Due to Levying 27.84 Mills on All Business Property								
	Non-business Property		Business Property						
			Real Property				Tangible Personal Property		
	Residential Real (%)	Agricultural Real (%)	Industrial Real (%)	Commercial Real (%)	Mineral Real (%)	Public Utility Real (%)	Public Utility Tangible Personal (%)	Other Tangible Personal (%)	Total Business Property (%)
Central City Districts	0	0	+7.3	+8.7	+20.9*	+7.6	-10.2	-11.0	-3.8
Satellite City Districts	0	0	+11.9	+2.9	+43.8*	+14.4*	-16.7	-10.1	-5.6
Independent City Districts	0	0	+17.9	+16.0	+26.0*	+16.2*	+1.2	+0.8	+5.1
Rural Districts	0	0	+31.2*	+26.4*	+32.2	+39.2	+12.2	+7.7*	+13.8
All Districts	0	0	+13.6	+8.7	+32.0	+18.6	-2.6	-6.1	0

*There is very little of this class of property in this class of districts, so the figure is not significant.

Table 35

Impact of Partial Diversion of Business Property Taxes, at a Uniform Statewide Rate, on the Liability of Ohio Taxpayers, by Class of Property and by Class of District, 1978

District Class	Percentage Change in Tax Liability Due to Levying 29.35 Mills on All Tangible Personal Property								
	Non-business Property		Business Property						
			Real Property				Tangible Personal Property		Total Business Property
	Residential Real (%)	Agricultural Real (%)	Industrial Real (%)	Commercial Real (%)	Mineral Real (%)	Public Utility Real (%)	Public Utility Tangible Personal (%)	Other Tangible Personal (%)	(%)
Central City Districts	0	0	0	0	0	0	-5.3	-6.2	-6.0
Satellite City Districts	0	0	0	0	0	0	-12.2	-5.2	-7.2
Independent City Districts	0	0	0	0	0	0	+6.7	+6.2	+5.9
Rural Districts	0	0	0	0	0	0	+18.3	+13.5*	+15.8
All Districts	0	0	0	0	0	0	+2.6	-1.0	0

*There is very little of this class of property in this class of districts, so the figure is not significant

This analysis has demonstrated that redistribution of tax burdens among business firms is substantial when full tax diversion is coupled with the use of a statewide uniform rate. Partial tax diversion by contrast, sharply reduces the extent of redistribution of tax liability among business taxpayers. If redistributing the business tax burdens is expected to generate serious political opposition to tax diversion, then partial tax diversion may be much more practical than full tax diversion. If opposition to <u>any</u> redistribution of tax liability is strong, another practical alternative would be full tax diversion but with district-determined tax rates retained. This alternative accomplishes all of the inter-district equity gains earlier projected for the full reform package while not requiring any immediate changes in the tax burdens of property owners.

2. Eventual effects of the reform package on voter behavior

Adoption of the full reform package might eventually alter the willingness of local voters to support property tax operating millage for schools. The reform package would tend to change the level of operating revenue per pupil available in the school district, and it would also tend to change the revenue yield to the district from levying an additional mill of tax. It is impossible to predict the precise effect of reform on voter behavior, but several observations can be made.

Voter attitudes toward operating millage levies could change regardless of how the tax rate is determined for the property subject to tax diversion. The full reform package would affect voters through a "price effect" and a "budget effect." We turn now to an explanation of these effects.

The "price effect" of the reform package raises the "price of educational resources" as viewed by local voters. The price of educational resources

is simply the additional tax that residents must pay in order to purchase a given quantity of additional educational resources. Two elements in the reform package tend to raise the price of educational resources to district voters. First, property tax diversion implies that when new millage is voted, the school district receives no additional tax revenue from the business property subject to tax diversion. Even if these businesses are taxed at locally-determined rates, the additional taxes they pay on the new millage will simply benefit the state's basic aid fund, without any appreciable effect on the home district. Second, replacing the guaranteed yield plan with a foundation plan implies that if new millage is voted there will not be any accompanying increase in basic state aid, since the foundation plan contains no "reward for local tax effort" feature. These two elements in the reform package hence restrict the district's revenue gain from new millage to the new taxes received from residential and agricultural property owners. For this reason, a district that wished to purchase educational resources worth, say, $200 per pupil would need to approve a larger increase in tax millage as a result of the reform package. In this sense the price of educational resources to the local voter is raised by the reforms.

This price effect of the reform package is illustrated for a hypothetical school district in Table 36. Immediately before reform this district's revenue options are shown in the left side of the table. If the district's voters approve a 20 mill tax rate, total operating revenue per pupil will be $1,500. If instead the voters approve 25 mills, total operating revenue per pupil rises to $1,700, and a millage of 30 generates operating revenue per pupil of $1,900. Notice that each additional 5 mills

Table 36

Impact of the Full Tax Diversion Reform Package on the Price of Education in a Hypothetical School District

Revenue Sources	Operating Revenue per Pupil					
	Immediately Before Reform			After Reform		
	at 20 mills ($)	at 25 mills ($)	at 30 mills ($)	at 20 mills ($)	at 25 mills ($)	at 30 mills ($)
Local Tax Revenue from Residential Property	300	375	450	300	375	450
Local Tax Revenue from Business Property	300	375	450	0	0	0
State Basic Aid	600	650	700	1,025	1,025	1,025
Categorical State and Federal Aid	300	300	300	300	300	300
Total, All Sources	1,500	1,700	1,900	1,625	1,700	1,775

brings in new revenue from (1) residential property owners, (2) business property owners, and (3) state basic aid (under a guaranteed yield formula). After the reform package is adopted, however, additional millage generates less new operating revenue per pupil than before. For instance, if the district had actually been levying 25 mills before reform, it would have received $1,700 per pupil in total operating revenue, and it could continue to receive this level after reform. However, additional millage no longer would be as powerful. After reform, raising the millage from 25 to 30 adds only $75 per pupil to total operating revenue, whereas it would have raised $200 before. Viewed another way, the district could have raised its budget by $200 per pupil at a price of 5 mills before reform but this same budget increase after reform would require a price of 13.33 mills. On the other hand, if the district were considering reducing its millage from 25 to 20, the millage reduction would cost the district $200 per pupil in operating revenue before reform but only $75 after.

It is reasonable to assume that the price effect of the reform package would tend to reduce local voter support for new millage. It might even increase the desire by some voters to reduce the level of school operating millage below its current rate. What is <u>not</u> clear is the magnitude of the price effect. Historical evidence available at this time is not sufficient to permit a prediction concerning how many districts might be discouraged from levying new millage or encouraged to reduce their millage as a result of the price effect.

The analysis of voter behavior is complicated by the "budget effect" of the reform package. The reason for complexity is that while the price

effect tends to discourage voter support for millage, the "budget effect" can in some cases encourage voters to support new millage. The budget effect is simply the tendency of the reform package to alter the district's overall revenue budget. For instance, if a given district suffers a loss in total operating revenue per pupil as a result of reform, its voters might resist the school budget reduction by levying additional millage. On the other hand, districts that enjoy a budget increase as a result of the reform package might desire to take this opportunity to reduce their tax millage.

The budget effect of reform is illustrated by two hypothetical school districts in Table 37. Immediately before reform the two districts face identical revenue options. These options are shown in the left side of Table 37, and they are in fact the same options as were displayed in Table 36 also. Assuming that both districts levy 25 mills before reform, they both receive annual operating revenues of $1,700 per pupil before reform. District A is favorably affected by the reform package, since its operating revenue per pupil is raised to $1,875, while district B suffers a reduction to $1,525 per pupil. The different effects of reform on these districts could be due to the operation of the poverty and cost factors. District A may be located in a high-wage area and may have a substantial poverty incidence, while district B may lack these features.

The reaction of voters to the budget effect of the reform package will depend on their attitudes toward the proper level of the school budget. If voters strongly prefer the pre-reform budget level, they can be expected to adjust the district millage rate to minimize the change in

Table 37

Impact of the Full Tax Diversion Reform Package on Voter Choices: A Comparison between Favorably and Adversely Affected School Districts*

Revenue Sources	Operating Revenue per Pupil					
	Immediately Before Reform			After Reform		
	at 20 mills ($)	at 25 mills ($)	at 30 mills ($)	at 20 mills ($)	at 25 mills ($)	at 30 mills ($)
Local Tax Revenue from Residential Property	300	375	450	300	375	450
Local Tax Revenue from Business Property	300	375	450	0	0	0
State Basic Aid — District A	600	650	700	1,200	1,200	1,200
State Basic Aid — District B				850	850	850
Categorical State and Federal Aid	300	300	300	300	300	300
Total Revenue, All Sources — District A	1,500	1,700	1,900	1,800	1,875	1,950
Total Revenue, All Sources — District B				1,450	1,525	1,600

*The two hypothetical districts face the same revenue choices before reform, but the reform package helps district A and hurts district B.

the school budget. Voters in district A, for instance, may see little need for the budget to rise from $1,700 per pupil to $1,875, so they may react by lowering the millage to 20, which would still permit a budget level of $1,800 per pupil after reform. Voters in district B may resist the budget reduction from $1,700 to $1,525 per pupil by raising their millage to, say, 30 mills. Although this millage increase would not fully restore the pre-reform budget level, it might soften the blow.

Notice that in Table 37 the two districts experience the price effect of reform package, just as the district pictured in Table 36. In each case, the district could raise $?00 per pupil in new total operating revenue with a 5-mill levy before reform but could do so only with a 13.33-mill levy after reform. The budget effect on district A in Table 37 tends to reinforce the tendency of voters to be discouraged from supporting local tax millage. For district B, however, the budget effect works in opposition to the price effect. Which effect will be stronger? We simply do not know. Districts adversely affected by the reform package (like B) may in some cases raise millage to restore budget cuts, but in other cases they may maintain or even reduce their millage rates.

Analysis of the price and budget effects of reform, then, fails to yield definitive predictions concerning voter behavior. This may or may not pose a significant difficulty for policy makers. There is little difficulty if one argues that districts should be completely free to raise or lower millage rates once they have met a specified minimum tax rate and are providing at least the foundation level of educational resources. On the other hand, it is likely that some policy makers will

object to allowing districts to reduce millage in response to increased state aid. Others may object to the possibility that some districts may seek voter support for higher levels of property taxation. If there is substantial concern over the eventual impact of the reform package on voter behavior, uncertainty concerning this impact may create opposition to the reform package.

VI. Policy implications

A. Role of equity in school finance policy

This paper has focussed on the equity of Ohio's school finance system, to the virtual exclusion of other considerations. The equity standard employed in this analysis is:

> Every public school district within the state should have equal power to purchase educational resources per unit of educational need.

Our stress on equity is not meant to deny the importance of other goals or concerns. School finance policy should seek to insure an adequate overall funding level for Ohio schools. In addition, the state must be concerned that educational needs are clearly understood, that schools deliver services in an efficient manner, and that Ohio pupils are in fact learning. The school finance system should also provide flexibility for school districts while simultaneously insuring accountability by these districts to local voters and taxpayers and to the State Board of Education and General Assembly. These objectives are not always in complete harmony. Policy makers must often consider compromises among conflicting goals.

Equity is rather easily ignored when difficult choices are being made. Specific educational programs are represented by articulate lobbies, as are school administrators and teachers. Specific groups of taxpayers are also represented during consideration of school finance policy. Equity in the overall use of educational resources has no constituency, however. As an abstract concept, equity may seem less compelling than the forcefully articulated needs of specific groups.

American society has long cherished the ideal of "equal opportunity" for all citizens. Traditionally it has been held that public education for all children is the key to insuring equal opportunity. Of course, the school system is not capable of guaranteeing equal opportunity for children who may be victims of their parents' inability to obtain adequate housing, employment, and health care. Without equal <u>educational</u> opportunity, however, it is doubtful that the social goal of equal opportunity can be approached. The equity standard used in this study is designed as a necessary but not sufficient condition for achieving equal educational opportunity. Even if resources were distributed strictly according to educational need, as the standard demands, the ultimate effect on children would depend on the performance of teachers, parents, and the children chemselves. Still, the equity standard seeks to insure that <u>one</u> of the necessary conditions for equal educational opportunity is met.

Ohio's existing school finance plan fails to meet or even approach the equity standard. Ohio school districts with little economic strength have relatively limited revenues with which to meet their educational needs. This observation applies to districts with modest property wealth per pupil, with low levels of personal income among residents, and with little of the property tax base accounted for by business property. Such districts tend to respond to their relatively modest revenue levels by hiring fewer teachers per thousand pupils than is typical elsewhere. Although state aid recognizes some of these disparities among districts, equalization efforts by the state have fallen far short.

Ohio has also failed to meet the equity standard due to inadequate attention to the special problems in districts with a high poverty incidence

and in those where the cost of purchasing educational resources is high. State and federal aid have failed to fully address these problems, and this failure is most damaging to the central city school districts that tend to suffer from both poverty and high cost of purchasing resources.

B. Need to make difficult choices

The existing inequities in Ohio school finance are not simply the result of inattention to equity. They are instead due to the focus of the General Assembly's attention on immediate problems such as schools closing for lack of funds and taxpayer discontent. In response to a series of such "crises" the General Assembly has enacted ad hoc responses in the form of either specific financial assistance to districts with critical problems or specific tax relief to particular taxpayer groups. The overall shape of the distribution of educational resources has often been ignored during these crises. Considerations of equity have seemed secondary to keeping schools open through the remainder of the current year.

The school finance reforms studied in this paper would represent a difficult challenge for the General Assembly. They involve broad issues and long-range needs. More critical, they generate losers. Under each reform option or combination there are adversely-affected school districts, and in some cases adversely-affected taxpayers also. The General Assembly simply cannot respond adequately to the existing inequities without a political cost. If it is decided that no districts can be adversely affected by reform, the total level of state aid would need to climb dramatically even to achieve modest equity gains. If

redistribution among districts is chosen, the total tax burden can be retained at or near its present level but there will be cries of anguish from the representatives of adversely-affected districts.

If the General Assembly were to deal with these broad reform issues, there might well be a variety of benefits. First, greater equity in school finance could be achieved. Second, taxpayer equity could be enhanced by an integrated system of reforms. Third, confusion over the goals and priorities in education could be reduced. Fourth, voter suspicion concerning both schools and property taxes could be reduced by reforms that stress the integrity of the system. Of course, the reforms could easily be undercut in the future by a return to the pattern of patchwork responses to crises or to demands of school interests.

C. Need for equalization leverage

In Ohio, the modest share of district revenues contributed by state unrestricted aid tends to afford the state only limited opportunity to influence the overall distribution of revenues. No substantial redistribution of school operating revenues could occur without increasing the level of state unrestricted aid. If the state is to avoid substantial increases in the tax burden on Ohio voters, property tax diversion is the most plausible means of gaining equalization leverage in school finance. When a portion of district property tax revenue is diverted to the state basic aid fund, the state can then distribute these revenues among districts according to educational need.

Property tax diversion does reduce the financial autonomy of some school districts, and this will be viewed as a critical problem by some. Districts will continue to be able to supplement the foundation-level

school program, but they will have much more limited financial power to do this. Districts whose great economic strength has enabled them to enjoy a superior program with a modest tax rate will be most adversely affected. On the other hand, many of the poorer districts will gain new revenue and as a result will enjoy <u>greater</u> financial discretion than before.

D. The reforms

It is hazardous to adopt a significant reform in school finance without careful consideration of the side effects. This proposition is illustrated by the four specific reforms studied above. If property tax diversion were adopted without poverty or cost factors, many districts that suffer from a high poverty incidence and a high cost of purchasing resources would be hurt. On the other hand, if a cost factor were adopted without either property tax diversion or a poverty factor, substantial new state aid would flow to affluent suburban districts whose financial problems are relatively modest.

The full reform package presented here succeeds in overcoming the adverse side effects that result when only one part of the package is adopted. As a whole, the reform package would enable Ohio to approach the equity standard to a very substantial degree. The current disparities based on district economic strength would be sharply reduced, and at the same time districts suffering from a high poverty incidence and a high cost of purchasing educational resources would be helped to deal with these problems. In this way the reform package represents a balanced and relatively comprehensive response to existing inequities.

If it proves impossible to adopt the full reform package, adoption of the poverty factor would be constructive. The poverty factor channels new state basic aid to the districts whose educational needs have been least adequately met. Further, adopting a poverty factor does not involve inequitable side effects. The poverty factor is the only specific reform option studied that can generate both significant and unambiguous equity gains even without the rest of the reform package.

E. Tools for public policy analysis

The most significant problem in analysis of school finance problems has been lack of perspective. It is essential that an integrated approach be taken, in which the interrelations among specific problems are stressed. In this paper, for instance, several sorts of disparities among Ohio school districts were combined by incorporating them into a single equity standard. An integrated equity analysis can help policy makers retain perspective when beset by a variety of "crises" and demands. This perspective may help policy makers cope with frivolous demands and it may help them avoid responding to problems in ways that simply create or exacerbate other problems.

The statistical measures presented in this paper are designed to stress an integrated approach to school finance policy. The index of inequality is a measure of equity that reflects all of the dimensions of disparity studied in the paper. This index has not been employed before (in Ohio or elsewhere), and it deserves wider use in equity analyses. The quintile analysis presented here is not novel, but also deserves wider use. Presenting a revenue distribution among quintiles

is an effective way of showing the "shape" of the distribution without burdening the reader with dozens of numbers. A major advantage of the use of quintile analysis is that it tends to turn attention from the effects of policy on specific school districts to the broad pattern of effects among groups of districts. Policy makers must, of course, consider the effects of policy on specific districts and specific taxpayers, but too often the specific effects are the only ones considered. If public policy is ever to respond to equity problems the broad pattern of effects must command the center of attention. Use of statistical measures such as the index of inequality and the quintile tables may enable policy makers to retain a broad, integrated perspective.

Empirical research is needed for informed policy making. The two sorts of research most crucial to policy analysis are simulation and multiple regression. Simulation, as illustrated in this paper, involves the systematic projection of the implications of specific policies or of packages of policies. In school finance, policy makers must have access to a computer simulation capacity that permits rapid and accurate analysis of the effects of a proposed policy. The simulation programs must be able to generate district-by-district information and also show the broader patterns of effects and side effects.

Multiple regression research is needed in order to assess the severity of specific school finance problems. For example, even if all would agree that districts with a high poverty incidence require more educational resources than other districts, public policy requires an estimate of the magnitude of the financial problems created by poverty incidence. Multiple regression analysis is capable of generating such

estimates, and is thus a statistical tool that must be understood by policy analysts. If policy makers wish to consider adopting a poverty factor or a cost factor, they need to know how heavily to weight these factors in order to cope with the problems identified. Multiple regression, when used by trained statisticians, can suggest the proper weights. It is true that multiple regression is complex, and as a result many policy makers will lack the training to fully understand it. These policy makers are forced to rely either on the statisticians or their own intuition when considering the proper weightings for poverty and cost factors. In either case, the results of careful statistical analysis ought to be available to policy makers for their consideration.

Policy makers, particularly members of the legislature, should not expect that empirical research will automatically appear as it is needed. The research will await an expressed demand for it by legislators. Simulation and multiple regression research require good data and trained analysts, and thus are expensive. Experience has shown that only when legislators insist on empirical information will it be available. Furthermore, policy makers will not receive accurate and timely information about the effects of proposed policies unless they articulate their information needs long before the decision deadline. These considerations point to the need for school finance policy makers to anticipate issues and to oversee a continuing research program that is addressed to these issues.

Footnotes

[1]Bruce L. Gensemer and Paul Remke, An Empirical Analysis of Ohio School Finance Problems (Columbus: The Academy for Contemporary Problems, December, 1979).

[2]Ibid., pp. 75-79.

[3]Ibid., pp. 78-79.

[4]Ibid., pp. 79-81.

[5]Ibid., p. 79.

[6]Ibid., p. 82.

[7]Ibid.

[8]Ibid., pp. 82-89.

[9]Ibid., p. 86

[10]Ibid., p. 89.

[11]Ibid., pp. 90-93.

[12]Ibid., pp. 93-99.

[13]Ibid., pp. 99-106.

[14]Ibid., pp. 151-155.

[15]Bruce L. Gensemer, Fiscal Neutrality in Ohio School Finance (Westerville, Ohio: School Management Institute, Inc., April, 1978).

[16]Ibid., pp. 30, 35.

[17]See pp. 83-84 below.

[18]Gensemer, op. cit., pp. 1-5.

[19]Ibid., pp. 16, 18, 30, and 35.

[20]Gensemer and Remke, op. cit., pp. 139-140.

[21]Ibid., 141-150.

[22]Ibid., pp. 82-89.

[23] Ibid., p. 85.

[24] Ibid., pp. 109-112.

[25] Ibid., pp. 67-69.

[26] Ibid., pp. 12-13.

[27] Ibid., pp. 82-89.

Appendix

The Academy for Contemporary Problems
1501 NEIL AVENUE / COLUMBUS, OHIO 43201 / (614) 421-7700
Washington Office
444 NORTH CAPITOL STREET NW, SUITE 349/ WASHINGTON, D.C 20001 / (202) 638-1445

Memorandum

TO: Users of ACP School Finance Simulation Program

August 8, 1979

FROM: Bruce Gensemer and Daniel Chall

Guide to Use of the Ohio School Finance Simulation Program

1. LOGON Procedure

   a. The following procedure can be used on either the CRT or the Decwriter and for calling either one of the TSO accounts, it is slightly slower than method b.
      (1) Type "Logon" (CR)
      (2) In response to USERID, type "TS0330 (or TS0545)" (CR)
      (3) In response to PASSWORD, type the password for that account (CR)
      (4) In response to TERMINAL ID, type "AC62" if on Decwriter or "AC61" if on CRT (CR)
      (5) In response to UNIVERSITY ID, type the university ID for that account (CR)
      (6) The computer will then respond indicating that your logon is in progress.

   b. The following procedure can be used on either the CRT or the Decwriter (preferably the CRT since the password and ID numbers can be cleared off the screen and will not be left on a permanent record).
      (1) Type "Logon TS0330(or 545)/password f(ac62/1) i(university ID) (CR)
      (2) The computer will then respond indicating that your logon is in progress.

2. DECSET Command (for use on Decwriter only)

   a. After logon is in progress, type "Decset". This enables the output to be printed the entire width of the paper, otherwise the output will be printed out as if on CRT.

3. Call Program

   For either TS0330 or TS0545 there are four (4) programs for running the simulation model.

   a. 1978 Data
      (1) Type "Edit Program.CNTL(SIM78ACP)", this will produce one copy to be printed out at the Academy.
      (2) Type "Edit Program.CNTL(SIM78CEN)", this will produce copies to be printed out at Baker Systems.

   b. 1979 Data
      (1) Type "Edit Program.CNTL(SIM79ACP)", this will produce one copy to be printed out at the Academy.
      (2) Type "Edit Program.CNTL(SIM79CEN)", this will produce copies to be printed out at Baker Systems.

Note: From this point on, it is assumed that a carriage return will follow any operator input.

4. How to change number of copies printed at Baker

This procedure may be used at any time before a program is submitted should the need for a certain number of copies change after you have already started the actual editing of the program simulation parameters.

(1) Type "L 40". This is the line of the program that contains the option for numerous copies.
(2) If the copy option is sufficient you don't need to do anything else.
(3) If the copy option is not sufficient type "c /current number of copies /desired number of copies
(4) Type "L 40" again to verify that your change occurred.

5. List program (to see what the simulation parameter values are currently).

(1) Type "L". This will produce a copy of the entire program with the current values.

6. How to change simulation parameters (and verify the changes made)

a. Request verification
(1) Type "V". This enables the computer to print out each of your value changes as you make them.

b. How to change a simulation parameter
(1) Type "L 00" (or whatever line number you wish to change). The computer will respond by printing the requested line.
(2) Type "C /current value/desired value". The computer will respond by printing the change you requested.

c. Final listing of newly changed program
(1) Type "L". This will give you a printout of the entire program with the changes you requested. Use this listing to proofread your values. See Illustration A.

7. Meaning of Simulation Parameters

Line #	Name	Definition
110	AGFLAG	=1, if agricultural property remains at local level (together with residential property) =0, if agricultural property is diverted to state level
120	REALFLAG	=1, if all real property remains at local level while all personal property is diverted to state level =0, if real commercial, industrial, mining, and public utility property is diverted to state level
130	MINRATE	sets the qualifying millage rate in effective mills on real property (program assumes that all districts will increase their millage, if needed, to qualify for basic aid.)
140	NCOST	(strength of cost factor): sets the denominator "n" in cost factor formula--

District Cost Factor =

$$\left[\left(\frac{\text{District's WTERN77}}{\text{Ave. WTERN77 in 5 lowest counties}} - 1\right) * \frac{1}{n}\right] + 1$$

=0, if no cost factor is to be used
=2, if "n" in above formula equals 2
(Average WTERN77 in 5 lowest counties = 159)

Illustration A

```
 40
00040 //SYSPRINT DD SYSOUT=A,COPIES=2
c /2/1
00040 //SYSPRINT DD SYSOUT=A,COPIES=1
l 120
00120 REALFLAG=0
c /0/1
00120 REALFLAG=1
l 160
00160 EXTRA=657E6
c /657/235
00160 EXTRA=235E6

l 110,300
00110 AGFLAG=1
00120 REALFLAG=1
00130 MINRATE=15
00140 NCOST=2
00150 FLAG=1
00160 EXTRA=235E6
00170 NEWPOP=1955075
00171 POPGROW1=-6.39
00172 POPGROW2=-1.94
00173 POPGROW3=-2.52
00174 POPGROW4=-0.46
00180 ADCFLAG=1
00190 GUARLEVEL=90
00200 GROWTH=8.95
00210 OTHERUF=110E6
00220 OUTFLAG=1
00230 POLLINS=0
00240 IDLIST=1,24,28,31,33,37,47,63,75,79,82,93,134,143,152,169
00250 NODIVERT=0
00260 POLLFLAG=0
00270 BASIC2
00280 QUIT
00290 //
END OF DATA
save
EDIT
end
READY
```

150	FLAG	Determines what information is printed out =0, All districts printed out individually =1, District class grouping (4 groups plus state average) =2, Total wealth quintiles =3, All 146 sample districts printed out individually =4, Local wealth quintiles (groups districts by the wealth base that remains at local level after tax diversion) =5, Prints selected districts whose numbers appear in IDLIST below =6, Poverty (ADC %) quintiles =8, Wage (WTERN77) quintiles =10, Income (aggregate 1969 income in district per FTE ADM in base year) quintiles
160	EXTRA	Sets the dollar increase in the state appropriation (for basic plus categorical aid) over the base year. =0, if projection is for base year
170	NEWPOP	Sets a value for state total FTEADM different from the base year value. If =0, base year enrollments are used (unless POPGROW1, POPGROW2, etc., are non-zero). If positive, enrollments in all districts will be adjusted proportionally so as to total this number If both NEWPOP and POPGROW1, etc., have positive values, district enrollments will first be adjusted according to POPGROW1, etc., and then the resulting enrollments will be proportionally adjusted so as to total the value of NEWPOP
171	POPGROW1	Sets the percentage rate of growth (+ or -) for districts in class 1 (central cities). All these districts are assumed to "grow" uniformly. If it =0, then base year FTEADM will be retained (unless NEWPOP is non-zero).
172	POPGROW2	Same as above, for class 2 (independent urban).
173	POPGROW3	Same as above, for class 3 (satellites).
174	POPGROW4	Same as above, for class 4 (rural).
180	ADCFLAG	=0, if no poverty factor (or weighting) is used =1, if triple tier poverty factor is used: (a) No additional weight for ADC pupils below 5% of Total ADM (b) Additional weight of 0.5 for ADC pupils between 5% and 15% of Total ADM (c) Additional weight of 1.0 for ADC pupils above 15% of Total ADM
190	GUARLEVEL	Sets the percentage of actual base year <u>total</u> revenue per pupil guaranteed to every district in the projection. =0, if no percentage guarantee is desired =100, if it is desired that no district suffer a loss in total revenue per pupil from the base year actual level.

200	GROWTH	Sets a statewide uniform percentage rate of growth in the total property tax base (all classes of property assumed to grow at same rate). =0, if base year property values are desired
210	OTHERUP	Sets the dollar increase in "other aid" (categorical state aid, federal aid, and state rollback reimbursement aid), which diverts money from EXTRA away from the pot of unrestricted aid. =0, if "other aid" is to equal the base year level.
220	OUTFLAG	=0, if no outlier districts are to be printed out =1, if outlier districts are to be printed out
230	COLLINS	=0, if no Collins guarantee is desired. =1, if the Collins guarantee is desired. Collins guarantee is a grant of unrestricted state aid to districts which otherwise would be severely hurt by tax diversion (do not use this option with the NODIVERT=1 option). The Collins guarantee equals the total value of property tax revenue from diverted property in the projection year minus the district's foundation state aid in the projection year. Using Collins guarantees insures that no district has more tax revenue diverted to the state than it receives from the state in foundation state aid plus Collins guarantee.
240	IDLIST	Lists the numbers of districts to be printed out if FLAG=5. The central city districts are: 1, 24, 28, 31, 33, 37, 47, 63, 75, 79, 82, 93, 134, 143, 152, 169
250	NODIVERT	=0, if tax diversion to the state level is to occur =1, if tax diversion is not to occur
260	ROLLFLAG	=0, value used by Gensemer and by Committee of Twenty =1, if the state reimbursement for the 10% rollback on nondiverted property is to be put into the state basic aid pot instead of sent back to the districts.

8. Save current version of simulation parameters

   (1) Type "Save", in doing this the values you have put with the various simulation parameters will be stored in the program.

9. Submit program

   a. How to submit a program
      (1) Type "Submit", the computer will respond with: 'Job TS0330_(JOB____) Submitted'. When the program has completed running, the computer will respond '$HASP TS0330 Ended'

10. How to check the status of a submitted program

   (1) Type "St", the computer will respond by listing all the programs that have not been outed and their place in the queue. You can tell this by looking at the word printed below "STAT". It will say "OUTQ" if your program has run and is in the out queue, "INQ" if your program has not yet run, or "XEQ" if your program is in the process of running.

Note: For programs run to automatically out at Baker, there will be a corresponding job in your status file that will have under the "MISC" column "H/OUT". This is the job language which gives the statistics of the time used in various steps of your program. It is not the meat of your program. If you are confident that the program ran successfully you can delete this from your status file by typing "OUT TS0330_ Delete" or you can just leave it in your status file and it will be automatically deleted overnight.

If you are not confident that the program ran, you can out it as you would in step #11.

11. How to "out" the run at ACP (use Decwriter only)

(1) Type "End", if you have already done step 8, the computer will respond with the word READY. If you have not completed step 8, the computer will give you another chance to save your simulation parameters values by responding with NOTHING SAVED - TYPE SAVE OR END. At this point, type "Save" or "End", the computer will respond with the word READY.
(2) Turn the knob on the Decwriter to advance the paper to line #36 on the paper.
(3) Type "Out TS0330_", the computer will respond by printing your program.

12. How to "out" the run at Baker

a. Program originally set to out at Baker
(1) If you were using "Program.CNTL(SIM78/79CEN), your program automatically outed at Baker when it finished running.

b. Program originally set to out at ACP but now wanted at Baker
(1) Type "Out Ts0330_ Dest(CEN)", the computer will then put your program in the queue for outing at Baker. This is a much slower method of having the program printed if the computer is carrying a heavy load of programs to automatically out at Baker. Therefore, if it can be predicted in advance, use the program to automatically out at Baker.

c. Where to pick up output at Baker

The output for TS0330 is put in bin 12 of the Submittal Room, 5th floor Baker Systems. The output for Ts0545 is in bin 01.

13. How to check space allocation

After completing an editing session, check the disk space limit by typing:
(1) "space m(r)"; if the number of tracks allocated exceeds the allocation limit, type:
(2) "compress program.cntl rlse noprint"; then recheck the space limit by typing:
(3) "space m(r); if the number of tracks allocated still exceeds the allocation limit, compress another data set; otherwise, logoff.

14. Miscellaneous problems and their solutions

a. Forgetting to type an "L" before a line number when editing will delete that line. The computer will respond by printing the number and value of the line immediately preceding the deleted line.
   (1) If you are on the Decwriter, go to the listing of the program you have from just before you began making any value changes. Look up the line that you deleted. Type the line exactly as it appears on the listing, followed by a carriage return. Run another listing of the program to make sure that you inserted the line correctly by typing "L".
   (2) If you are on the CRT, find the most recent hard copy of the program, then follow step (1).
   (3) If you don't have a hard copy, make a note of the line the computer responded with, then type "L". This will give you a listing of the program as it now stands. Look for a break in the numbering pattern. Check on the worksheet that you were planning to make your changes from for the missing simulation parameter. When you locate where the missing simulation parameter should be, type "L" and the number of the line preceding the missing parameter. The computer will respond by printing that line. Type the deleted line number, a space, then the parameter name, and = sign, and the value you planned to insert. The computer will respond by printing the new line. Type "L" for a listing and check for the insertion.

15. How to Interpret the Printout

a. List of the simulation parameters chosen

b. Tax Diversion Information
   (1) tells whether tax diversion was selected and which property was diverted
   (2) tells the statewide average effective millage rate on the diverted property (if any)
   (3) tells, in dollars:
      (a) state property tax revenue (on diverted tax base)
      (b) other state revenue (appropriation out of state general fund for unrestricted state aid to schools)
      (c) total equalization pot [sum of (a) and (b) above]

c. Participation in the Foundation Aid program
   (1) tells number of districts that receive foundation aid in the projection (only districts whose local revenues per pupil after diversion exceed the foundation level would be excluded, and these normally include Kelleys Island and Middle Bass).
   (2) tells number of pupils in those districts out of state total (in both unweighted and weighted pupils)

d. Standard Foundation level
The foundation level is the minimum level of unrestricted funds per pupil from local and state revenue in all districts that levy the qualifying millage. "Standard foundation level" is the level for the districts in the five lowest-wage counties.
   (1) "Weighted pupil" refers to poverty factor weighting
   (2) "Unweighted pupil" uses FTEADM without adjustment

e. Average foundation level
Each district's foundation level depends on how high is its cost factor (i.e., the average weekly wage in its county). The average "cost-adjusted" level is the total foundation dollars statewide divided by the total of pupils statewide.

f. Collins Guarantees
(1) Lists the name of district and the amount of its Collins guarantee per FTEADM, for all districts receiving this guarantee (see COLLINS under simulation parameters above for meaning of this guarantee).
(2) Tells the total cost of these guarantees

g. Guarantees
(1) Lists the name of district and amount per FTEADM it receives in the percentage guarantee (see GUARLEVEL in simulation parameters above), for all districts on the percentage guarantee.
(2) Total cost of percentage guarantee
(3) Tells whether all districts would remain in foundation plan if it were cut to fund this guarantee and what the cut in the foundation level would need to be.

h. Winning and Losing Districts:
(1) Number of "winning districts," i.e., districts in which total revenue per pupil rose from base year actual to the projection.
(2) # unweighted (=FTEADM) pupils in winning districts
(3) Average gain per winning pupil = the average rise in total revenue per pupil in winning districts.
(4) Average loss is analogous.
(5) Average % gain and average % loss are analogous.

i. Coefficients of Variation (of total revenue per pupil), before (i.e., actual value in base year) and after (in the projection).
--defined as standard deviation in total revenue per pupil divided by its mean.
--In real terms vs. actual dollars: Total revenue per pupil either deflated by the district's cost factor to make it comparable to revenues in low wage districts, or not deflated.
--Per weighted or per unweighted: refers to poverty factor weighting.

j. Number of Jurisdictions and number of pupils in the groups of districts reported in this printout (either grouped by district class or by some sort of quintiles).
(1) If FLAG=1, the numbers are for class 1, class 2, class 3, class 4, and state total
(2) If FLAG=2, 4, 6, 8, or 10, the numbers are for quintiles from low (wealth, income, poverty, etc.) to high, with no state totals.

k. Outlier districts (when OUTFLAG = 1 and FLAG = 1, 2, 4, 6, 8, or 10)
For each group (district class or quintile) the 5 top losing districts and the 5 top winning districts are shown. The gain or loss always compares the projection with the base year actual level, and is in percent terms.

Within each cluster, the 5 top losers are shown first, from top loser down, then the top winners are shown, from the fifth top winner down to the top winner.

l. Total revenue per (FTEADM) pupil, after change (if any) in the tax base and enrollment since the base year, assuming the use of the foundation plan as specified. Figures are shown both without tax diversion and with it. The right column shows the change in total revenue per pupil from base year actual to the projection with tax diversion.

m. Nonresidential tax payments per (FTEADM) pupil: both without and with tax diversion, and % change due to diversion (all in the projection year). These payments are the taxes paid by taxpayers whose taxes are being diverted to the state level in this projection. The % change figure shows the % change in tax liability for these taxpayers as a group.

n. Tax Rates, before diversion, on agricultural (AG), public utility tangible personal (PU-TP), public utility real (PU-REAL), and other tangible personal property (tax rates differ because different classes of property are not equally distributed among high and low tax rate districts).

o. Percent changes in the tax rates on the above classes of property due to tax diversion (assumes that diverted property is taxed at the state average tax rate on the diverted property).

p. Tax Rates, before diversion, on mineral, industrial, and commercial real property.

q. Percent changes in the tax rates on the above classes of property due to tax diversion.

r. Local revenue per (FTEADM) pupil in projection year, without and with tax diversion.

s. Residential tax rate before diversion, and change needed to maintain total revenue per pupil at level when there is no tax diversion.

t. Unrestricted State Aid per (FTEADM) pupil in projection year.
--Includes Basic Aid and DPIA
--Col. 1: Without tax diversion (in projection year)
--Cos. 2-4: <u>With</u> tax diversion, in these parts: foundation aid, DPIA, and total of these two parts.

u. Other Aid (categorical state aid + state rollback reimbursement to districts + federal aid) in projection year: without and with tax diversion. Tax diversion affects the rollback reimbursement, since the rollback on diverted property is added to the basic aid pot instead of sent to the districts as "other aid."

v. Collins guarantee per (FTEADM) pupil in the projection (see COLLINS in simulation parameters for explanation).

w. "Percentage" guarantee revenue per (FTEADM) pupil in projection (see GUARLEVEL in simulation parameters for explanation).