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Analysis of Equity in Idaho's System of Public School Funding

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Introduction

A school funding equity analysis examines the degree of variation that occurs in the distribution of education resources. The need to examine equity in Idaho's distribution of school funding arises from the relationship between adequacy and equity. Even in a state with a high level of public school funding, the school finance system cannot be considered adequate if high variability occurs in funding the education of students with similar levels of educational need. High funding at a statewide level may not be adequate at the student level if the state's allocation formula results in substantially lower levels of funding for students in one district compared to the funding available to educate comparable students in another district (Berne & Stiefel, 1984). This equity analysis was performed to determine the extent to which Idaho's district funding levels are comparable.

Robert Berne and Leanna Stiefel, early researchers in the field of equity analysis, identified two types of funding equity and suggested a variety of methods for measuring each type (1984). One type examines the *horizontal equity* of a state's funding distribution. In a funding system characterized by horizontal equity, equals are treated equally. That is, funding is allocated in a way that ensures that funding in one district is comparable to funding levels in other districts. Indices that capture the spread, or dispersion, of a distribution often are used to measure horizontal equity (Berne & Stiefel, 1984, p. 18).

Vertical equity, the second type described by Berne and Stiefel (1984), is present when funding is based on individual differences - i.e., when "unequals" (p. 35), such as students with educational resource needs that are different from those of other students, are appropriately treated "unequally" (p. 35) through the allocation of sufficient funding to meet their educational needs. Challenges in measuring vertical equity include determining which individual differences should be considered in defining groups of students and determining how funding should vary among these groups (Berne & Stiefel, 1984, p. 35). These challenges are discussed in our interpretation of the results of our equity analysis in the "Results" section of this report.

Purpose of the Analysis

The purpose of our equity analysis is to use generally accepted measures of equity to determine the extent to which Idaho's system of public school finance resulted in a horizontally and vertically equitable distribution of public funds in 2007, the fiscal year examined.

Method Used in Developing the Models

This section briefly describes the procedure we used in selecting analytical methods and the unit of analysis for this study. The section then explains the approach we took in developing and using spreadsheet models for our equity analysis.

Analytical Methods

We chose the coefficient of variation (COV) index to measure horizontal equity ("equal treatment of equals"), although we used Berne and Stiefel's (1984) approach in modifying this index to address vertical equity concerns. The coefficient of variation index measures the extent to which districts' per-pupil funding levels vary; it reaches zero (no variation in funding) if all districts' per-pupil funding levels are equal. A low index value indicates a high degree of equity.

We selected the coefficient of variation, because it is a generally accepted equity index for which a benchmark is available for use as a standard in assessing a state's equity index results. Table 1 summarizes the information on the various horizontal equity indices, the number of authors we identified in a non-exhaustive search who had included these indices among the methods they had used, and the frequency with which these authors mentioned use of a benchmark for interpreting results.

Table 1
Researchers' Use of Horizontal Equity Indices and Related Benchmarks

Measure	Authors Using Index	Authors Mentioning Benchmark (Value Mentioned)
Range	4	0
Restricted Range	5	0
Federal Range Ratio	5	1 (.25 max.)
Coefficient of Variation	6	2 (.10 max.)
McLoone Index	4	1 (.95 min.)
Verstegen Index	2	1 (1.0 max.)
Gini Coefficient	5	1 (.05 max.)
Theil Index	2	0

Each of these equity indices provides information on a different equity-related characteristic. Some, such as the coefficient of variation, are calculated using data from all districts in a state, whereas others, such as the McLoone and Verstegen indices, are restricted to one segment of the population of districts (i.e., districts with per-pupil revenue below the state median [McLoone Index] or those with per-pupil revenue above the state median [Verstegen Index]). No index alone can fully describe all equity characteristics of a state's school district revenue distribution (Berne & Stiefel, 1984).

The criteria used in selecting the wealth elasticity measure, a vertical equity index (Appendix A), were similar to those used in selecting the horizontal equity measure. The wealth elasticity index has been cited in at least two studies of public school funding equity, and a benchmark (less than or equal to .10) (Odden, et al., 2007) is available for use as a standard.

Unit of Analysis

Two units of analysis are available to researchers calculating school finance equity: the district unit and the pupil unit. Underlying the district unit method is an assumption that the state is a distribution of districts, not of pupils. All districts, regardless of size, are weighted equally in arriving at the state's public school funding equity level. The pupil unit method is based on an assumption that the state is a distribution of pupils. This method weights each district by size (average daily attendance or enrollment) in calculating a state's funding equity (Berne & Stiefel, 1984, p. 18). We chose the pupil unit method, because it is particularly appropriate for a state with districts of widely varying size, as is the case in Idaho.

Coefficient of Variation Spreadsheet Model Development

We developed a spreadsheet model for each of the two equity analyses performed in this study, the coefficient of variation and wealth elasticity analyses. Development of each model began with entry of formulas for calculating the basic index.

Berne and Stiefel (1984) listed the following formula for calculating the coefficient of variation using the pupil as the unit of analysis:

> With X_i and P_i representing per-pupil dollar inputs in district *i* and number of pupils in district *i* respectively, the coefficient of variation of per-pupil dollar inputs under the pupil unit of analysis can be represented as
>
> $$\frac{\sqrt{\frac{\sum_i P_i(\bar{X}_p - X_i)^2}{\sum_i P_i}}}{\bar{X}_p}$$
>
> Where $\bar{X}_p$ equals the mean calculated with the pupil unit of analysis and $\sum_i P_i$ is the number of pupils in the state (p. 56).

Using this formula, the following variables for each district and charter school were included in our calculation of Idaho's fiscal year 2007 coefficient of variation:

- Revenue from local, state, and federal sources. Local revenue included property taxes and other miscellaneous revenue generated by school districts, but excluded proceeds from bond sales. These revenues are reported to the State Department of Education using Revenue Codes 411100 through 429000.

- Average daily attendance based on the "best 28 weeks" method for computing average daily attendance [ADA])[1]

To adjust the coefficient of variation calculation as described below, we included the following additional variables:

- Geographic Cost of Education Index (GCEI) data. This index was derived from 1993 data by Jay Chambers. The Idaho component of the GCEI was conveyed by Chambers to OPE in 2008. The index we received included data for all Idaho school districts with three exceptions. In each case of missing data, we used the index value for another district in the same region as the index value for the missing district.
- Comparable Wage Index (CWI) data developed by Lori Taylor (Taylor & Fowler, 2006). We used the 2005 update of the CWI's Idaho component .

After entering and checking formulas, we adapted the model to improve its utility in assessing influences on equity that are most relevant to legislative policy making. For example, equity index values based only on the distribution of total funding (local, state, and federal revenue) might be less relevant to legislative policy makers than one that can be used to measure state funding alone, or, optimally, an interactive model that can be used to examine the effects of various combinations of funding sources on the equity of the funding distribution.

For this reason, our initial adjustments included several features to facilitate separate examination of the impact of local, state, and federal revenue on the coefficient of variation. First, the model allows users (i.e., Office of Performance Evaluations analysts) to examine variation in state revenue alone by omitting local and federal revenue from the coefficient of variation calculation. The model also permits users to examine the specific impact of local or federal funding patterns on the COV by setting every district's state per-pupil revenue at the same level (the statewide average per-pupil revenue), thereby eliminating all state-level variation and ensuring that the resulting coefficient of variation calculation measures variation in, for example, local revenue alone (if federal revenue is omitted from the calculation).

We also included an interactive feature in the model allowing the user to select one of two methods for adjusting the coefficient of variation to account for geographic variation in the cost of education: the Geographic Cost of Education Index (GCEI) developed by Jay Chambers and the Comparable Wage Index (CWI) developed by Lori Taylor (Taylor & Fowler, 2006). The model permits the analyst to decline use of either of these methods, thereby omitting any adjustment for geographic differences in cost.

Berne and Stiefel (1984, p. 36) have noted that measures of horizontal equity, such as the coefficient of variation, can be adjusted to reflect differences in the cost of providing instructional services to students in various categories, such as those who are eligible for free or reduced price meals,

[1] The "best 28 weeks" attendance method was used in this analysis because the Department of Education uses this ADA measure (as opposed to full-term ADA) in allocating formula-based funding.

those with limited English proficiency, and students with disabilities. The adjusted index, known as a weighted dispersion measure, then serves as an indicator of funding equity among districts with varying proportions of students with specific needs. The resulting adjusted index addresses concerns about whether appropriate "unequal" levels of funding are provided to districts in a way that is consistent with the percent of students with specific needs, accomplishing this by adjusting a horizontal ("equal funding to equal students") index to account for variations in student funding needs. To make valid adjustments, researchers must respond to the challenges noted by Berne and Steifel (1984) — determining which individual differences should be considered in defining groups of students and how funding should vary among these groups.

No empirical evidence is available, however, to definitively establish the student categories that should be considered in an adjusted index, or the relative funding needs of students in specific categories. In the absence of such evidence, we created an interactive spreadsheet model that can be used in sensitivity analyses testing the effects of a variety of assumptions about the specific student needs that should be considered in calculating the adjusted index, as well as assumptions about the degree to which the varying costs of services for these student categories deviate from the cost of serving a student who is not a member of these specific need groups. We included in the model three student categories chosen by Odden and his colleagues (2007; p. 27) and by Chambers, Levin, DeLancey, and Manship (2008; p. 60): percent of students who are eligible for free or reduced price meals, percent of students with limited English proficiency, and percent of students with disabilities. We listed as defaults the factors used by Odden et al. (.25, .20, and .90, respectively) in their Wisconsin study and by Chambers et al. (.375, .094, and 1.723, respectively) for a study in New Mexico. In using Odden's factors, for example, a researcher assumes that responding to the learning needs of students who are eligible for free and reduced price meals (a student background characteristic associated with a need for higher levels of educational resources) would cost 25 percent more than the amount required to meet the needs of a student who is not a member of this group. A researcher using Odden's factors also assumes that the amounts needed for students with limited English proficiency or disabilities would be 20 percent and 90 percent, respectively, above the amount needed to serve a student who is not a member of a specific need groups.

As noted in the Office of Performance Evaluation's report on the use of average daily attendance to fund public education (Office of Performance Evaluations, 2007), Idaho's funding formula provides proportionally higher allocations to very small districts. This provision may be a reflection of the Legislature's intent to achieve a constant level of output among the state's districts, which vary markedly in size and, therefore, in the extent to which they can benefit from economies of scale. Berne and Stiefel (1984, p. 15) suggested that cost differences among districts of varying size that are based on economy of scale considerations and that do not reflect differences in quantity or quality of output should be considered a form of appropriately unequal treatment. To help answer questions about the impact of funding patterns for small districts, we included an interactive feature that permits calculation of the index with and without data on small districts. This feature permits the user to omit smaller districts from the calculation by entering a number that designates the minimum number of pupils in average daily attendance a district must have to be included in the COV calculation.

In addition to the "small district" feature, we included a feature permitting the user to omit five districts from the COV calculation. These districts (Boise, Blaine County, Swan Valley Elementary, Avery, and McCall-Donnelly Joint District) were permitted to continue to levy taxes for maintenance and operations (M&O) after this authority was withdrawn from other districts. By removing these districts from the calculation, analysts can estimate the effect of this "grandfathering" provision on the dispersion of funds across all districts.

Wealth Elasticity Spreadsheet Model Development

We calculated the wealth elasticity index to measure the extent to which Idaho's funding is fiscally neutral. This index is considered a vertical equity measure because it examines the relationship between district property wealth, an indicator of students' economic backgrounds, and district revenue. A close relationship between students' economic backgrounds and per-pupil funding (i.e., high levels of per-pupil funding for districts with wealthy students and low levels for districts with less wealthy students) would indicate inappropriately unequal treatment of students with unequal economic backgrounds.

The wealth elasticity index, like the coefficient of variation, was calculated using the pupil as the unit of analysis. We used the following fiscal year 2007 district-level data in calculating the state's wealth elasticity:

- Revenue from local , state, and federal sources
- Average daily attendance based on the "best 28 weeks" method for computing average daily attendance [ADA])
- Total assessed value of district property

We began by computing the slope of a line regressing per-pupil revenue on property value using Berne and Stiefel 's formula (1984, p. 74):

$$b = \frac{\sum_i P_i x_i w_i}{\sum_i P_i w x^2_i}$$

where per-pupil revenues ($\mathbf{X_i}$) and per-pupil property values ($\mathbf{W_i}$) are expressed as deviations from their mean values ($\mathbf{x_i} = \mathbf{X_i} - \overline{\mathbf{X}}$; $\mathbf{w_i} = \mathbf{W_i} - \overline{\mathbf{W}}$) and $\mathbf{P_i}$ represents the number of pupils in each district.

As shown in the elasticity formula presented by Berne and Stiefel (1984, p. 74), we incorporated this variable (*b*) into the wealth elasticity calculation:

> "The formula for the simple elasticity, calculated at the mean values of the variables, based on the simple regression is the following:
>
> $$e = b\left(\frac{\overline{W}_p}{\overline{X}_p}\right),$$

Where $\overline{W}_p$ and $\overline{X}_p$ are the means of per-pupil property values and per-pupil dollar inputs respectively" (Berne & Stiefel, 1984, p. 74).

As in the case of our coefficient of variation model, we included a series of interactive features in the model we developed for measuring wealth elasticity. These include the "small district" feature that permits the user to set an ADA criterion for including districts in the calculation, as well as the "omit local revenue" and "omit federal revenue" features that allow analysts to isolate the effects of state funding on the index. Consistent with the method we used in developing the coefficient of variation model, we included in the elasticity model a state revenue leveling feature setting state funding for each district at a uniform level to facilitate examination of the independent effects of local and federal revenues. We also included in the wealth elasticity model the feature permitting the user to omit from the elasticity calculation five districts that were permitted to continue to levy taxes for M&O after this authority was withdrawn from other districts. By removing these districts, analysts can estimate the effect of this "grandfathering" provision on the state's wealth elasticity.

Results

The coefficient of variation model measures the spread (or dispersion) of districts' per-pupil funding. The wealth elasticity model measures the extent to which 2007 property wealth was associated with 2007 per-pupil funding. In working with these models we found that Idaho's unadjusted measures of dispersion and revenue neutrality fell somewhat short of their respective standards. Model adjustments provided insights on factors affecting the state's funding equity and some of these adjustments improved Idaho's index values. This section lists and discusses unadjusted index values for each of the two equity measures, as well as index values based on various combinations of adjustments. In each of the following tables lower index values indicate higher levels of equity. The standard for each of these measures is .10.

Coefficient of Variation Index

Table 2 lists coefficient of variation values based on state funding only, funding from local or federal levels in combination with state funding, and funding from all sources. In this table we used the "Omit local" and "Omit federal" features of the model to examine the variability of per-pupil funding when state funding is combined with federal funding or with local funding. As this table shows, the equity index based on state revenue only (COV = .1541) is higher than the standard value (.10), but, when local funding is added, the index value for the two sources rises substantially to .2314, indicating a decrease in equity. When we isolate the variability of local revenue by leveling state funding at the statewide per-pupil average and add local revenue, the index (which in this form essentially measures the variability of local revenue per pupil) remains at .20. We conclude from this analysis that variability in state revenue per pupil exceeds what some consider to be the standard range, but variability in local funding is greater. In practical terms, this would mean that if state revenue per pupil were perfectly equitable, the current variability in local revenue per pupil would create inequity at a level exceeding the standard range (0.0 to .10).

If, using a similar method, we omit local revenue and combine state and federal revenue, the COV value would be .1757, showing that federal funding reduces the level of equity in comparison with the equity associated with state revenue only. Using the state revenue leveling procedure and adding federal revenue yields an index value of just .0733 (the variability of federal revenue per pupil). We conclude that all revenue sources contribute to Idaho's funding variability, but local funding contributes the larger share of variability.

Table 2

Coefficient of Variation Index Values by Source of Funding

Model Settings Equity in per-pupil revenue based on—	**Coefficient of Variation***
State revenue only	.1541
State and local revenue	.2314
Local revenue with state per-pupil revenue held constant at average state revenue per pupil (i.e., all variation is from local revenue)	.1999
State and federal revenue	.1757
Federal revenue with state per-pupil revenue held constant at average state revenue per pupil (i.e., all variation is from federal revenue)	.0733
Local, state, and federal revenue	.2208

* Standard: coefficient of variation less than or equal to .10

To identify the factors associated with relatively high variability in local funding, we examined the effect of geographic differences in cost on the state's equity levels. To do this we observed the extent of change that occurred in the COV when we applied cost of education factors to 1) state revenue only and 2) combined local, state, and federal revenue (Table 3). We found that applying each geographic cost index resulted in increased variability. If these geographic cost indices are accurate, regional differences in cost cause a decrease in equity among the districts, particularly in state funding. For example, applying the Geographic Cost of Education Index to state revenue increased measured variability from .1541 to .1879, a moderate loss in equity.

Table 3

Coefficient of Variation Index Values by Source of Funding and Geographic Cost Adjustments

Model Settings Per-pupil revenue equity based on—	**Coefficient of Variation***
State revenue only	.1541
Geographic cost adjustments	
Comparable Wage Index	.1814
Geographic Cost of Education Index	.1879
Local, state, and federal revenue	.2208
Geographic cost adjustments	
Comparable Wage Index	.2399
Geographic Cost of Education Index	.2311

* Standard: coefficient of variation less than or equal to .10

We used the “omit grandfathered districts” feature of the coefficient of variation model to examine the role played by districts that retained their authority to levy M&O taxes in broadening the variability of per-pupil funding. Table 4 shows that the variability of combined state and local funding declines considerably (the equity level improves) when the “grandfathered” districts are excluded from the analysis (COV = .2314 when all districts are included, and COV = .1557 when districts retaining M&O authority are excluded).

To further explore the factors that might contribute to variability associated with local funding, we omitted from the analysis all districts with fewer than 30 students in average daily attendance, as well as all “grandfathered” districts (Table 4). This adjustment resulted in a further decline in variability (COV = .1506). We concluded from this analysis that a major portion of the variability associated with local funding is attributable to five districts’ retention of M&O taxing authority. A smaller portion of the variability occurring in combined state and local funding is attributable to the per-pupil revenue levels of the six districts with the state’s lowest average daily attendance.

The slight decline in variability when the same six extremely small districts are excluded from the calculation of the COV for state funding only (from .1541 to .1444) suggests that the provisions of the state funding formula allocating higher levels of funding to very small districts increase the variability of state funding. Raising the minimum ADA for exclusion even further (e.g., 100, 200, 300, 400, 500) causes the index to decline, dropping below the .10 index beginning with district sizes over 300 ADA. Even at 500 ADA, the funding formula can still favor such districts. This increased variability attributable to the inclusion of the smaller districts in the analysis might be considered appropriate because the intent of the statutory provisions increasing funding for small schools may be to ensure a constant level of output among the state’s districts.

Table 4

Coefficient of Variation Index Values as Influenced by Revenue of Small Districts and Districts that Retained M&O Taxing Authority ("Grandfathered" Districts)

Model Settings Per-pupil revenue equity based on—	**Coefficient of Variation***
State revenue only	.1541
With districts with ADA less than 30 excluded	.1444
State and local revenue— with all districts included	.2314
With "grandfathered" districts excluded	.1557
With "grandfathered" districts and districts with ADA < 30 excluded	.1506

* Standard: coefficient of variation less than or equal to .10

By excluding districts with ADA lower than 30 in the above analysis, we addressed one of the equity considerations suggested by Berne and Stiefel (1984)—that of unequal funding to compensate for small districts' lack of access to economies of scale. Another case of appropriate "unequal" treatment occurs in a state's consideration of students' specific needs and the costs associated with addressing those needs. Researchers examining revenue equity, such as Odden and his colleagues (2007) and Chambers et al. (2008), have incorporated specific need factors into equity calculations to account for the needs of student groups such as those with income-related learning challenges, limited English proficiency, and disabilities. As mentioned earlier, use of specific need factors in allocating funds and in adjusting equity measures to accommodate the presence of these funds in district allocations ideally would be based on research evidence. The most valid basis for calculating these factors would be studies that establish appropriate funding ratios for the education of students with special needs in relation to the cost of providing educational services to students in general .

Odden's and Chambers's factors were useful to us in exploring the approximate effect that a set of specific need considerations might have on Idaho's funding equity. We found that their effect is detectable but relatively small in comparison with the factors causing variability that we described above (e.g., the overall change in variability when local revenue is combined with state funding, and the effect of M&O levy "grandfathering"). Table 5 shows that use of Odden's factors in our equity calculations improved COV values slightly more (from .1541 to .1519 for state revenue only), than did Chambers's factors (from .1514 to .1537), but neither set of factors had an appreciable effect on the coefficient of variation.

Table 5

Coefficient of Variation Index Values by Source of Funding and Specific Need Adjustments

Model Settings Per-pupil revenue equity based on—	**Coefficient of Variation***
Local, state, and federal revenue	.2208
Specific need adjustments (meals, Eng. proficiency, sp. ed.)	
Factors used by Odden (Wisconsin study)	.2197
Factors used by Chambers (New Mexico study)	.2201
State revenue only	.1541
Specific need adjustments (meals, Eng. proficiency, sp. ed.)	
Factors used by Odden (Wisconsin study)	.1519
Factors used by Chambers (New Mexico study)	.1537

* Standard: coefficient of variation less than or equal to .10

Wealth Elasticity Index

Because districts' local property tax revenues are directly related to local property wealth, removing local revenue from this fiscal neutrality calculation dramatically affects the index, as would be expected. The index falls from .1327 to .008 when local revenues are removed , but declines slightly less dramatically to .0135 when federal revenues also are excluded (Table 6). At this level (elasticity = .0135), a 100 percent increase in per-pupil property value (i.e., a $494,394 increase) would be associated with a 1.35 percent increase in per-pupil state revenue (a $72 increase). This demonstrates the relative neutrality of state funding in Idaho.

Nevertheless, with a wealth elasticity index value of .0135 for state funding when local and federal revenues are removed, a slight relationship remains between property wealth and state revenue. This may be explained by the fact that some of the smaller districts, in terms of ADA, are also some of the relatively wealthier districts, and many of the smaller districts generate relatively more support units. So, considering state funding only, raising the minimum ADA for exclusion (e.g., 100, 200, 300, 400, 500) causes the index to decline. In summary, the slight relationship noted between property wealth and state revenue may be explained by 1) the formula's provisions for higher per-pupil funding of smaller districts, and 2) a general tendency among small districts toward higher levels of property wealth.

Table 6

Wealth Elasticity Index Values by Source of Funding

Model Settings Extent of fiscal neutrality based on—	**Wealth Elasticity Index***
Local, state, and federal revenue	.1327
State and federal revenue	.0080
Federal revenue with state per-pupil revenue held constant at average state revenue per pupil (i.e., all variation is from federal revenue)	-.0038
State and local revenue	.1511
Local revenue with state per-pupil revenue held constant at average state revenue per pupil (i.e., all variation is from local revenue)	.1409
State revenue only	.0135

* Standard: wealth elasticity index less than or equal to .10

The presence of high-property-wealth/high-revenue districts (those with grandfathered M&O authority) in the neutrality calculation substantially increases the extent of the overall relationship between property wealth and district revenue. When those five districts are removed from a calculation based on state and local revenue, the index falls by more than half from .1511 to .0690 (Table 7). The state's wealth-to-district revenue neutrality for the remaining set of 137 districts is well below the standard suggested by Odden (elasticity < .10). Removing districts with fewer than 30 students in average daily attendance further increases neutrality from .0690 to .0658, but this is a very limited improvement.

Table 7

Wealth Elasticity Index Values by Source of Funding and as Influenced by Revenue of Small Districts and Districts that Retained M&O Taxing Authority ("Grandfathered" Districts)

Model Settings Per-pupil revenue equity based on—	**Wealth Elasticity Index ***
State revenue only	.0135
With districts with ADA less than 30 excluded	.0102
State and local revenue— with all districts included	.1511
With "grandfathered" districts excluded	.0690
With "grandfathered" districts and districts with ADA < 30 excluded	.0658

* Standard: wealth elasticity index less than or equal to .10

Conclusions

Idaho school districts vary in the total revenue they receive per pupil and in the amount they receive from local and state sources. This variation exceeds the level some consider the standard for state equity. Some funding patterns that might lessen Idaho's funding equity, such as proportionally higher state allocations for smaller districts, may be in place as a result of the Legislature's intent to promote equal educational outcomes for districts that are too small to benefit from economies of scale. Another factor reducing state and local funding equity, a pattern of regional differences in geographic costs of education, may be outside the scope of local, state, or federal control. Another source of variation in local funding equity is a statutory provision permitting some districts to retain their M&O levying authority. When state funding only is considered, and smaller districts (<=300 ADA) are excluded from the analysis, the variation falls within the standard we have employed.

Although state and local revenues per pupil were found to vary among the districts, another equity measure suggests that Idaho's state funding meets a fiscal neutrality standard considered by some to represent a high level of equity. That is, we found that funding from state sources is virtually unrelated to school district wealth. Property-wealthy districts tend to receive the same levels of state funding as do property-poor districts. However, local funding does not meet the same neutrality standard. The M&O levy authority mentioned above also affects the fiscal neutrality of local funding. Unlike the results of the dispersion analysis described above, however, district size is not a major factor affecting fiscal neutrality. We found little evidence that district size affects the relationship between wealth and funding from state, local, or federal sources.

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Appendix A

Measures of Horizontal and Vertical Equity

Horizontal Equity: Equality of Revenue Per Pupil—Researchers, Measures, and Availability of Benchmarks*

	Researcher, year, and state studied	**Range**	**Restricted Range**	**Federal Range Ratio**	**Coefficient of Variation**	**McLoone Index**	**Verstegen Index**	**Gini Coefficient**	**Theil Index**
1	Odden (2007 report, Wisconsin)	Calculated; no benchmark mentioned	Calculated; no benchmark mentioned	Calculated; no benchmark mentioned	Author considers this one of two "most often used"; benchmark: <= 10%	Author considers this one of two "most often used"; "Standard benchmark": => 95%	Calculated; no benchmark mentioned		
2	Gates (2005 doctoral dissertation, New Mexico)	Calculated; no benchmark mentioned	Calculated; no benchmark mentioned	Benchmark: .25	Calculated; no benchmark mentioned			Calculated; no benchmark mentioned	Mentioned; no benchmark mentioned
3	Ko (2006 journal article, Missouri)	Calculated; no benchmark mentioned	Calculated; no benchmark mentioned	Calculated; no benchmark mentioned	Calculated; no benchmark mentioned	Calculated; no benchmark mentioned		Calculated; no benchmark mentioned	
4	Parrish (1998 NCES publication, U.S.)		Calculated; no benchmark mentioned	Calculated; no benchmark mentioned	Calculated; no benchmark mentioned	Calculated; no benchmark mentioned		Calculated; no benchmark mentioned	

	Researcher, year, and state studied	Range	Restricted Range	Federal Range Ratio	Coefficient of Variation	McLoone Index	Verstegen Index	Gini Coefficient	Theil Index
5	Bingham (2007 article, Texas)				Calculated; cited Odden and Picus (2004) benchmark of .10 (max.)		Calculated; cited Odden and Picus (2004) benchmark of 1.00 (max.)	Calculated; cited Odden and Picus (2004) benchmark of .05 (max.)	
	Berne & Stiefel[a, b] (1984, book)[c]	Listed formula and provided example; no benchmark	Listed formula and provided example; no benchmark	Listed formula and provided example; no mentioned	Listed formula and provided example; no benchmark	Listed formula and provided example; no benchmark		Listed formula and provided example; no benchmark	Listed formula and provided example; no benchmark

* In addition to the indices listed in this table, Odden et al. (2007) and Berne and Stiefel (1984)demonstrated use of decile analysis in examining revenue equity; Odden also applied this method to district effort and wealth

[a] Berne and Stiefel mention and provide formulas for the following additional revenue-disparity measures: relative mean deviation, variance, standard deviation of logarithms, and Atkinson's index.

[b] Berne and Stiefel assume in their discussions of equity measures that "the issue of interest is the assessment of the equity of a state's school-finance system over time or the comparison of the equity of two or more states' school-finance systems at one or more points in time." (p. 18) They offer no benchmark ranges for any of the equity measures they discuss.

[c] Frequently cited; appears to be the first book-length compilation of methods and formulas for measuring revenue disparity in education finance, judging from the preface and first chapter; also examines "value judgments" inherent in measurement approaches

Vertical Equity: Fiscal Neutrality

	Study	Correlation or regression coefficient	Wealth Elasticity
1	Odden	Calculated; no benchmark mentioned	This is a "key fiscal neutrality statistic"; "equity benchmark": <= 10%
2	Berne & Stiefel[a, b] (1984, book)	Listed formulas for and provided examples of numerous regression approaches, ranging from simple to quadratic; no benchmarks mentioned	Listed formula and provided example