Funding the Formula Adequately in Oklahoma

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ABSTRACT

This report is a longevity, simulational study that looks at how the ratio of state support to local support effects the number of school districts that breaks the common school’s funding formula which in turns effects the equity of distribution to the common schools. After nearly two decades of adequately supporting the funding formula, Oklahoma has become the national leader in decreasing funding to common schools. This action has greatly reduced the equity of distribution to the poorer school districts in the state. This report looks at three areas: 1) the ratio between local support and state support, 2) the number of school districts that break the funding formula, and 3) two measures of equity. From these results, it was determined that 1) an important relationship exists between the ratio of the state support to local support and the Restricted Range for both the actual and simulation data, and 2) an important relationship exists between the number of districts that broke the formula in whole or in part and the Restricted Range for both the actual and simulation.
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Introduction

With the economic downturn in 2009 and the politics of “Choice”, the door was open for Oklahoma legislative leaders to direct funding endeavors away from the poor to the rich. Educational funding to the common schools was cut. As the economy began to recover, educational funding continued to be a secondary thought until the last two years when the teacher shortage became a major topic with over 800 teaching positions left open in Oklahoma and larger class sizes. One of the main reasons cited for the shortage has been the lack of salary (Doney, 2015). While the Oklahoma Constitution does not require adequacy or equity for common schools, it does require the state legislature to maintain a free public school system (Sec. XIII-I). The question becomes – Is Oklahoma continuing to maintain a system of free public schools when taxes are being cut and money is being diverted to charter and private schools?

This report is a longevity, simulation study from SY-1988 to SY-2013 that looks at how the ratio of state support to local support effects the number of school districts that breaks the common school’s funding formula which effects the equity of distribution to the common schools. After nearly two decades of adequately supporting the funding formula, Oklahoma has become the national leader in decreasing funding to common schools as reported in the Tulsa World on October 16, 2014. This action has greatly reduced the equity of distribution to the poorer school districts in the state. This report looks at three areas: 1) the ratio between local support and state support, 2) the number of school districts that break the funding formula, and 3) two measures of equity; correlation and restricted range (Berne, 1984).
Definitions

Fiscal neutrality: The wealth of the state, as a whole, must be behind every student (Monk, 1990). Such a situation occurs when there is little or no correlation between the ability of a district to raise revenue for education and the total amount of revenue raised from all sources. For this study, two measures of fiscal neutrality will be used.

First, fiscal neutrality is defined as an inverse relationship between district wealth and the amount of money that can be appropriated by the state to fund a district’s educational program (Berne, 1984). A perfect inverse relationship would be a correlation of a negative one (–1) which means that the state sends more money to the poorer districts than to the rich districts based upon the ability of a district to support its public schools.

Second, fiscal neutrality is defined as the difference in total generated dollar amounts per pupil between the highest and lowest funded districts after the top 10% and the bottom 10% of the districts have been removed (Restricted Range) from a rank ordered list of districts based on dollar amounts per pupil (Berne, 1984).

Per-pupil revenue: The total dollars available divided by the Weighted Average Daily Attendance of a school district.

WADM or Weighted Average Daily Membership: Weights given to students whose special circumstances require greater number of dollars to educate as well as weights given to districts based on specific criteria which require a district to expend more money to operate its educational program.

District Wealth (Local Ability): The product of the total net assessed valuation of a school district time 35 mills plus a district’s total State Dedicated funds per WADM and a 4 mill county levy.
Recapture: A method used in school funding formulas that creates negative state aid (Monk, 1990, p. 199). This provision requires districts whose local revenue is more than necessary to send the excess to the state for redistribution to other districts, otherwise the district receives no state aid and keeps the excess for their own district.

Four Mill County Levy: A levy assessed and collected on all property in a county that is redistributed to all school districts in that county according to their average daily attendance. (This levy was originally used as the means to finance the “separate schools” in Oklahoma.)

Breaking the Formula: Recapture is not utilized in the Oklahoma common school funding formula. Thus, if a district produces more tax revenue through its sources of income whereby the district exceeds the amount provided as a guarantee in any part of the formula, the district has broken the formula.

Methodology

Data bases were created from the Annual Report: Statistical Report on Oklahoma Schools and the State Department of Education for the school years of 1988 to 2013. From these data bases, only regular common schools were included where all pertinent data was available for a specific year. This data included the Total Net Valuation, Weighted Average Daily Membership, Local and County Revenue, State Dedicated funds, and State Appropriated funds. In addition to this, a simulated 4 Mill County Levy was calculated. (For all tax calculations in the simulations, the assumption employed was that all taxes were collected and paid on time.)

For the Actual parts of the study, the State Dedicated funds were used as part of the local ability of a district. The remainder of the local ability was determined by the actual collection of local funds as reported in the respective Annual Reports. These two components were added together to form the local ability of the district.
For the simulated parts of the study, the State Dedicated funds were used as part of the local ability of a district. The remainder of the local ability was determined by multiplying the Net Valuation by 35 mills (.035) and adding the calculation for the 4 Mill County Levies. These three components were added together to form the local ability of the district.

The total dollar amount of income for districts was determined by adding the local ability to the state appropriations. For the actual calculations, this included transportation dollars, other grants, and money raised through district foundations and gifts to a school district. For the simulation, transportation dollars were not calculated or used, nor were any monies from sources outside of the regular tax ability for a district for a particular year used as part of a district's ability to fund the school system.

A ratio of state to local dollars was determined by dividing the local ability into the total state appropriations. This ratio was calculated based upon the actual local income as reported in the Annual Reports. A simulation ratio was also determined from a recalculation of the funding formula based upon the pertinent information found in the Annual Report, but without the inclusion of the transportation section while using the same Foundation Aid and Incentive Aid factors for the given years of the study.

The number of schools who broke the funding formula for each year was determined by calculating the funding formula for each district using the pertinent data available from the Annual Report of each of the given years. Oklahoma uses an equalizing formula, but does not employ recapture. If a district produces more money in its local tax collections in a particular part of the formula that exceeds the money provided by the state, the calculation for that area becomes zero. Thus, the formula for that part has been broken, and the district does not receive any money from that portion of the formula.
Two tests of equity were performed for each area of the study. A Pearson r was calculated to determine one of the levels of fiscal neutrality. Further, the Pearson $r_{xy}$, correlation coefficient, was changed to a Fisher’s $z$ ($z^*$) statistic using the formula $z^* = \frac{1}{2} [\log e (1+r) – \log e(1-r)]$ (Edwards, 1954). This change was made to prepare data for a test of importance of the r’s. While a test of significance is not required for this study. According to Horowitz (1974), a test of significance is used with samples as a means of drawing inferences about the total population. In this study, the entire population was included. Thus, any differences are significant. Further, a calculation of a Z score was performed by dividing the Fisher’s $z$ by the standard error ($1/\sqrt{N-3}$) to determine if any differences are important which will give strength to the findings of this study in the area of fiscal neutrality. For purposes of this study, importance is defined at the .05 level as a Z score of 1.96 and at a .01 level as a Z score of 2.58.

A Restricted Range was also determined. This method rank orders the income per student for each district. Each district's per pupil income was determined by taking the sum of the simulated local sources of revenue, State Dedicated funds, and the simulated state aid, then dividing the total by the WADM of the district. To eliminate the extremes, which tends to exaggerate differences, the top and bottom 10% of the districts were removed from the listing. The differences in the income per student of the top and bottom of the middle 80% of the districts were calculated to determine the Restricted Range.

*Note:* This method of determining the middle 80 percent of the districts takes into account, typically, between 85% and 95% of all the WADM in the state for each time the Restricted Range is calculated.

A second simulation was calculated, once the districts who broke the formula in part or in whole were determined. The districts who broke the funding formula in whole or part were
removed from the body of the study and both a correlation coefficient and a Restrict Range were
performed to determine the effectiveness of the funding formula.

From this point, it was hypothesized that 1) an important relationship exists between the
ratio of the state support to local support and the Restricted Range for both the actual and
simulation data, and 2) an important relationship exists between the number of districts that
broke the formula in whole or in part and the Restricted Range for both the actual and
simulation.

Results

The following chart provides the summary of the equity measure calculations that were
gleaned from the Oklahoma Annual Reports from SY-1988 to SY-2013.

| Year | No. Dists | ACTUAL | | | | SIMULATION 1 | | | | SIMULATION 2 | | | | Broke Form. |
|------|----------|--------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|      |          | r      | RR              | Ratio St/Dist   | r               | RR              | Ratio St/Dist   | r               | RR              |
| 1988 | 611      | -0.679 | 687             | 1.101           | -0.806          | 299.58          | 0.923           | -0.952          | 169.64          | 1.036           | 126             |
| 1989 | 604      | -0.752 | 631             | 1.187           | -0.893          | 303.10          | 0.963           | -0.950          | 188.71          | 1.074           | 130             |
| 1990 | 593      | -0.769 | 572             | 1.213           | -0.891          | 305.14          | 1.035           | -0.946          | 190.36          | 1.150           | 113             |
| 1991 | 578      | -0.882 | 320             | 1.468           | -0.954          | 12.27           | 1.563           | -0.999          | 10.32           | 1.605           | 26              |
| 1992 | 569      | -0.876 | 309             | 1.564           | -0.954          | 11.14           | 1.698           | -0.999          | 10.49           | 1.724           | 15              |
| 1993 | 554      | -0.831 | 330             | 1.721           | -0.954          | 11.26           | 1.798           | -0.999          | 10.24           | 1.838           | 19              |
| 1994 | 551      | -0.349 | 613             | 1.793           | -0.669          | 18.69           | 1.778           | -0.999          | 10.33           | 1.867           | 45              |
| 1995 | 550      | -0.925 | 208             | 1.853           | -0.954          | 11.43           | 1.846           | -0.999          | 10.71           | 1.875           | 14              |
| 1996 | 549      | -0.856 | 306             | 1.828           | -0.905          | 11.68           | 1.819           | -1.000          | 10.88           | 1.841           | 12              |
| 1997 | 548      | -0.792 | 281             | 1.803           | -0.861          | 13.40           | 1.774           | -0.997          | 12.24           | 1.800           | 14              |
| 1998 | 547      | -0.747 | 224             | 1.837           | -0.825          | 13.19           | 1.793           | -0.997          | 12.23           | 1.816           | 12              |
| 1999 | 544      | -0.815 | 272             | 1.858           | -0.843          | 13.35           | 1.790           | -1.000          | 12.39           | 1.808           | 11              |
| 2000 | 544      | -0.847 | 264             | 1.741           | -0.851          | 13.63           | 1.689           | -1.000          | 11.72           | 1.713           | 14              |
| 2001 | 543      | -0.910 | 364             | 1.866           | -0.933          | 15.83           | 1.581           | -1.000          | 12.46           | 1.628           | 27              |
| 2002 | 542      | -0.902 | 310             | 1.797           | -0.959          | 15.18           | 1.629           | -1.000          | 13.55           | 1.651           | 12              |
| 2003 | 541      | -0.892 | 345             | 1.671           | -0.934          | 17.37           | 1.379           | -1.000          | 13.46           | 1.423           | 29              |
| 2004 | 541      | -0.878 | 267             | 1.694           | -0.930          | 18.04           | 1.397           | -1.000          | 13.48           | 1.462           | 34              |
| 2005 | 540      | -0.864 | 318             | 1.664           | -0.895          | 19.52           | 1.327           | -1.000          | 14.44           | 1.929           | 41              |
| 2006 | 540      | -0.870 | 363             | 1.407           | -0.881          | 21.16           | 1.407           | -1.000          | 14.90           | 2.065           | 47              |
| 2007 | 539      | -0.841 | 366             | 1.716           | -0.879          | 21.37           | 1.392           | -1.000          | 9.83            | 1.496           | 42              |
| 2008 | 533      | -0.845 | 361             | 1.708           | -0.877          | 23.16           | 1.473           | -1.000          | 17.40           | 2.501           | 43              |
| 2009 | 532      | -0.841 | 422             | 1.703           | -0.881          | 30.69           | 1.406           | -1.000          | 19.11           | 2.208           | 50              |
The following graph depicts the equity measures of the Pearson r correlations for SY-1988 to SY-2013 for the school districts in Oklahoma.

As expected, Simulation 1 out preformed the Actual, because the Transportation grant is not distributed based on a WADM measure, but on Average Daily Haul and the density of the population. Also, the local ability is not only about the collection of taxes based on their ad valorem, but can include gifts, school foundation giving, past years tax collections as well as other income from private, state, and/or federal grants and awards.
In order to determine how well the actual school funding formula works requires that sources other than those included in the formula itself be eliminated. The Simulation 1 line provides that information, and as expected, consistently outperformed the Actual correlation. The surprise of this exercise was found in Simulation 2 in which the districts that broke the funding formula, in whole or in part, were excluded from the calculations. Except for the first three years of the study, in which the Foundation Aid section was calculated on ADM instead of WADM, the correlation coefficient was very consistent at -0.999 or higher. Even in the first three years of the study, the Pearson r was higher than either the Actual or Simulation 1 calculations.

Graph 2 shows the Restricted Range for the three scenarios.

Graph 2:

Of interest are the first three years and the last two years. The first three years were before the Oklahoma Funding Formula utilized WADM in the Foundation Aid section. The last two years depicts the reduction in state support for the formula. (This will be demonstrated more
completely when the Restricted Range is compared to the ratio of state to local support in the funding formula.)

Graph 3 demonstrates the closeness of the Restricted Ranges of the two simulations when the extremes were eliminated; SY-1988 to 1990 and SY 2012-2013. Graph 4 is a demonstration of these same Restricted Ranges when they are calculated as a portion of the total dollars available for a given year. Those calculations were made by dividing the total money available into the Restricted Range and then multiplying it by 1 billion. These calculations place the Restricted Ranges on an equal footing so as to determine a trend; whereas if not calculated, the Restricted Range will tend upwards as the total dollar amount inserted into the funding formula increases. This calculation stabilizes the Restricted Range and provides an opportunity to see if the equity is increasing or decreasing. Notice how the lines tend to flatten out in Graph 4 compared to Graph 3. (From 1988 to 2013, the dollar amounts for the simulations increased by over $2 billion, the actual dollar amount by over $3.2 billion, and the WADM increased by nearly 300,000 and over 77,000 for ADM. (Note: $1 in 1988 would be equivalent to $1.97 in 2013.)

Graph 3

![Restricted Range](image-url)
The following chart provides the information obtained from the calculations of the relationships between the ratio of state to district support and the Restricted Range calculations.

**Chart 2: Correlation of Ratio and Restricted Range**

<table>
<thead>
<tr>
<th></th>
<th>Actual</th>
<th>Simulation 1</th>
<th>Simulation 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>(r)</td>
<td>-0.798</td>
<td>-0.766</td>
<td>-0.673</td>
</tr>
<tr>
<td>Fisher’s (z^*)</td>
<td>-1.094</td>
<td>-1.011</td>
<td>-0.816</td>
</tr>
<tr>
<td>(Z) score</td>
<td>-5.246**</td>
<td>-4.846**</td>
<td>-3.915**</td>
</tr>
</tbody>
</table>

N = 26, Standard error = 0.209.

In all three calculations, the \(Z\) score was greater than 2.58. Thus, each met the test of being importance at the .01 level.

The following graph illustrates the relationship between the Ratio and the Restricted Range for the Actual calculations. Notice the curvature of the two values. As the Ratio increased then decreased corresponds to the decrease and increase of the Restricted Range.
Graph 5

(In order to place and compare the values, the ratio was multiplied by 100 and the Restricted Range was divided by 10.)

Graph 6 demonstrates the relationship that occurred in the first simulation. When the ratio went below about $1.50 to $1.00, the Restricted Range expanded rather rapidly beginning in 2003.

Graph 6

(The Ratio X 10, Actual Restricted Range.)
Graph 7 provides an insight into what happens with the Restricted Range when enough money is put into the formula where all schools receive some state aid by way of the funding formula. If the first three years are removed from the graph, the Pearson r goes to a positive coefficient of $0.141$ and the Z score is $0.681$ which is displayed in the graph. There does not seem to be an important correlation between the ratio and the Restricted Range when no school districts break the funding formula.

**Graph 7**

![Graph 7](image)

Chart 3 provides the calculations for the relationships that exists between the Restricted Range and the number of districts that broke the funding formula in whole or part.

**Chart 3: Correlation of Restricted Range and Broken Formulas**

<table>
<thead>
<tr>
<th></th>
<th>Actual</th>
<th>Simulation 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>$r =$</td>
<td>0.441</td>
<td>0.935</td>
</tr>
<tr>
<td>Fisher's $z^*$</td>
<td>0.473</td>
<td>1.698</td>
</tr>
<tr>
<td>Z score</td>
<td>2.271*</td>
<td>8.144**</td>
</tr>
</tbody>
</table>

N = 26, Standard error = 0.209

The Z scores in the results were important at least at the .05 level (1.96)*. The Z score of the simulation indicate that it was important at the .01 level (2.58)**.
Graph 8 provides a picture of how closely related the number of districts who broke the funding formula is to the Restricted Range for each of the years.

**Graph 8 - Actual**

(Broke figure x 10.)

Graph 9 also depicts the closeness of the Restricted Range to the number of districts that broke the formula during a given year.

**Graph 9 - Simulation**
A look back to Graph 6 reveals that 2008 was the last high point of the ratio of State to local support at a $1.473 to $1.00 as shown in the simulation. If the state was to maintain a 2008 level of effort to support the public schools of Oklahoma, the following chart demonstrates what the amount of additional money the state would have had to have provided.

**Chart 4: Differences in Yearly Funding at 2008 Levels**

<table>
<thead>
<tr>
<th>Year</th>
<th>Ratio</th>
<th>Local Support</th>
<th>State Support</th>
<th>Difference to 2008 Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>1.473</td>
<td>1,297,975,596</td>
<td>1,912,113,551</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>1.406</td>
<td>1,373,862,280</td>
<td>1,931,410,452</td>
<td>-92,288,686</td>
</tr>
<tr>
<td>2010</td>
<td>1.343</td>
<td>1,390,185,331</td>
<td>1,867,321,665</td>
<td>-180,421,328</td>
</tr>
<tr>
<td>2011</td>
<td>1.237</td>
<td>1,448,153,135</td>
<td>1,791,476,455</td>
<td>-341,653,128</td>
</tr>
<tr>
<td>2012</td>
<td>1.134</td>
<td>1,507,998,887</td>
<td>1,710,087,236</td>
<td>-511,195,125</td>
</tr>
<tr>
<td>2013</td>
<td>1.115</td>
<td>1,538,876,639</td>
<td>1,716,051,063</td>
<td>-550,714,226</td>
</tr>
</tbody>
</table>

It is evident that the local tax base was growing at about a yearly rate of 3.5% while the state officials were reducing support to public schools by about a 2.1% yearly rate. During this five year period, with a lack of funding and a teacher shortage, a question of the wisdom of tax cuts has been raised.

**Conclusions & Recommendations**

1. It is evident that the Oklahoma Funding Formula is an equalizing formula that when funded adequately provides a very high level of equity to all of the school districts. As one looks at the difference in Chart 1, from 1991 to 2005, the Restricted Range remained under $20 in the simulation.

2. Adequately funding the formula does not mean the adequate funding of the educational system in Oklahoma. It seems that when the funding formula receives at least $1.50 from the state for every $1.00 in local support, the funding formula provides a manageable level of equity across the state as indicated in Graph 6. When the level goes below the $1.50 threshold, the inequity starts to increase so that not all the children in the state have an equal opportunity for an
education. Starting in 2003, the Restricted Range of the Simulation became larger and larger, jumping to over $70 in 2012 and over $140 in 2013.

3. The most significant indicator of equity revolves around the number of districts that break the formula in whole or part. When viewing Chart 1 and comparing the number of school districts to the number of districts who broke the formula, nearly 10% broke the formula in the last five years of the study. When viewing nearly every graph, 2003 is when inequity started to grow.

4. The first and foremost recommendation to the state of Oklahoma, if the desire is to provide equity of opportunity, is to fund the formula with at least 60 percent of the total funds placed in the formula, which would be $1.50 to every $1.00 of local support. This may require several actions involving the tax structure in Oklahoma from a moratorium on income tax cuts to the elimination of some tax incentives to an increase in the diversification of the tax structure.

5. While the following is not recommended per se, if resources cannot be found elsewhere or the desire is to never raise any tax for education, one way to provide an increase to the state side of the formula, which would require a change in the Oklahoma Constitution, would be to move the State Dedicated Funds to the state to distribute through the formula instead of a subtraction in the Foundation Aid section of the formula.

References


OK Const., Sec. XIII-1


Attachment:

**OKLAHOMA STATE AID FORMULA**

**FOUNDATION AID**

Weighted ADM \( \times \) Foundation Aid Factor \( = \) \( (1) \)

**SUBTRACT CHARGEABLE INCOME**

Previous year (In January; Current Year)

Adjusted Valuation \( \times \) 15 Mills: \( \times \) 0.015* =

*Plus increased millage because of personal property tax adjustment

75\% \ of \ County \ 4-Mill \ Levy \( \times \) 0.75 =

School Land
Gross Production (State Dedicated Funds) =

Motor Vehicle Collections
R.E.A. Tax

**TOTAL CHARABLES**

\( \text{TOTAL} = \) \( (2) \)

**FOUNDATION AID TOTAL**  \( \text{(Amount [1] less Amount [2])} = \) \( (3) \)

**TRANSPORTATION:**

(Average Daily Haul \( \times \) Per Capita \( \times \) Transportation Factor)

\( \times \) \( \times \) \( \text{TOTAL} = \) \( (4) \)

**SALARY INCENTIVE AID**

A. Incentive Aid Factor \( \times \) \( = \)

(Weighted ADM)

B. Adjusted District Assessed Valuation / 1000 =

C. Step A (-) Step B =

Step C \( \times \) 20 Mills = SALARY INCENTIVE AID = \( (5) \)

**TOTAL STATE AID** \( \text{(Amounts 3 + 4 + 5)} = \) \( \)