FUNDING GAPS 2015

TECHNICAL APPENDIX

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Introduction and Overview of Methodology

Funding Gaps 2015 contains an analysis of funding disparities between the highest and lowest poverty school districts, as well as districts serving the most and the fewest students of color. The analysis only considers disparities in state and local revenues, as federal revenues are intended to provide supplemental services to specific groups of students — such as students in poverty, English learners, and students with disabilities. The only federal dollars included in our analysis are those that are specifically meant to replace state and local funds: Impact Aid and Indian Education Aid.

Our analysis includes a total of 13,300 regular public school districts that serve 48 million students. Because Census school funding data — the primary data source in our analysis — does not include charter schools operated by non-governmental entities, the vast majority of charters are excluded from our analysis.

Districts are classified as high-poverty and low-poverty based on the percent of students living below the poverty line in 2012. They are classified as serving the most or the fewest students of color based on 2012 student enrollment data by ethnicity. Average state and local revenues per student are calculated for each district using the U.S. Census Bureau's Public Elementary and Secondary Education Finance Data. Our revenue estimates are based on a three-year average of district financial information (for fiscal years 2010-12) to minimize the impact of such year-to-year revenue fluctuations as those arising from capital investments. State and local revenues per student are adjusted for geographic differences in labor market costs, as well as for inflation.

We measure funding disparities by calculating the differences in state and local revenues per student between groups of districts serving the most and the fewest students in poverty, as well as between groups of districts serving the most and the fewest students of color.

This technical appendix describes our data sources and methodology in detail.

Data Sources

The following is a list of data sources and variables used in this analysis.

District Financial Data: U.S. Census Bureau, "Public Elementary and Secondary Education Finance Data, 2010-2012," http://www.census.gov/govs/school/ (Downloaded June 2014).

These files contain the results of Census' F33 survey administered to all public elementary and secondary school systems annually since 1977. Charter districts operated by entities that are not governmental bodies are not included in these files.

The analysis uses the following variables from these files:

- School-level code (SCHLEV)
- Fall membership for each academic year (V33)
- Total revenue from state sources, in thousands of dollars (TSTREV)
- Total revenue from local sources, in thousands of dollars (TLOCREV)
- Impact Aid (B10)
- Indian Education Aid (B12)

District Enrollment Data: National Center for Education Statistics, "Common Core of Data, Local Education Agency (School District) Universe Survey Data, 2012," http://nces.ed.gov/ccd/pubagency.asp (Downloaded June 2014).

This dataset contains a listing of every education agency in the country that provides public elementary/secondary education or educational support services, complete with information on location, type of district, student demographics, and more.

The analysis uses the following variables from this dataset:

- Education Agency Type Code (TYPE)
- American Indian/Alaskan Native students (AM)
- Asian students (ASIAN)

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MARCH 2015

- Hispanic students (HISP)
- Black, non-Hispanic students (BLACK)
- White, non-Hispanic students (WHITE)
- Hawaiian Native/Pacific Islander students (PACIFIC)
- Calculated agency race/ethnicity membership (TOTETH)

District Poverty Data: U.S. Census Bureau, "Small Area Income and Poverty Estimates by School District, 2012," http://www.census.gov/did/www/saipe/data/schools/data/index.html (Downloaded June 2014).

This dataset contains estimates of the overall number of 5- to 17-year-olds, as well as the number of 5- to 17-year-olds in poverty in each school district.

The analysis uses the following variables from this dataset:

- Number of children in district, ages 5-17 (CPOP517)
- Number of children in district, ages 5-17, in poverty (CPOP517POV)

Geographic Cost of Living Adjustment Data: Lori Taylor, The Bush School of Government and Public Service at Texas A&M University, "Comparable Wage Index Data: Extending the NCES CWI," http://bush.tamu.edu/research/faculty/Taylor_CWI/ (Downloaded June 2014).

This index measures variations in the salaries of college graduates (excluding educators) to estimate the geographic differences in labor market costs outside of school district control. The Comparable Wage Index (CWI) adjustment allows for better comparison of finances across districts, states, and the nation.

The analysis uses the following variables from this file:

- District Extended Comparable Wage Index (DISTRICT_CWI)
- State Extended Comparable Wage Index Cost adjustment for state (STATE_CWI)
- National Extended Comparable Wage Index Cost adjustment for nation (NATIONAL_CWI)

Inflation Data: Bureau of Labor Statistics, "Consumer Price Index — All Urban Consumers, U.S. City Average," http://data.bls.gov/pdq/querytool.jsp?survey=cu, (Downloaded June 2014).

This index gives data on changes in the prices paid by urban consumers for a representative basket of goods and services, allowing for comparisons of financial values at different points in time. The analysis uses the annual CPI for all urban consumers for 2010, 2011, and 2012.

Dataset Construction

To perform our analysis, we began with the 2012 Census financial file to determine the sample of districts to be included in the analysis (N=14,482). This file was merged with the 2010 and 2011 Census financial files, district enrollment data, district poverty data, and CWI data using the National Center for Education Statistics district identification numbers.

Then, the following types of districts were removed from our dataset, as they were outside the scope of the analysis or were missing key data points:

1. Districts that were not classified as "regular" elementary, middle, or high school districts (N=1141):
   a. Districts categorized in the Census finance file as having a School Level Code (SCHLEV) equal to Vocational or Special Education School System (05), Nonoperating School System (06), or Educational Service Agency (07). These districts serve special populations of students, are no longer functional, or are funded in unique ways that put them beyond the scope of this analysis.
   b. Districts that were classified as Type "Other" (Type 8) in the Common Core of Data (CCD) file were removed from the sample, as they also serve special populations of students. Districts in Arizona and Minnesota that are classified as Regional Education Services Agencies (Type 4) in the CCD file were also removed.
   c. Districts that only operate charter schools (Type 7 in the CCD file) were excluded since the majority of charter districts are not included in the Census finance data collection.

2. Districts missing key financial or enrollment data needed for the analysis (N=17):
   a. A small number of districts that had no student enrollment in 2012.
   b. Districts with no state or local revenues, the dependent variables in the analysis.

3. Districts that had revenue and enrollment data, but were missing key demographic information needed for the analysis (N=24):
   a. Districts missing ethnicity data in the CCD file.
   b. Districts missing poverty data in the Small Area Income and Poverty Estimates (SAIPE) file.[1]

In total, our analysis captures about 92 percent of districts, 99 percent of students, and 97 percent of state and local revenues reported in the Census Public Elementary and Secondary Finance Data (see Table 1).

[1] An additional N=22 districts that were missing poverty data were manually matched by comparing district names in both files.

Table 1: Counts of Districts, Students, and Local and State Revenues Captured in Analysis, by State

(Gray shading indicates that our analysis captures less than 95 percent of students or revenues. See notes at bottom of table for further details.)

State	Total Number of Districts, Students, and Dollars Captured in Analysis			Totals in Analysis as Percent of Totals in the Census Public Elementary and Secondary Finance Data		
	Districts	Students	State and Local Revenues	Districts	Students	State and Local Revenues
AK	53	130,771	$2,031,397	100.0%	100.0%	100.0%
AL	132	744,621	$6,346,995	100.0%	100.0%	100.0%
AR	239	475,671	$4,423,444	94.1%	100.0%	98.2%
AZ	207	940,291	$6,767,731	86.6%	99.7%	98.3%
CA*	943	6,112,068	$55,438,794	88.5%	98.5%	92.1%
CO	178	843,120	$7,856,866	90.8%	100.0%	99.3%
CT	166	522,451	$9,224,272	95.4%	100.0%	96.5%
DE*	16	111,431	$1,517,449	84.2%	93.9%	90.8%
FL	67	2,658,559	$21,070,945	100.0%	100.0%	100.0%
GA	179	1,668,446	$15,625,470	91.3%	100.0%	99.5%
HI	1	182,706	$2,216,310	100.0%	100.0%	100.0%
IA	351	495,870	$5,719,540	97.5%	100.0%	99.4%
ID	114	267,556	$1,714,172	98.3%	100.0%	99.9%
IL	862	2,071,481	$26,548,722	86.2%	100.0%	96.6%
IN	290	1,006,627	$11,190,773	91.8%	100.0%	99.0%
KS	286	485,591	$5,203,568	100.0%	100.0%	100.0%
KY	174	681,827	$6,209,198	100.0%	100.0%	100.0%
LA	69	658,374	$6,878,176	98.6%	98.9%	99.0%
MA	297	894,526	$14,200,476	89.7%	96.9%	96.1%
MD	24	853,778	$12,893,277	100.0%	100.0%	100.0%
ME	175	184,046	$2,302,159	72.0%	98.3%	97.1%
MI*	547	1,420,560	$14,669,927	90.3%	99.9%	87.6%
MN	335	797,718	$9,522,528	83.5%	99.7%	95.8%
MO	520	888,854	$8,695,478	99.6%	99.5%	96.3%
MS	149	489,569	$3,674,098	98.0%	99.8%	99.8%
MT	414	142,237	$1,402,987	95.2%	100.0%	99.2%
NC	115	1,462,172	$10,957,644	100.0%	100.0%	100.0%
ND	176	97,436	$1,146,621	83.8%	99.9%	96.7%
NE	249	300,941	$3,283,803	94.0%	100.0%	96.6%
NH	174	190,778	$2,775,978	100.0%	100.0%	100.0%
NJ*	546	1,300,795	$24,759,985	92.5%	97.8%	94.5%
NM	89	328,690	$2,986,977	100.0%	100.0%	100.0%
NV	17	428,526	$3,650,397	100.0%	100.0%	100.0%
NY	679	2,640,461	$55,016,838	99.4%	99.9%	99.6%
OH*	611	1,630,865	$19,118,872	82.8%	100.0%	92.0%
OK	522	664,200	$5,047,424	98.7%	100.0%	99.9%
OR*	183	564,006	$5,179,412	84.7%	99.6%	92.9%
PA*	499	1,644,759	$23,803,890	82.9%	100.0%	92.5%
RI	36	137,400	$2,003,596	100.0%	100.0%	100.0%
SC	83	715,744	$7,011,877	88.3%	100.0%	99.6%
SD	152	127,726	$1,086,108	95.0%	100.0%	100.0%
TN	135	998,590	$7,720,963	99.3%	100.0%	99.9%
TX	1,028	4,840,758	$43,500,684	97.8%	99.9%	99.2%
UT	41	553,873	$3,790,658	100.0%	100.0%	100.0%
VA	132	1,257,332	$13,500,630	98.5%	100.0%	99.5%
VT*	223	86,076	$1,426,233	68.2%	97.8%	87.5%
WA	295	1,044,856	$10,752,494	97.0%	100.0%	98.7%
WI	424	863,314	$10,212,146	99.3%	100.0%	99.8%
WV	55	282,088	$3,505,425	87.3%	100.0%	99.1%
WY	48	89,994	$1,520,255	100.0%	100.0%	100.0%
USA	13,300	47,980,129	$527,103,662	91.8%	99.6%	96.9%

*CA: Dropped districts include a number of special education districts with substantial revenues, as well as Joint Power Associations (JPAs), which report state and local revenues but no student enrollment.

*DE: All dropped districts are regional vocational school districts.

*MI: The majority of dropped districts are Intermediate Districts, which report state and local revenues but no student enrollment.

*OH: The majority of dropped districts are Educational Service Centers and joint vocational districts, which report state and local revenues but no student enrollment.

*OR: The majority of dropped districts are Educational Service Districts, which report state and local revenues but no student enrollment.

*PA: Dropped districts include a number of Intermediate School Units and vocational districts that report state and local revenues but no student enrollment.

*VT: The majority of dropped districts are Supervisory Unions and non-operational school districts, which report state and local revenues but no student enrollment.

Additional Data Notes

We addressed several additional data issues prior to performing any calculations:

1. Missing district-level CWI data: When a district did not have district-level CWI data, we replaced it with state-level CWI data.

2. Matching New York City financial and demographic data: New York City financial data are reported as a single, citywide record. The district's student enrollment by ethnicity data are reported at the geographic district level. To create one district record, we aggregated the enrollment by ethnicity data for the 32 geographic districts to match the financial record used in our analysis.

3. Matching financial and demographic data for five California districts: Financial data for five California districts are reported at the unified (secondary and elementary combined) level, while enrollment by ethnicity is reported as two separate records. We aggregated the enrollment data for the elementary and secondary levels to their respective unified district level.

Calculating District Revenues

Our analysis is based on three-year averages of state and local revenues per student for every district, adjusted for geographic cost differences and inflation. We estimate total district revenues by multiplying the three-year average by 2012 district enrollment to approximate the total resources available to the district given the number of students served in 2012.

This section describes the district-level, three-year average calculations. Note that we create three revenue estimates for each district — one for within-state funding gap analyses (using state CWI and adjusting for inflation), one for nationwide analyses (using the national CWI and adjusting for inflation), and one that includes state revenue only (using state CWI and adjusting for inflation).

Calculating district revenues for the within-state analysis

1. **Calculate adjusted district-level revenues (ADJREV) for geographic cost differences and inflation.**

   To account for the fact that the costs of providing education services vary from one part of a state to another, we adjust district revenues for school years 2010-2012 using the CWI for calendar years 2009-2011, respectively. When calculating total revenue for a district, we include state and local funds, as well as dollars for Impact Aid and Indian Education Aid as they are meant to replace local funds:

$$ADJREV_{YearXDistrictY}=[(TSTREV_{YearXDistrictY}+TLOCREV_{YearXDistrictY}+B10_{YearXDistrictY}+B12_{YearXDistrictY})/DISTRICT\_CWI_{YearXDistrictY})*STATE\_CWI_{YearXDistrictY}]$$

   Next, the 2010 and 2011 ADJREV values were inflation-adjusted (INFREV) into 2012 dollar values using their respective CPI values:[2]

$$2010: INFREV_{2010DistrictY}=ADJREV_{2010DistrictY}*(CPI2012/CPI2010)$$

$$2011: INFREV_{2011DistrictY}=ADJREV_{2011DistrictY}*(CPI2012/CPI2011)$$

$$2012: INFREV_{2012DistrictY}=ADJREV_{2012DistrictY}$$

2. **Calculate per-student state and local revenues for each district (ADRVPST).**

   We calculated per-student revenue amounts by dividing the inflation-adjusted value for every district by that district's total fall membership for each year of the analysis, as follows:

$$ADRVPST_{YearXDistrictY}=INFREV_{YearXDistrictY}/V33_{YearXDistrictY}$$

3. **Calculate a three-year average, per-student revenue (AVGRVPST).**

   Before calculating a three-year average of state and local revenues per student, we weighted each year's revenues by the number of students enrolled in the district that year so that no one year's finances had an effect on the three-year average beyond that of its enrollment.

   Weights were calculated by dividing each year's enrollment by the sum of all three years' enrollments:

[2] The CPI values for 2010, 2011, and 2012 are 218.056, 224.939, and 229.594, respectively.

$$WEIGHT10_{DistrictY}=V33_{2010DistrictY}/(V33_{2010DistrictY}+V33_{2011DistrictY}+V33_{2012DistrictY})$$

$$WEIGHT11_{DistrictY}=V33_{2011DistrictY}/(V33_{2010DistrictY}+V33_{2011DistrictY}+V33_{2012DistrictY})$$

$$WEIGHT12_{DistrictY}=V33_{2012DistrictY}/(V33_{2010DistrictY}+V33_{2011DistrictY}+V33_{2012DistrictY})$$

Three-year average state and local revenues per student were then calculated:

$$AVGRVPST_{DistrictY}=(ADRVPST_{2010DistrictY}*WEIGHT10_{DistrictY})+(ADRVPST_{2011DistrictY}*WEIGHT11_{DistrictY})+(ADRVPST_{2012DistrictY}*WEIGHT12_{DistrictY})$$

4. **Calculate total revenues for each district (STSSPEND).**

   We calculated total revenues for each district by multiplying the average revenue per student by 2012 enrollment, as follows:

$$STSSPEND_{DistrictY}=AVGRVPST_{DistrictY}*V33_{2012DistrictY}$$

Calculating revenue amounts for additional analyses

1. **Calculate adjusted district-level revenues for national analysis (ADJREVNAT).**

   To perform the national analysis in which we compare the highest poverty districts with the lowest poverty districts across the country — not just within individual states — we repeated steps one to four above, simply substituting the national CWI value for the state CWI value in step one:

$$ADJREVNAT_{YearX}=[(TSTREV_{YearXDistrictY}+TLOCREV_{YearXDistrictY}+B10_{YearXDistrictY}+B12_{YearXDistrictY})/DISTRICT\_CWI_{YearXDistrictY})*NATIONAL\_CWI_{YearX}]$$

2. **Calculate adjusted district-level revenues for state revenue analysis (ADJREVST).**

   To perform the state revenue analysis, we repeated steps one to four, excluding TLOCREV, B10, and B12 in step one:

$$ADJREVST_{YearX}=[(TSTREV_{YearXDistrictY})/DISTRICT\_CWI_{YearXDistrictY})*STATE\_CWI_{YearXDistrictY}]$$

Calculating Gaps Between Revenues of the Highest and Lowest Poverty Districts

To calculate funding gaps between the highest and lowest poverty districts, we assigned districts to quartiles based on poverty rates, ensuring that each quartile had approximately the same number of students, rather than the same number of districts. We then compared the average, per-student revenues for the highest and lowest poverty quartiles.

In the state-by-state analysis, districts were sorted by poverty rate and assigned to quartiles within each state. For the national analysis, districts were sorted by poverty rate, regardless of state, and assigned to nationwide quartiles.

All states were included in the national poverty gap analysis, but a number were excluded from the state-by-state analysis. Hawaii was excluded because it is one district. Alaska and Nevada were also excluded because their student populations are heavily concentrated in certain districts and thus, could not be sorted into quartiles. Because so many New York students are concentrated in New York City, we sorted districts in that state into two halves, as opposed to four quartiles.

Calculating Gaps Between the Highest and Lowest Poverty Districts in Each State

1. **Calculate the percent of children in poverty for each district (PCTPOV).**

   We divided the number of children ages 5 to 17 in the district living in poverty by the total number of children ages 5 to 17 in the district from the Small Area Income and Poverty Estimates file:

$$PCTPOV_{DistrictY}=CPOP517POV_{DistrictY}/CPOP517_{DistrictY}$$

2. **Sort districts into quartiles.**

   We ranked districts from the highest poverty rate to the lowest poverty rate in each state, and then divided them into four quartiles so that each quartile had approximately the same number of students. Quartile 1 has the districts with the highest poverty rates in the state, while Quartile 4 has the districts with the lowest poverty rates in the state.

3. **Calculate average, per-student revenues for each quartile (TOTREVST).**

   Per-student revenues by quartile were calculated as follows:

$$TOTALREV_{QuartX}=\sum STSSPEND_{QuartX}$$

$$TOTSTUDENTS_{QuartX}=\sum V332012_{QuartX}$$

$$TOTREVST_{QuartX}=TOTALREV_{QuartX}/TOTSTUDENTS_{QuartX}$$

4. **Calculate funding gap between the highest and lowest poverty quartile (GAP).**

   We subtracted the per-student funding value of the lowest poverty quartile from that of the highest poverty quartile:

$$GAP=TOTREVST_{Quart1}-TOTREVST_{Quart4}$$

   We then calculated the gap as a percentage of the per-student funding value in the lowest poverty quartile:

$$PERCENTGAP=GAP/TOTREVST_{Quart4}$$

Calculating Gaps Between the Highest and Lowest Poverty Districts Nationwide

To calculate the funding gap between the highest and lowest poverty districts in the nation, we repeated steps two to four on page 6, using a single ranking of every district in the country based on the percentage of students in poverty, regardless of state. For this analysis, we also used district revenues adjusted for geographic cost differences using the national, rather than the state, CWI values.

Calculating Gaps in State Revenues Between the Highest and Lowest Poverty Districts in Each State

To calculate the funding gaps in state revenues, we repeated steps two to four on page 6, but using state revenues only.

Accounting for the Additional Needs of Students in Poverty

To account for the fact that students in poverty may require additional support to succeed in school, we re-ran the poverty gap analyses (both within state and national) with the assumption that it costs a district 40 percent more to educate a student in poverty than a student not in poverty. To do this, we counted every student in poverty as 1.4 students, and every student not in poverty as one student. The total weighted number of students (V33WTD) in each district was calculated as follows:

$$V33WTD_{2012DistrictY}=(PCTPOV_{DistrictY}*V33_{2012DistrictY}*0.4)+V33_{2012DistrictY}$$

District quartile assignments did not change, but we re-calculated per-student revenues for each quartile using the sum of V33WTD as the denominator. We then compared average, per-student revenues for the highest and the lowest poverty quartiles, as described in step four on page 6.

Calculating Gaps Between Revenues of Districts Serving the Most and the Fewest Students of Color

In addition to poverty gaps, we also examined gaps between districts serving the most students of color and those serving the fewest both within states and nationwide. To run this analysis, we used the same dataset and methodology as used in the poverty gap analysis, except districts were sorted by the percentage of students of color they serve, not the percentage of students in poverty. The percentage of students of color was calculated by dividing the total number of African American, Hispanic, and Native American students in a district by the calculated ethnicity membership of the district (TOTETH in the CCD enrollment file). In Hawaii, the calculation was the same, except Asian and Pacific Islander students were included in the numerator.

As in the poverty analysis, Hawaii, Alaska, and Nevada were excluded from the within-state analysis, while New York was divided into halves as opposed to quartiles. Maine, New Hampshire, Vermont, and West Virginia were also excluded from the within-state analysis because fewer than 10 percent of their students are students of color.

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