

***DID PENNSYLVANIA'S STATEWIDE SCHOOL FINANCE
REFORM INCREASE EDUCATION SPENDING OR PROVIDE
TAX RELIEF?***

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We examine how local school districts respond to statewide education finance reform. Specifically, we evaluate the impact of Pennsylvania's Act 61, which provided additional state aid to districts spending below state-determined adequacy targets (spending shortfall districts), on district tax effort in support of education. We find that high-tax shortfall districts reduced their property tax rates significantly more than districts without spending shortfalls and, as a consequence, did not increase educational spending compared with their no-shortfall counterparts. Our results suggest that state equalization aid for high-taxing districts with spending shortfalls was used for property tax relief rather than for supplementing education spending.

Keywords: education finance, state equalization aid, district property tax, education spending

JEL Codes: H52, I22, I28

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Online Appendix

Suppose that two districts, A and B, have the same market value of taxable property, and also the same preferences for educational investment (as reflected in the amount of desired property tax revenue). If the assessed value of taxable property as a share of market value is lower in District A than in District B, then District A’s school board must set a higher RET rate in order to raise the same amount of property tax revenue as District B can raise with a lower RET rate. Therefore, the RET rate will not provide an accurate measure of the desired effort a district makes toward supporting local educational investment, but instead will reflect differences in the assessed value of taxable property in otherwise identical school districts. Instead, the EM rate provides a better measure of district effort, reflecting both a district’s preferences for educational investment (captured by the desired level of property tax revenue) as well as the market value of taxable property, which can be considered less endogenous to district decisions about tax rates than is the ratio of assessed-to-market value.

Table A1
Stylized Example of District Tax Effort

| District | Market Value (MV) | Assessed Value (AV) | AV/MV | Property Tax Revenue | Real Estate Tax (RET) Rate (Mills) | Equalized Mill (EM) Rate |
|-----------------|--------------------------|----------------------------|--------------|-----------------------------|---|---------------------------------|
| A | \$100,000 | \$50,000 | .50 | \$2,000 | 40 | 20 |
| B | \$100,000 | \$100,000 | 1.0 | \$2,000 | 20 | 20 |

Note: The RET rate is reported in mills, where one mill is equivalent to 1/1000 of a dollar. The EM rate is calculated as the ratio of property tax revenue to market value (multiplied by 1000). The EM rate is a standardized millage rate, normalizing district tax effort by the market value of taxable property and is therefore independent of the assessed value of taxable property.

Table A2**Summary of District Tax Rates, Property Values and Property Taxes**

| District characteristic | 2003/04 | 2004/05 | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 |
|--------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Equalized Mill Rate | 21.6 (5.1) | 21.0 (5.4) | 21.9 (5.6) | 20.5 (5.3) | 20.9 (5.3) | 18.4 (4.8) | 18.6 (4.9) | 18.0 (4.8) | 18.3 (4.9) | 18.4 (5.0) |
| Real Estate Mill Rate | 55.6 (73.8) | 57.7 (77.6) | 46.9 (45.6) | 46.0 (43.1) | 47.3 (44.5) | 48.8 (45.9) | 43.9 (33.8) | 44.1 (34.2) | 44.5 (35.1) | 45.1 (35.4) |
| Market Value | 313,641.8 (163,712.0) | 333,142.5 (175,009.9) | 326,285.8 (168,926.0) | 358,618.4 (193,251.2) | 359,820.5 (191,325.6) | 390,053.4 (211,509.9) | 398,497.8 (211,575.2) | 424,087.9 (224,693.1) | 417,686.4 (216,687.6) | 425,894.8 (216,962.1) |
| Assessed Value | 226,207.5 (217,707.3) | 221,653.1 (210,772.8) | 229,979.2 (205,868.1) | 235,235.0 (205,628.4) | 233,922.8 (203,589.9) | 230,767.3 (198,875.2) | 247,810.9 (204,046.6) | 249,041.9 (199,900.4) | 253,790.1 (203,589.7) | 250,841.9 (199,936.5) |
| AV/MV | 0.72 | 0.67 | 0.70 | 0.66 | 0.65 | 0.59 | 0.62 | 0.59 | 0.61 | 0.59 |
| Property Tax Payable | 6,235.5 (9,810.9) | 6,338.5 (10,113.8) | 6,231.4 (4,365.2) | 6,310.3 (4,322.8) | 6,497.3 (4,459.0) | 6,618.8 (4,562.7) | 6,956.0 (4,760.9) | 7,124.9 (4,960.5) | 7,165.8 (5,000.2) | 7,181.9 (4,891.5) |
| Property Tax Collected | 5,295.0 (2,952.8) | 5,517.6 (3,079.3) | 5,659.7 (3,117.0) | 5,819.1 (3,224.2) | 5,956.1 (3,314.2) | 5,713.7 (3,311.3) | 5,943.2 (3,458.1) | 6,097.1 (3,498.6) | 6,118.0 (3,442.4) | 6,165.1 (3,423.3) |
| Property Tax Delinquency | 939.8 (9,169.0) | 821.0 (9,442.0) | 538.8 (2,906.6) | 491.2 (2,755.6) | 542.9 (2,852.0) | 905.1 (2,922.4) | 1,012.8 (3,064.4) | 1,027.8 (3,269.8) | 1,047.9 (3,406.2) | 1,016.8 (3,290.3) |
| Districts | 498 | 498 | 498 | 498 | 498 | 498 | 498 | 498 | 498 | 498 |

Notes: Means (standard deviation) reported. Authors' calculations from data retrieved from the Pennsylvania Department of Education and the Pennsylvania State Tax Equalization Board. All finance variables reported on a per-pupil basis and inflation adjusted and reported in 2012 dollars. The equalized millage rate is a standardized millage calculated by dividing a school district's total taxes collected and remitted by its total market value as certified by the Pennsylvania State Tax Equalization Board. The real estate millage rate is the rate assessed by a school district on the assessed value of real property in each school district. Market value is defined as the sales value of taxable real estate as certified by the Pennsylvania State Tax Equalization Board. Assessed value is determined by the county real estate tax assessor in each county. AV/MV measures the ratio of assessed value to market value. Property taxes payable is calculated by multiplying the real estate millage rate by the assessed value of taxable property. Property tax collected is defined as the sum of current and interim real estate tax revenue. Property tax delinquency is calculated as the difference between property taxes payable and property taxes collected.

Table A3
Finance Reform Summary Statistics

| District Characteristic | All Districts | All Shortfall | All No Shortfall | Difference (Shortfall vs. No Shortfall) | High Tax Shortfall | Low Tax Shortfall | Difference (High vs. Low Tax) |
|------------------------------------|-----------------------|-----------------------|-----------------------------|--|-------------------------------|------------------------------|--|
| Panel A: 2008-09 | | | | | | | |
| Total Expenditures | 13,945.1 (2,450.0) | 13,588.1 (1,994.6) | 18,525.8 (3,093.5) | 4,937.7*** (361.9) | 14,842.1 (2,038.9) | 13,276.3 (1,859.0) | 1,565.8*** (220.9) |
| Adequacy Target | 11,165.8 (991.5) | 11,173.5 (1,000.2) | 11,066.3 (878.1) | 107.3 (171.7) | 11,692.7 (1,390.5) | 11,044.4 (830.2) | 648.3*** (112.7) |
| Adequacy Shortfall | 2,132.2 (1,163.4) | 2,298.4 (1,037.6) | 0 (0.0) | 2,298.4*** (173.1) | 2,123.8 (1,384.0) | 2,341.8 (929.1) | 218.0* (120.6) |
| State Funding Target | 1,058.3 (758.5) | 1,140.8 (725.2) | 0 (0.0) | 1,140.8*** (121.0) | 1,407.7 (1,088.3) | 1,074.5 (590.0) | 333.2*** (83.1) |
| State Phase-In | 123.4 (110.7) | 133.0 (109.3) | 0 (0.0) | 133.0*** (18.2) | 235.8 (182.3) | 107.4 (58.5) | 128.3*** (11.2) |
| State Phase-In / BEF | 0.036 | 0.039 | 0 | 0.039*** (0.005) | 0.068 | 0.031 | 0.036*** (0.003) |
| State Phase-In / State Revenue | 0.020 | 0.022 | 0 | 0.022*** (0.003) | 0.037 | 0.018 | 0.019*** (0.002) |
| BEF / State Revenue | 0.559 | 0.574 | 0.376 | 0.197*** (0.019) | 0.543 | 0.581 | 0.039*** (0.012) |
| State Revenue / Total Revenue | 0.441 | 0.458 | 0.220 | 0.238*** (0.029) | 0.414 | 0.470 | 0.056*** (0.020) |
| Districts | 498 | 462 | 36 | | 92 | 370 | |
| Panel B: 2009-10 | | | | | | | |
| Total Expenditures | 14,652.1 (2,656.0) | 14,338.5 (2,385.2) | 18,588.8 (2,783.0) | 4,220.3*** (412.9) | 15,483.0 (2,069.2) | 14,057.0 (2,376.0) | 1,426.0*** (271.4) |
| Adequacy Target | 11,997.0 (1,052.1) | 12,031.9 (1,053.9) | 11,562.1 (938.0) | 469.8*** (178.7) | 12,385.5 (1,339.6) | 11,944.9 (953.1) | 440.6*** (121.7) |
| Adequacy Shortfall | 2,454.5 (1,314.7) | 2,651.5 (1,159.3) | 0 (0.0) | 2,651.5*** (190.8) | 2,291.3 (1,483.4) | 2,740.1 (1,048.3) | 448.8*** (134.2) |
| State Funding Target | 1,216.1 (849.8) | 1,313.7 (807.4) | 0 (0.0) | 1,313.7*** (132.9) | 1,529.1 (1,199.8) | 1,260.7 (668.7) | 268.4*** (93.7) |
| State Phase-In | 278.2 (212.5) | 300.5 (205.1) | 0 (0.0) | 300.5*** 33.8 | 425.4 (333.8) | 269.8 (143.1) | 155.6*** (22.9) |

| | | | | | | | |
|-----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| State Phase-In / BEF | 0.074 | 0.080 | 0 | 0.080*** (0.008) | 0.113 | 0.072 | 0.041*** (0.002) |
| State Phase-In / State Revenue | 0.046 | 0.050 | 0 | 0.050*** (0.005) | 0.069 | 0.046 | 0.023*** (0.003) |
| BEF / State Revenue | 0.617 | 0.634 | 0.398 | 0.236*** (0.021) | 0.600 | 0.643 | 0.047*** (0.014) |
| State Revenue / Total Revenue | 0.400 | 0.417 | 0.193 | 0.223*** (0.025) | 0.385 | 0.424 | 0.039** (0.017) |
| Districts | 498 | 461 | 37 | | 91 | 370 | |
| Panel C: 2010-11 | | | | | | | |
| Total Expenditures | 14,826.4 (2,785.4) | 14,512.6 (2,487.2) | 19,395.6 (2,926.9) | 4,883.0*** (460.0) | 15,899.9 (2,308.0) | 14,162.1 (2,409.9) | 1,737.8*** (275.9) |
| Adequacy Target | 12,209.1 (1,059.2) | 12,241.0 (1,055.8) | 11,744.1 (1,013.4) | 497.0** (192.5) | 12,625.3 (1,380.1) | 12,143.9 (934.2) | 481.3*** (119.9) |
| Adequacy Shortfall | 2,541.2 (1,335.0) | 2,715.7 (1,195.8) | 0 (0.0) | 2,715.7*** (211.6) | 2,267.6 (1,462.6) | 2,828.0 (1,092.0) | 561.3*** (135.7) |
| State Funding Target | 1,246.6 (850.9) | 1,332.2 (812.2) | 0 (0.0) | 1,332.2*** (143.7) | 1,495.2 (1,169.3) | 1,291.0 (689.6) | 204.2** (93.4) |
| State Phase-In | 399.7 (272.8) | 427.1 (260.4) | 0 (0.0) | 427.1*** (46.2) | 479.4 (374.9) | 413.9 (221.1) | 65.5 (29.9) |
| State Phase-In / BEF | 0.101 | 0.112 | 0 | 0.112*** (0.011) | 0.128 | 0.108 | 0.020*** (0.007) |
| State Phase-In / State Revenue | 0.069 | 0.074 | 0 | 0.074*** (0.007) | 0.081 | 0.072 | 0.008* (0.004) |
| BEF / State Revenue | 0.651 | 0.668 | 0.411 | 0.257*** (0.025) | 0.623 | 0.679 | 0.056*** (0.015) |
| State Revenue / Total Revenue | 0.385 | 0.398 | 0.204 | 0.194*** (0.026) | 0.357 | 0.408 | 0.051*** (0.017) |
| Districts | 498 | 466 | 32 | | 94 | 372 | |

Notes: Authors' calculations from data retrieved from the U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD) and the Pennsylvania Department of Education. All finance variables reported on a per-pupil basis and inflation adjusted and reported in 2012 dollars. Total expenditures include expenditures on instruction, support services, the operation of non-instructional services, facilities acquisition and construction, and financing uses including debt service payments. Shortfall districts are districts with an adequacy shortfall in the relevant school year. BEF is Pennsylvania State Basic Education Funding. State revenue is defined as revenue originating from Commonwealth of Pennsylvania appropriations and directly disbursed to school district. Total revenue is defined as the sum of local revenue, state revenue, federal revenue, and other revenue. Differences are statistically significant at the *10 percent, **5 percent, and ***1 percent levels.

Table A4

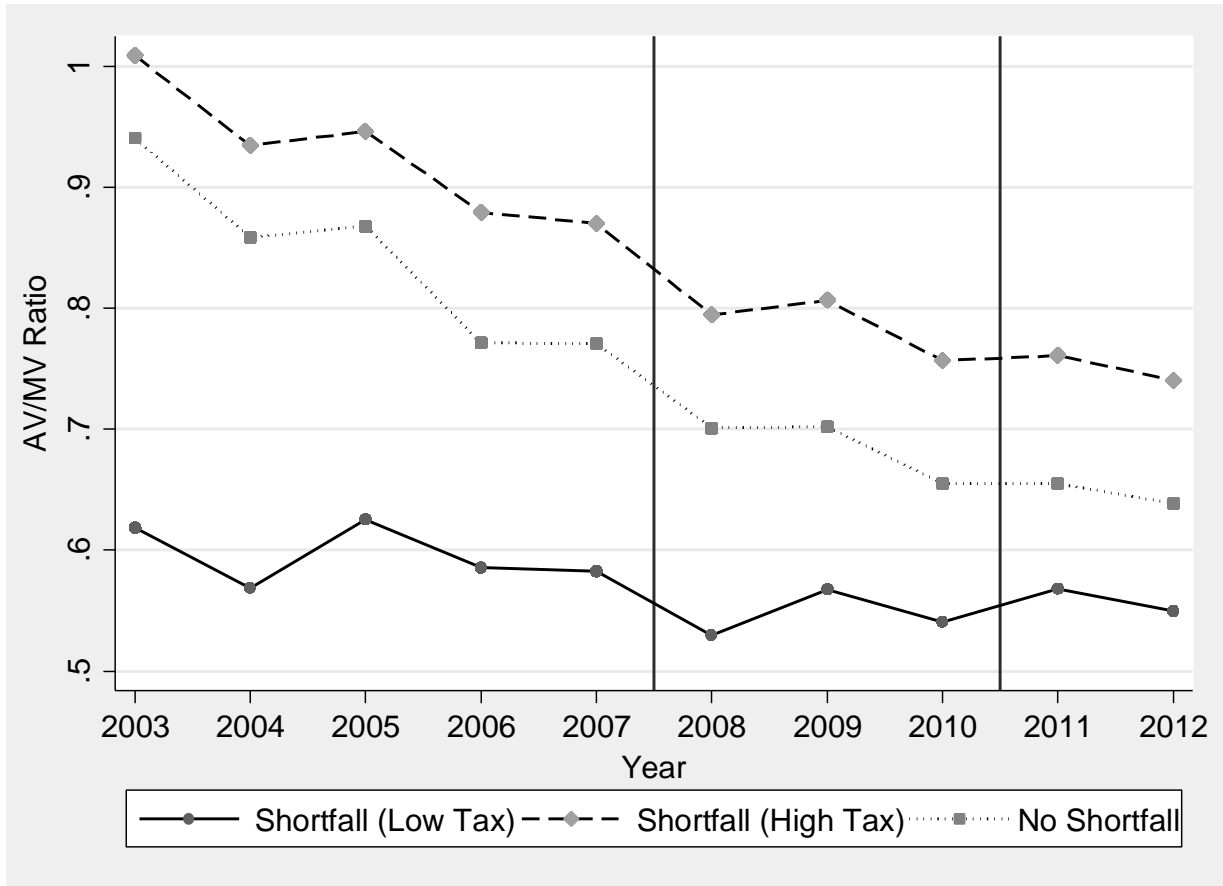
Difference-in-Difference Estimates of the Effect of Finance Reform on Tax Effort

| | Equalized Mill Rate | | | | | |
|---|---------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| <i>HighTax</i> *Reform | -1.32*** (.369) | -1.37*** (.362) | -1.44*** (.354) | | | |
| <i>LowTax</i> *Reform | -.03 (.273) | -.03 (.259) | -.09 (.256) | | | |
| <i>HighTax</i> *Reform _(Year 1) | | | | -1.47*** (.354) | -1.48*** (.344) | -1.55*** (.340) |
| <i>HighTax</i> *Reform _(Year 2) | | | | -1.29*** (.363) | -1.35*** (.361) | -1.42*** (.356) |
| <i>HighTax</i> *Reform _(Year 3) | | | | -1.19*** (.441) | -1.27*** (.433) | -1.34*** (.418) |
| <i>LowTax</i> *Reform _(Year 1) | | | | -.20 (.245) | -.18 (.230) | -.24 (.230) |
| <i>LowTax</i> *Reform _(Year 2) | | | | -.09 (.267) | -.10 (.256) | -.16 (.256) |
| <i>LowTax</i> *Reform _(Year 3) | | | | .22 (.348) | .20 (.334) | .14 (.325) |
| P-value from F-test: | | | | | | |
| <i>HT</i> *Reform: <i>Yr1</i> = <i>Yr2</i> = <i>Yr3</i> | | | | 0.298 | 0.518 | 0.516 |
| <i>LT</i> *Reform: <i>Yr1</i> = <i>Yr2</i> = <i>Yr3</i> | | | | 0.091 | 0.122 | 0.119 |
| District FE | X | X | X | X | X | X |
| District Characteristics | | X | X | | X | X |
| District* <i>YearTrend</i> | | | X | | | X |
| Districts | 498 | 498 | 498 | 498 | 498 | 498 |
| Observations | 3,984 | 3,984 | 3,984 | 3,984 | 3,984 | 3,984 |

Notes. Each column represents a separate regression. Coefficients reported with standard errors (clustered at the district level) in parentheses. All models include year fixed effects and controls for federal aid and revenues from other sources (excluding state and local revenue) on a per-pupil (\$2012) basis. District characteristics include: student enrollment; the proportion of FRPL, IEP and minority students; geographic indicators; and total personal income (per-pupil, \$2012). *HighTax* is a time-invariant indicator for whether a district had an adequacy shortfall and was a high-tax district (i.e., 2006-07 equalized mill rate greater than or equal to 24.7 mills); there are 92 such districts. *LowTax* is a time-invariant indicator for whether a district had an adequacy shortfall and was a low-tax district (i.e., 2006-07 equalized mill rate less than 24.7 mills); there are 370 such districts. The variable *Reform* indicates the Act 61 reform period, taking on a value of 1 in the 2008-09 through 2010-11 school years, and zero in the pre-reform period (i.e., 2003-04 through 2007-08 school years). The variable *Reform*_(Year 1) takes on a value of 1 in the 2008-09 school year, and zero otherwise; *Reform*_(Year 2) takes on a value of 1 in the 2009-10 school year, and zero otherwise; and *Reform*_(Year 3) takes on a value of 1 in the 2010-11 school year, and zero otherwise. The variable *YearTrend* is a linear time trend defined as Year–2002 (so that *YearTrend*=1 in 2003-04, *YearTrend*=2 in 2004-05,

up to *YearTrend*=8 in 2010-11). Coefficients statistically significant at the *10 percent, **5 percent, and ***1 percent levels.

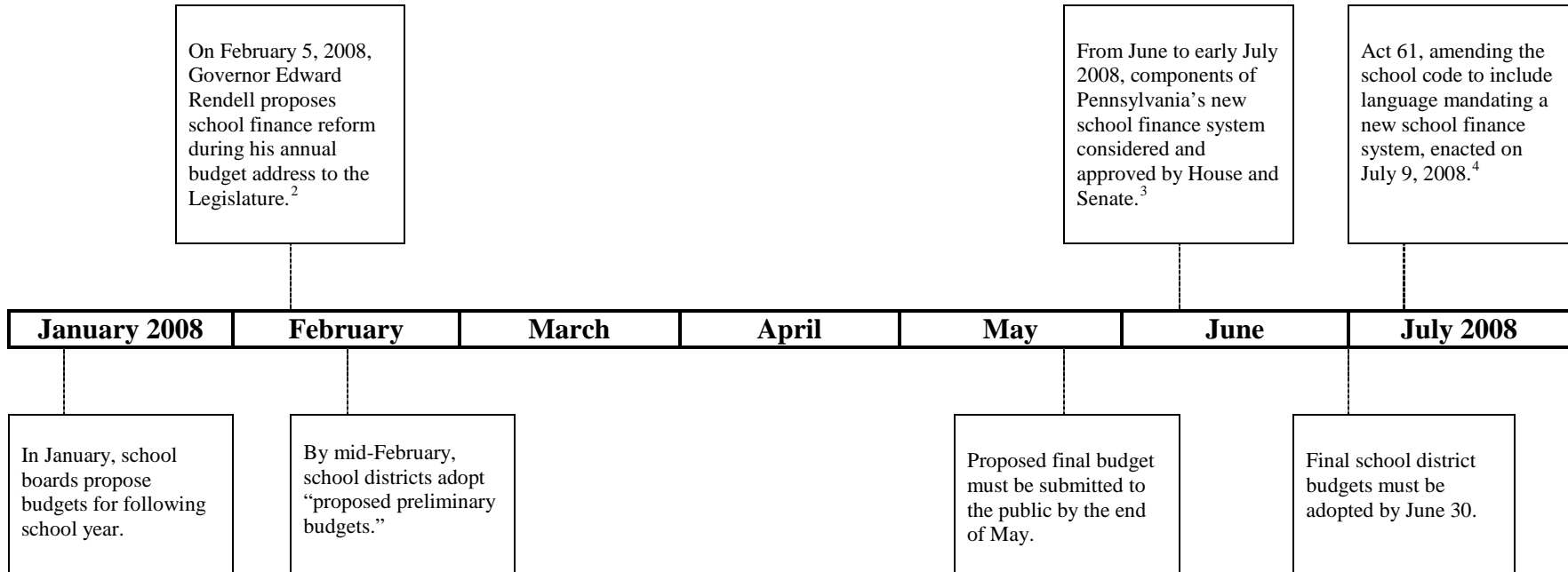
Figure A1
Assessed Value to Market Value Ratio



Notes: The year 2003 refers to the 2003-04 school year. Market value (MV) of taxable property is defined by the Pennsylvania State Tax Equalization Board as the sales value of taxable real estate property. Assessed value (AV) is determined by the county real estate tax assessor in each county. N=498 school districts.

Figure A2

Timeline of Pennsylvania School District Budget & Act 61 School Finance Reform¹



¹ Note: Pennsylvania Department of Education (PDE) typically notifies local school districts of their appropriations in June when the state budget is finalized, potentially restricting district response to state aid if their information is incomplete. Act 61, however, was a much discussed funding change and was introduced well before school district budgets were finalized. School boards have limitations concerning tax increases above certain indexes so they may seek exceptions from PDE or may place a referendum question on the ballot for primary elections in May. School boards do not appear to have limitations in reducing taxation.

² Rendell, E. G. (2008, February 5). Fiscal Year 2008-2009 Budget Address of Governor Edward G. Rendell. *Commonwealth of Pennsylvania, Legislative Journal, Session of 2008, 192nd of the General Assembly. No 10*, p. 334.

³ Pennsylvania General Assembly, www.legis.state.pa.us/

⁴ Act of Jul. 9, 2008, P.L. 846, No. 61.

Figure A3

Statewide Finance Reform Policy Design⁵

1. Adequacy Target \longrightarrow 2. Adequacy Shortfall \longrightarrow 3. State Funding Target \longrightarrow 4. State Share Phase-in

Calculated for each district by summing: base cost, poverty supplement, English language learner supplement, and adjustment for geographic price differences.⁶

Calculated as:
 $\max\{0, AT_t - \text{Spending}_{t-2}\}$,
 where AT is the Adequacy Target and Spending is district expenditures (excluding special education spending).

Calculated as:

$$AS * \frac{MV}{PI} * \left(\min \left\{ 1, \frac{EM_{t-2}}{EM_{t-2}^{75th\%}} \right\} \right)$$
 where AS is the Adequacy Shortfall, EM is the equalized millage rate, and $\frac{MV}{PI}$ is the market value to personal income aid ratio.⁷

Calculated as: $SFT_t * \lambda_t^j$

where SFT is the state funding target in year t , λ_t^j is a percentage applied for district type j in year t , and district type j is defined by a district's pre-policy tax effort, such that:

$$j = \begin{cases} \text{HighTax (HT)} & \text{if } EM_{06-07} \geq 24.7 \\ \text{LowTax (LT)} & \text{if } EM_{06-07} < 24.7 \end{cases}$$

$$\lambda_t^j = \begin{cases} 16.75\% & \text{if } j = HT \text{ and } t = 2008/09; \\ 10.0\% & \text{if } j = LT \text{ and } t = 2008/09; \\ 27.82\% & \text{if } j = HT \text{ and } t = 2009/10; \\ 21.40\% & \text{if } j = LT \text{ and } t = 2009/10; \\ 32.06\% & \text{if } t = 2010/10 \end{cases}$$

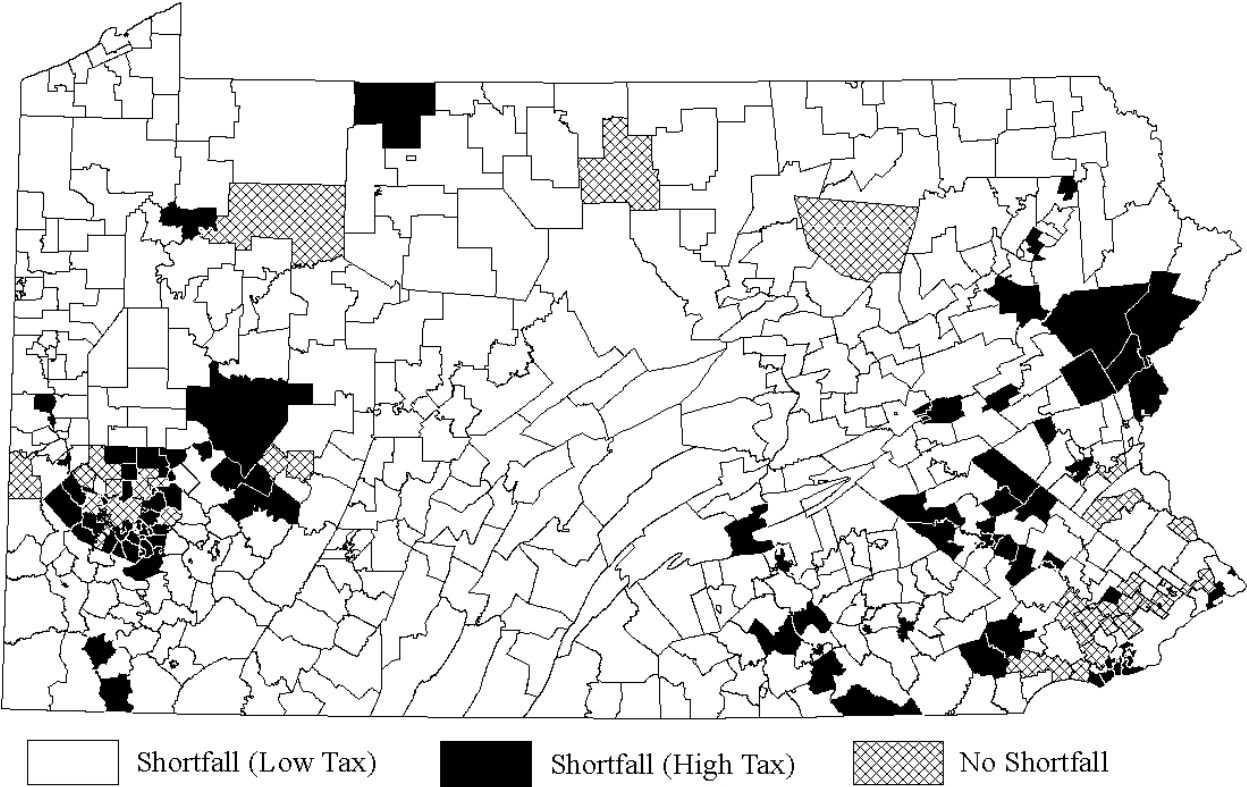
⁵ Act of Jul. 9, 2008, P.L. 846, No. 61, §2502.48

⁶ For the **Adequacy Target**: Calculated for each district by summing: **base cost**: (a) the base cost per student (2008-09: \$8,355; 2009-10: \$8,698; 2010-11: \$8,950) multiplied by (b) its modified average daily membership; **poverty supplement**: (a) the base cost per student multiplied by (b) its number of students eligible for free or reduced price meals under the national school lunch program on October 31, two years prior, multiplied by (c) 0.43; **district size supplement**: the greater of zero or (a) the base cost per student multiplied by (b) its 2006-2007 (or, for the 2010-11 school year, its 2008-09) adjusted average daily membership multiplied by (c) the sum of 0.483 and the natural logarithm of its 2006-2007 (or, for the 2010-11 school year, its 2008-09) adjusted average daily membership multiplied by -0.05; **English language learner supplement**: (a) the base cost per student multiplied by (b) its number of students identified as limited English proficient in the school year two years prior multiplied by (c) the sum of 3.753 and the natural logarithm of its adjusted average daily membership two years prior multiplied by -0.23, provided that such amount shall be no less than 1.48 and no greater than 2.43; **adjustment for geographic price differences** (for 2008-09 and 2009-10 school years) (a) its location cost metric multiplied by (b) the sum of the base cost, poverty supplement, district size supplement, and English language learner supplement minus (c) the sum of the base cost, poverty supplement, district size supplement, and English language learner supplement; **adjustment for geographic price differences** (for 2010-11 school year) (a) the greater of one or its location cost metric multiplied by (b) the sum of the base cost, poverty supplement, district size supplement, and English language learner supplement minus (c) the sum of the base cost, poverty supplement, district size supplement, and English language learner supplement.

⁷ For a detailed description of the market value/personal income aid ratio, see "Aid Ratio Calculation Methodology," <http://www.portal.state.pa.us>.

Figure A4

Map of Pennsylvania School Districts, by Shortfall Status



Notes: There are 370 Shortfall (Low Tax) districts; 92 Shortfall (High Tax) districts; and 36 No Shortfall districts.