THE LONG ROAD TO RECOVERY: NEW YORK SCHOOLS IN THE AFTERMATH OF THE GREAT RECESSION

Rajashri Chakrabarti and Max Livingston

OVERVIEW

• This study investigates school finance patterns in New York for the four years following the Great Recession, a period characterized by an influx of federal stimulus funding and its subsequent withdrawal.

• The authors find that the more than $6 billion in federal stimulus for New York initially helped school districts offset a loss in state and local support and maintain total funding and expenditure per student in line with pre-recession trends.

• The stimulus, however, ended in 2011, before state and local economies fully recovered. As a result, schools were forced to make widespread cuts in expenditures, including those supporting classroom instruction, the category most fundamental to student learning.

• The findings underscore the critical importance of federal support in softening the impact of fiscal crises on schools when other forms of public funding are tight.

When the Great Recession hit, the impact was severe and wide-reaching. The implosion of the housing market and the spike in unemployment led to declines in property, income, and sales tax revenue for federal, state, and local governments. State and local governments faced tough decisions about how to balance their budgets; many were forced to slash funding for a wide variety of programs and services. The federal government stepped in to bolster state and local funding by passing a large stimulus package, but after those funds were spent and the economy was still weak, both state and local governments were forced to make cutbacks. One key public institution affected by these funding cuts was our nation's school system.

State and local governments generally provide the vast majority of public school funding, so schools are particularly vulnerable to fiscal problems. To reinvigorate the economy and prevent serious budget cuts, the federal government passed the American Recovery and Reinvestment Act (ARRA). One of the ARRA's components was an allocation of $100 billion to states for education spending, beginning in the fall of 2009. New York received $5.6 billion in ARRA funding as well as $700 million from the Race to the Top competition. The stimulus was meant to help maintain funding in the short term while the economy improved and

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until states could provide for themselves again. After a massive influx of money in the 2009-10 school year, the federal stimulus started to dry up. However, the recovery from the Great Recession took longer than many had anticipated. The toll of the sluggish economy was felt in most sectors of the economy, and schools were no exception.

Schools are a vital part of our economy and our society. They are crucial in building human capital and shaping the nation's future. It is necessary to understand how schools were affected during the Great Recession and its aftermath and what, if any, repercussions the downturn might have on how students are educated. An earlier article in the *Economic Policy Review* (Chakrabarti, Livingston, and Setren 2015) studied the short-term effects of the Great Recession and stimulus funding on funding and expenditure in New York schools just after the recession. We define short term as the two years following the recession (in this case, 2009-10) and medium term as the four years following the recession (2009-12). The 2015 article found that total funding and total expenditure per pupil in New York schools continued to be on trend in the short term, as was instructional expenditure per pupil (the expenditure category most directly related to student learning). In contrast, noninstructional expenditure took a hit: transportation, utilities and maintenance ("utilities"), student activities, and student services received cutbacks (relative to trend), although the effects were not always statistically significant. In the present article, we take an important step forward toward understanding whether these effects persisted in the medium term, too. Were New York schools able to maintain funding and expenditure per pupil—and, importantly, instructional expenditure per pupil—on trend as the stimulus funding receded and the economy had not yet recovered? Or were there cutbacks in the medium term? These questions are of utmost policy importance, since any such reduction has the potential to adversely affect student learning and achievement and hence human capital formation and growth in the long run.

New York is of particular of interest because it contains New York City, the country's largest school district. Additionally, New York is the third largest state school system, serving 5.5 percent of the nation's students.[1] New York is also a very diverse state, with a range of urban, rural, and suburban districts and a wide distribution of income levels, all of which make studying the state interesting and instructive.

Using detailed data on school finance indicators and their compositions and an interrupted time-series analysis, we examine the above questions and discover some interesting patterns. Specifically, we find sharp differences in medium-term experience compared with short-term experience in New York. In our earlier study (Chakrabarti, Livingston, and Setren 2015), we found that severe cuts to school funding and expenditure were prevented when the stimulus funding was flowing. But in this article, we find that the picture was starkly different in the medium term. As the stimulus money dried up and with the economy still weak, districts faced revenue shortfalls and made major cuts to expenditures. In particular, districts were forced to cut instructional expenditure, the category most fundamental to student learning. This result is in sharp contrast to the initial years after the recession when the districts maintained instructional expenditure by cutting back on noninstructional expenditure (Chakrabarti, Livingston, and Setren 2015).

Separate analysis by metropolitan area reveals some intriguing patterns. New York City and Nassau experienced particularly sharp declines in funding, but these cuts were the deepest in the last two years of our review period (2011 and 2012). We see that in reducing noninstructional expenditure, different metropolitan areas chose different categories to cut—for instance,

Rochester had large negative shifts in pupil services while maintaining or increasing instructional support (relative to trend) and Nassau had positive shifts in pupil services while making deep cuts to utilities, transportation, and instructional support.

The picture in the medium term was quite different from that in the short term in the various metropolitan areas. Total funding in all metropolitan areas showed economically and statistically significant declines from the trend in the medium term, while no metropolitan area but Nassau and NYC sustained declines in the short term. Instructional expenditure per pupil in each metro area was maintained on trend in the short term, but they had all experienced economically significant declines by 2012.[2] For all noninstructional categories, each of the metro areas fared considerably worse in the medium term. By 2012, all metro areas had made deep cuts to each of the noninstructional categories; the only exception was Rochester, for instructional support per pupil, which was maintained on trend.

Our findings promise to increase our understanding of what effects large recessions can have on schools and how government policies can play a role in mitigating the impact. These findings have important implications for the long-term educational and economic outcomes of the affected students as well as for human capital formation in the economy. Changes in student learning and achievement at the K-12 level have the potential to affect college attainment and completion and hence not only individuals' labor market outcomes but also overall human capital formation and ultimately growth in the economy.

This article builds on the literature studying school funding but is more related to the literature that studies the impact of recessions on school finances.[3] Dye and Reschovsky (2008) and Chakrabarti, Livingston, and Roy (2014) analyze the effects of state funding cuts on changes in property taxes during the 2001 and 2008 recessions, respectively. They find that state funding cuts were associated with increased property tax funding, partially offsetting the cuts in state aid to education. As noted above, the article most closely related to the current study is Chakrabarti, Livingston, and Setren (2015), which studies the short-term effects of the Great Recession and stimulus funding on funding and expenditure in New York schools. In that article, the authors find that total funding and expenditure per pupil remained on trend in the two years following the Great Recession, as did instructional expenditure per pupil. Chakrabarti and Sutherland (2013a, 2013b) study the short-term effects of the Great Recession on funding and expenditure in New Jersey schools, while Bhalla, Chakrabarti, and Livingston (2017) contrast the experience of New York and New Jersey schools following the Great Recession in the short term. These two studies find that the experience of New Jersey schools was quite different from that of New York schools in that New Jersey schools sustained sizable cuts not only in total funding and total expenditure per pupil in the short term following the recession, but also faced sizable cuts in instructional expenditure per pupil.

This study is the first to look at the medium-term effects of the Great Recession on school funding and expenditure. Prior work referenced above examines the effect of the Great Recession in the short term (two years after the recession). Since the second year after the recession was characterized by a substantive influx of federal stimulus funding, these papers cannot fully capture the effects of the downturn. Here we look at the medium-term effects for the four years following the Great Recession. The analysis distinguishes between three phases—the immediate post-recession period, the stimulus funding period, and the period when the stimulus largely receded but the economy continued to be weak—and investigates whether the patterns in school funding and expenditure (and their components) differed between these three phases.

Studying the experience in the later years is especially instructive, since the economy in that period faced the full brunt of the recession, with the state and local governments still facing deep budget cuts while federal support had almost receded. This article finds that the experience of New York several years past the onset of the recession was quite different from that in the initial years. Unlike the earlier years, the later years saw major cuts to total funding and expenditure per student (relative to trend), as well as instructional expenditure per student, the expenditure category most closely related to student learning. The findings presented in this article are of critical importance, since they paint a fuller picture of the effects that a recession may have on schools. More broadly, we believe this article advances our overall understanding of schools' financial situations and budgetary decision making under fiscal duress, and the role policy can play in moderating the repercussions.

1. Background

1.1 The Great Recession, Federal Stimulus Funding, and Funding for New York Schools

The onset of the recession in 2007 strained state and local government finances as revenues dropped. Local governments, which often receive a large percentage of funds from property taxes, faced falling revenues owing to declines in the housing market. State governments also saw lower income tax revenues as a result of increased unemployment and lower sales tax revenues from less consumption. To counter cuts in state and local funding, the federal government allocated $100 billion to states for education through the ARRA, as noted above. The funds were available for the 2009-10 school year and then to a much more limited extent through the fall of 2011.

The ARRA provided approximately $5.6 billion to New York schools.[4] This money was spread out over a period of three years. New York received approximately $2.05 billion in 2009-10 in ARRA funds, and another $2.01 billion in 2010-11 from ARRA and the Education Jobs Fund, a grant award passed as part of the ARRA with a targeted purpose of creating or retaining school jobs. The revenue from the ARRA and Education Jobs program dwindled to $0.72 billion in 2011-12. New York won an additional $700 million from the Race to the Top competition, a grant program aimed at encouraging education innovation and reform, for the 2010-11 school year.

Public school funding comes from three main sources: the federal government, the state government, and local funding. Before the Great Recession (in the 2007-08 school year), New York school districts received approximately 3 percent of their funding from federal aid, 40 percent from state government, and 57 percent from local funding.[5] By 2009-10, reliance on federal aid increased to approximately 7 percent owing to the stimulus funding; the percentage of aid from state and local sources fell to 38 percent and 55 percent, respectively. By 2012, the federal government was providing 4 percent of district funding, on average, with the state providing 38 percent and local funding contributing 58 percent.

Components of Expenditure

Instructional Expenditure	
Instruction	All expenditures associated with direct classroom instruction, including teacher salaries and benefits, classroom supplies, and instructional training

| Noninstructional Expenditure	
Instructional support	All support service expenditures designed to assess and improve students' well-being, including food services, educational television, library, and computer costs
Student services	Psychological, social work, guidance, and health services
Utilities and maintenance	Heating, lighting, water, and sewage; operation and maintenance
Transportation	Total expenditures on student transportation services
Student activities	Extracurricular activities including physical education, publications, clubs, and band

2. Data

We obtain our school finance data from the New York Office of the State Comptroller. The data set spans the 2004-05 to 2011-12 school years and 696 school districts of New York State. Student racial demographic data and data on the percentage of students eligible for free or reduced-price lunches for the period 2005 to 2012 are from the New York State Department of Education. In the rest of the article, we refer to school years by the year corresponding to the spring semester.

The school finance data set includes school district level information on funding, expenditure, and enrollment, as well as components of funding and expenditure. We have data on total funding and the amount of aid received from federal, state, and local sources, as well as property tax revenue. The data includes total fall student enrollment. It also has information on total school district expenditure and its components: instructional expenditure, instructional support expenditure, student services, transportation, and utilities and maintenance. Table 1 summarizes the definitions of the categories.

This analysis first uses all districts to examine school finance patterns during the recession and the stimulus funding period (as compared with trends in the pre-recession period). Then it delves deeper and examines heterogeneities by different metropolitan areas. We consider the following metro areas: Buffalo, Rochester, Syracuse, New York City, and Nassau. The first three are Metropolitan Statistical Areas (MSAs). While New York City and Nassau County constitute one MSA, because of their differences, we study them separately as the New York–White Plains

Exhibit 1
Metropolitan and Micropolitan Areas of New York
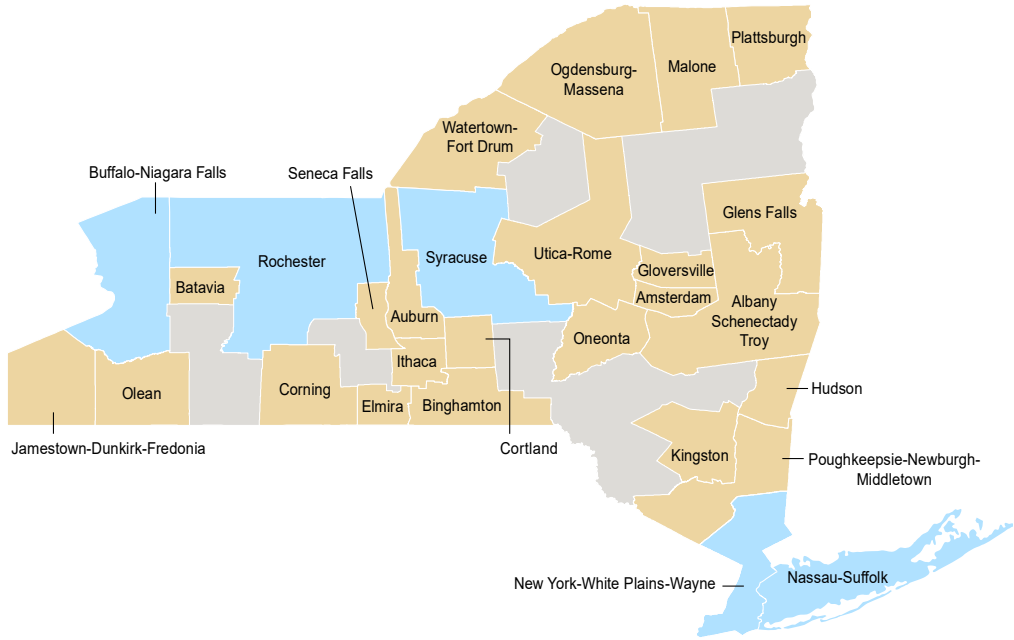
Notes: Areas in blue are the metropolitan areas examined in our heterogeneity analysis.
New York-White Plains-Wayne and Nassau-Suffolk are both part of the New York City metropolitan area, but are considered separate metropolitan divisions by the U.S. Census Bureau. We analyze them as separate metro areas because of divergences in their school finance patterns.

Metropolitan Division (NYC from now on) and the Nassau County-Suffolk County Metropolitan Division (Nassau). Each metro area is a collection of school districts: Buffalo includes 42 school districts, Rochester includes 58, Syracuse includes 43, NYC includes 57, and Nassau has 118. We use GIS mapping technology to visualize changes in financial variables across the state. The district and MSA shape files come from the U.S. Census Bureau. See Exhibit 1 for a map of the areas we examine.

Empirical Strategy

Our objective in this article is to study whether the post-recession period was associated with shifts in various school finance indicators from their pre-existing trends and, more specifically, whether the experiences of the school districts differed between the immediate post-recession period, the stimulus period, and the period when the stimulus had largely receded. We consider the 2007-08 school year as the immediate pre-recession year based on budget timelines. (Budgets for that school year would have been finalized in the spring of 2007, before the recession officially began in December 2007.) We use an interrupted time-series analysis and estimate the following specification:

$$Y_{it} = \alpha_0 + \alpha_1 T_t + \alpha_2 v_1 + \alpha_3 v_2 + \alpha_4 v_3 + \alpha_5 v_4 + \alpha_6 X_{it} + f_i + \varepsilon_{it} \quad (1)$$

where Y_{it} is a financial indicator for school district i in year t; α_0 is a constant term; T_t is a time trend variable that equals 0 in the immediate pre-recession year (2007-08) and increases by 1 for each subsequent year and decreases by 1 for each previous year; $v1 = 1$ if year = 2009 and 0 otherwise; $v2 = 1$ if year = 2010 and 0 otherwise; $v3 = 1$ if year = 2011 and 0 otherwise; $v_4 = 1$ if year = 2012 and 0 otherwise; X_{it} represents the school district demographic characteristics—racial composition and percentage of students eligible for free or reduced-price lunches; and f_i denotes district fixed effects.

It is important to note that the coefficient of the trend variable (α_1) is identified using the variation from the pre-recession period only, since we allow for separate intercepts ($\alpha_2 - \alpha_5$, respectively) in each of the post-recession years. These intercept shifts are identified by deviations from the pre-recession trend in each of the post-recession years. So the coefficient on the time trend variable, α_1, denotes the trend in the financial indicator in the pre-recession period. The coefficients on the year dummies, $\alpha_2 - \alpha_5$, represent the intercept shifts from the trend in each of the post-recession years 2009, 2010, 2011, and 2012. The chart on the next page is a stylized depiction of our empirical strategy using one of our financial variables (inflation-adjusted local funding per pupil) and excluding control variables for simplicity. The blue line depicts the actual data during the period. The pre-recession data are used to compute the pre-recession trend, which is represented by the bold red line. The dashed red line represents the projection along which local funding per pupil would be expected to evolve had there been no recession. The gaps between the actual data (blue line) and the projection (dashed red line) in each of the post-recession years represent the deviations from the trend in those respective post-recession years and are captured by $\alpha_2 - \alpha_5$, respectively.

All financial variables are inflation-adjusted to 2012 dollars. All regressions control for demographic and socioeconomic variables (percentage African-American, percentage Hispanic, percentage Asian, percentage American Indian, and percentage eligible for free or reduced-price lunches), and use robust standard errors adjusted for clustering by school district. The results are robust to the inclusion or exclusion of covariates.

Note that the post-recession shifts in the above regressions represent actual shifts of the corresponding inflation-adjusted financial variables. For easier interpretation and for comparison of the effects across various variables, we also express these in percentage shift terms. Here, the effects are expressed as the percentage of the pre-recession base of the corresponding dependent variable. This not only enables us to compare the effects across variables but also helps us understand the

Shift from the Expected Pre-Recession Trend in Local Funding per Pupil
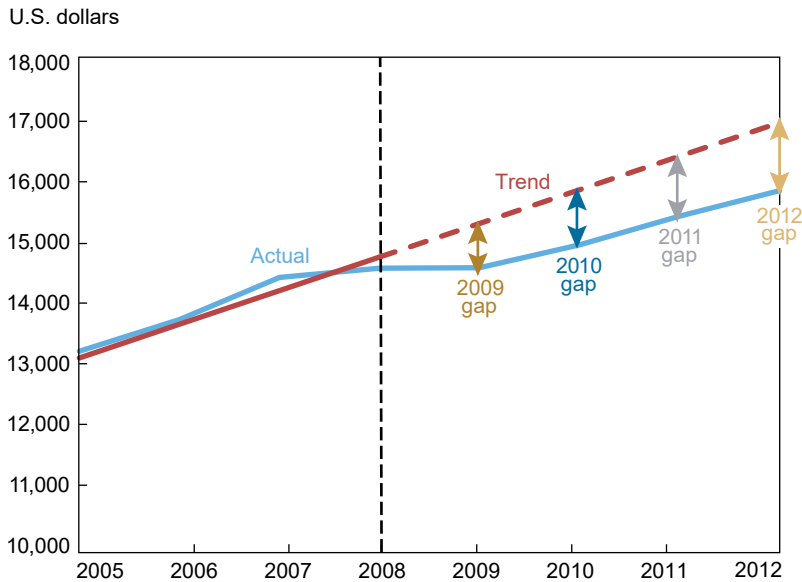
U.S. dollars

Source: Authors' calculations.

Notes: Sums are inflation-adjusted using 2012 dollars. School years correspond to the spring term.

size of the effect. The percentage shift in 2009 corresponds to the recession effect in that year, and the shifts in 2010 and 2011 correspond to the combined effect of the recession and stimulus in those years, with the shift in 2012 associated with the aftermath (when state and local funding were still tight and the federal stimulus had mostly receded).

An important caveat related to the above strategy should be mentioned here. We use an interrupted time-series analysis, and our estimates from specification (1) capture shifts from the pre-existing trend of the corresponding financial variable (see the chart above with local funding per pupil as the variable). Of note is that our estimates will be biased if there were shocks during the post-recession years (2009-12) that affected our financial indicators independently of the recession. In that sense, the results should be interpreted as suggestive rather than causal. However, we conducted extensive research to assess the presence of potentially confounding shocks that might affect our outcome variables independently of the recession and stimulus. To the best of our knowledge, we are not aware of any such shocks during this period. Moreover, the Great Recession was not a marginal shock, but rather a large and discontinuous shock. So even if there were small shocks during these years, they would, by far, be overpowered by as substantial a shock as the Great Recession and the effects obtained are likely to capture its impacts. Even so, the results should be interpreted with caution and should be regarded as strongly suggestive rather than causal.

3. Results

3.1 Overall Trends

We illustrate the overall trends in our variables of interest in Chart 1. Looking at total funding and total expenditure per pupil, we see that while, in general, both continued to be on trend throughout the recession, in the last two years of our review period, there was a leveling off in funding per pupil and a perceptible decline in expenditure per pupil. Because the pre-recession trend was a steady increase, even the leveling off is a negative deviation from the trend.

For the three main funding sources, federal aid, state aid, and local funding, we see some interesting patterns. The stimulus is clearly visible in Chart 1, as average per pupil federal aid doubled in 2010. Federal aid per pupil decreased in 2011 and 2012, although it is still above its pre-recession level in each of these years. State aid per pupil peaked in 2009 and has been declining since then. Local funding per pupil leveled off during the initial recession year (2009), but has picked up in more recent years. A likely driver of this trend is property tax revenue per pupil, which shows a similar pattern in the adjacent panel. Note, though, as the chart illustrates, both local funding per pupil and property tax revenue per pupil remained below trend in the post-recession period. (The stylized example in our empirical strategy section also shows this trend.)

The third row in the chart panel shows the changes in the composition of funding. There is a massive increase in the federal share of funding consistent with the spike in federal aid during the stimulus in 2010, and we can see that even though the share declines after 2010, it remains above the pre-recession trend. The state aid proportion peaked in 2009, the year before the stimulus kicked in, declined sharply in 2010 as the stimulus arrived, and further decreased in 2011 and 2012. The share of local funding increased steeply after 2010 as federal and state funding declined (a trend identified in Chakrabarti, Livingston, and Roy [2014] as well).

Chart 2 examines trends in some of the key components of expenditure. Instructional expenditure per pupil and instructional support per pupil remained roughly on past pace until 2010 but declined sharply in 2011 and 2012, especially in the latter year. Transportation and utilities expenditure per pupil fell below trend in the immediate post-recession year and remained perceptibly below trend in all of the post-recession years. However, the cuts (as revealed by the gaps from the respective trends) were most severe in 2012. Student activities and pupil services expenditure per pupil also trended downward in the post-recession period, with the impact most pronounced in 2011 and 2012.

CHART 1
Trends in School Funding and Expenditure
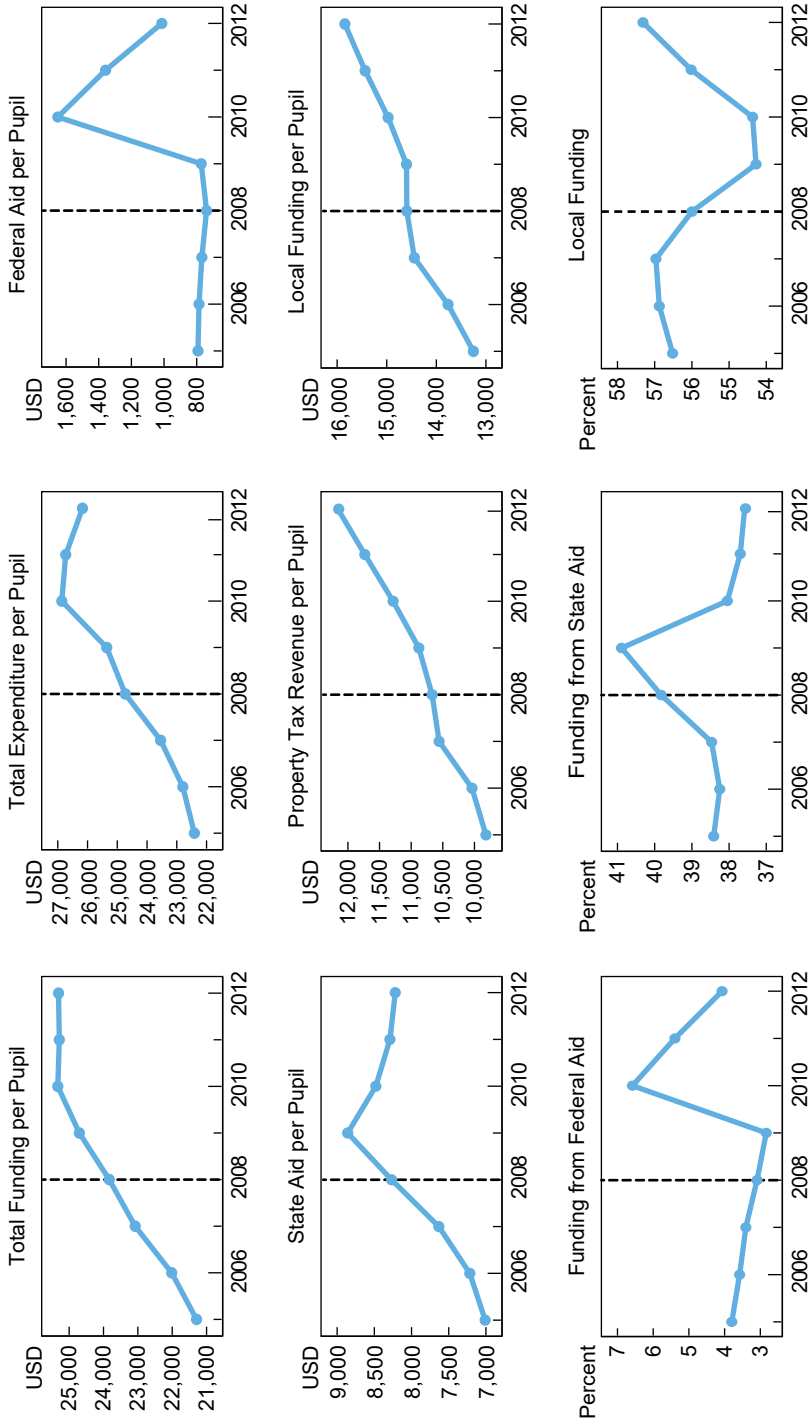
Source: Authors' calculations.

Notes: USD is U.S. dollars. School years correspond to the spring term. Dotted lines mark the immediate pre-recession school year (2007-08).

CHART 2
Trends in School Expenditure Components
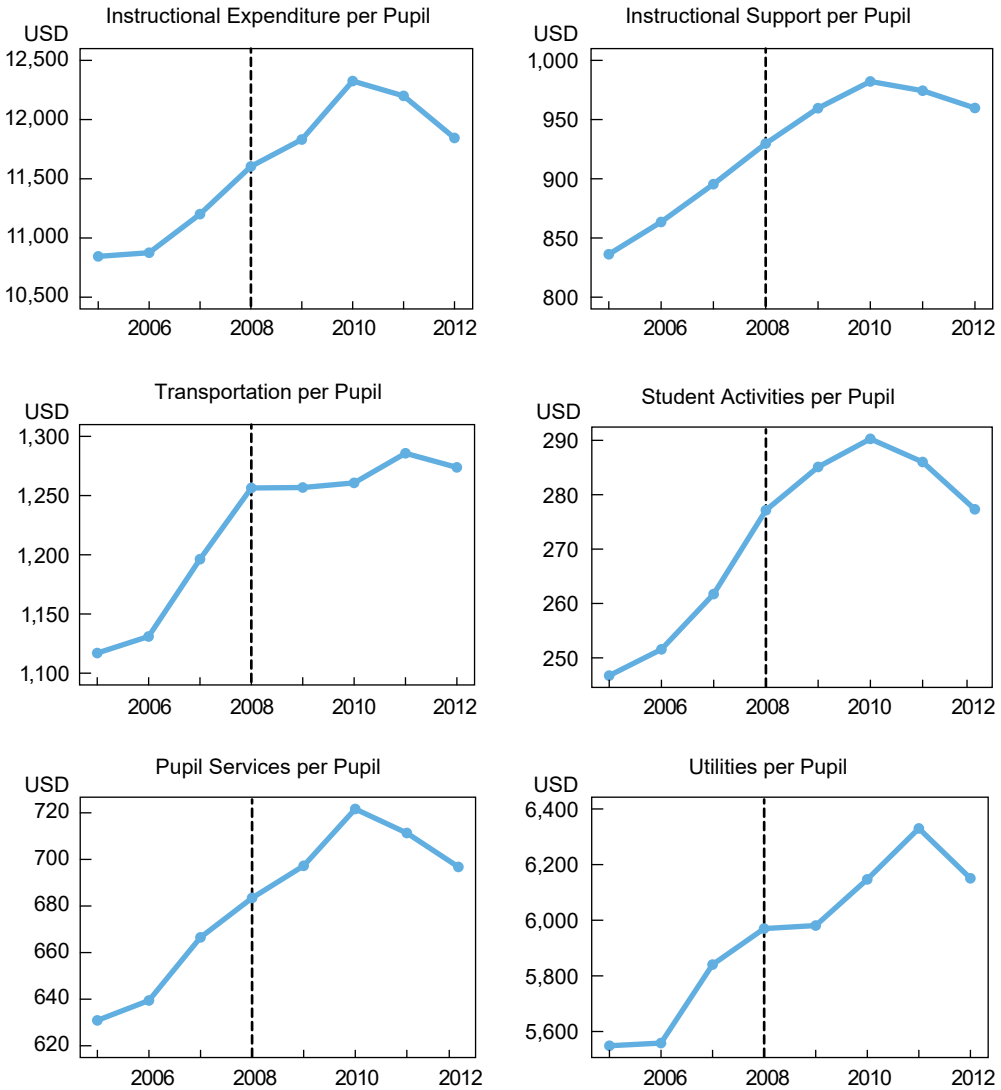
Instructional Expenditure per Pupil

Instructional Support per Pupil

Transportation per Pupil

Student Activities per Pupil

Pupil Services per Pupil

Utilities per Pupil

Source: Authors' calculations.

Notes: USD is U.S. dollars. School years correspond to the spring term. Dotted lines mark the immediate pre-recession school year (2007-08).

TABLE 2

Patterns in Funding and Expenditure after the Recession

	Total Funding per Pupil (1)	Total Expenditure per Pupil (2)	Federal Aid per Pupil (3)	State Aid per Pupil (4)	Property Tax Revenue per Pupil (5)	Local Funding per Pupil (6)	Percentage Federal Aid (7)	Percentage State Aid (8)	Percentage Local Funding (9)
Percentage shift in 2008-09	-0.59	-0.34	5.48	3.34***	-2.24	-4.79***	-2.27	2.67***	-3.51***
Percentage shift in 2009-10	-1.86	2.32	126.21***	-6.28***	-1.68	-5.86***	126.24***	-5.50***	-3.14***
Percentage shift in 2010-11	-5.79***	-1.45	89.13***	-13.76***	-0.90	-6.01**	95.35***	-7.54***	0.10
Percentage shift in 2011-12	-8.97***	-6.84**	47.74 ***	-19.79***	-0.51	-5.90*	60.63***	-9.22***	2.84***
Pre-recession base	$23,833.79	$24,732.84	$739.59	$8,267.70	$10,668.79	$14,594.96	3.09	39.83	56.00
Trend	990.38*** (107.62)	892.13*** (157.00)	-7.48 (10.74)	431.15*** (17.83)	360.50*** (88.16)	569.94*** (103.03)	-0.23*** (0.02)	0.40*** (0.04)	-0.09** (0.05)
2009	-141.40 (317.50)	-83.44 (415.50)	40.52 (54.82)	276.27*** (49.60)	-239.48 (163.09)	-698.55*** (256.59)	-0.07 (0.05)	1.06*** (0.10)	-1.96*** (0.11)
2010	-443.36 (361.77)	573.56 (586.75)	933.44*** (72.43)	-519.60*** (59.41)	-179.33 (266.31)	-854.97*** (326.88)	3.90*** (0.10)	-2.19*** (0.14)	-1.76*** (0.14)
2011	-1,379.60*** (473.36)	-358.21 (674.69)	659.22*** (87.91)	-1,137.96*** (69.84)	-95.64 (380.45)	-876.89** (441.01)	2.95*** (0.12)	-3.00*** (0.19)	0.05 (0.19)
2012	-2,138.18*** (549.20)	-1,691.47** (831.90)	353.08*** (70.24)	-1,636.33*** (81.87)	-54.82 (468.20)	-861.54* (515.45)	1.88*** (0.13)	-3.67*** (0.22)	1.59*** (0.23)
Observations	5,532	5,532	5,532	5,532	5,532	5,532	5,532	5,532	5,532
R^2	0.87	0.84	0.86	0.96	0.91	0.90	0.88	0.99	0.99

Source: Authors' calculations.

Notes: *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively. Robust standard errors adjusted for clustering by school district are in parentheses. All regressions control for racial composition and percentage of students eligible for free or reduced-price lunch. All financial variables are inflation-adjusted to 2012 dollars.

TABLE 3

Patterns in Expenditure Components after the Recession

	Instructional Expenditure per Pupil (1)	Instructional Support per Pupil (2)	Student Services per Pupil (3)	Transportation per Pupil (4)	Student Activities per Pupil (5)	Utilities and Maintenance per Pupil (6)
Percentage shift in 2008-09	-0.16	-0.07	-0.59	-4.03	0.20	-3.61*
Percentage shift in 2009-10	1.49	-0.63	0.70	-8.34**	-1.52	-4.55*
Percentage shift in 2010-11	-2.06	-4.64*	-1.98	-11.05**	-6.69***	-4.98*
Percentage shift in 2011-12	-7.16***	-9.65***	-5.05	-16.14**	-13.86***	-11.43***
Pre-recession base	$11,604.25	$929.79	$683.47	$1,256.43	$277.16	$5,970.06
Trend	307.52*** (54.12)	28.02*** (3.66)	19.83*** (5.44)	65.65*** (18.28)	9.99*** (0.79)	235.61*** (53.36)
2009	-18.57 (137.69)	-0.67 (8.42)	-4.06 (10.97)	-50.58 (54.20)	0.54 (1.86)	-215.41* (114.49)
2010	173.44 (189.40)	-5.83 (17.01)	4.76 (13.59)	-104.81** (51.17)	-4.20 (2.78)	-271.38* (153.36)
2011	-239.14 (198.12)	-43.15* (22.40)	-13.54 (14.40)	-138.86** (61.91)	-18.53*** (3.82)	-297.39* (166.04)
2012	-830.38*** (229.15)	-89.75*** (22.29)	-34.52 (26.09)	-202.79*** (73.70)	-38.43*** (4.57)	-682.61*** (227.00)
Observations	5,532	5,532	5,532	5,532	5,532	5,532
R^2	0.91	0.85	0.88	0.81	0.94	0.93

Source: Authors' calculations.

Notes: *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively. Robust standard errors adjusted for clustering by school district are in parentheses. All regressions control for racial composition and percentage of students eligible for free or reduced-price lunch. All financial variables are inflation-adjusted to 2012 dollars.
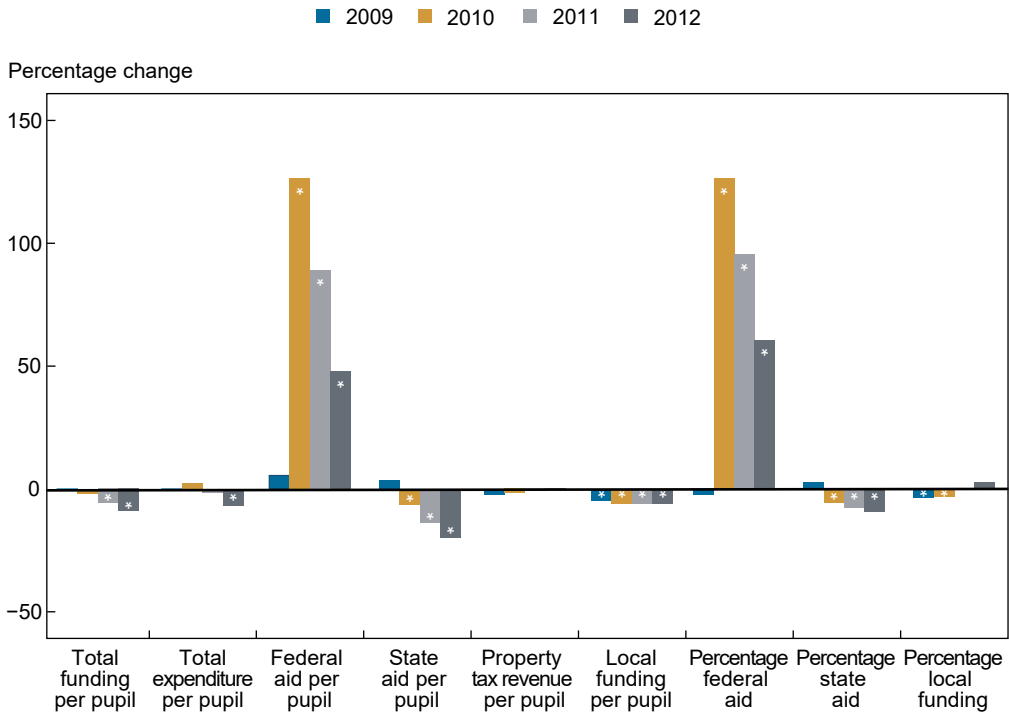
CHART 3
Shifts in Funding and Expenditure from the Pre-Recession Trend

■ 2009   ■ 2010   ■ 2011   ■ 2012

Source: Authors' calculations.

Note: Asterisk (*) indicates statistical significance at the 10 percent level.

We use a more formal interrupted time-series analysis to determine whether these patterns persist. In Tables 2 and 3, the top panels show the percentage shifts, while the lower panels present the regression coefficients that were used to derive the percentage shifts. For ease of comparison, we also provide bar graphs of the percentage shifts.

Table 2 and Chart 3 present results from estimation of specification (1). They reveal that in the first two years after the recession, school districts did not experience any statistically significant shift in total funding or total expenditure per pupil from their respective pre-recession trends. However, there is statistically significant evidence of negative shifts in funding in 2011 and in both funding and expenditure in 2012.

Looking at the components of funding, we find that there was a large positive shift (over 125 percent) in federal aid per pupil in 2010 and that federal aid continued to be significantly above trend in 2011 and 2012. This shift is consistent with the influx of stimulus funds from the ARRA, the bulk of which was disbursed in 2010 and 2011, with a remaining small disbursement in 2012.

The maps in Exhibit 2 show how the role of federal funding varies across all districts in the state and over time. The stimulus had a large effect across the whole state. Comparing the 2010 map to the 2008 map, we can see the steep buildup of federal funding that accompanied the stimulus and an almost equally drastic cutback in 2012, as the federal stimulus receded.

Exhibit 2

Percentage of District Funding from Federal Aid

Legend:
- No data
- 0 - 2
- 2 - 4
- 4 - 6
- 6 - 8
- 8 - 35

2008

2010

2012
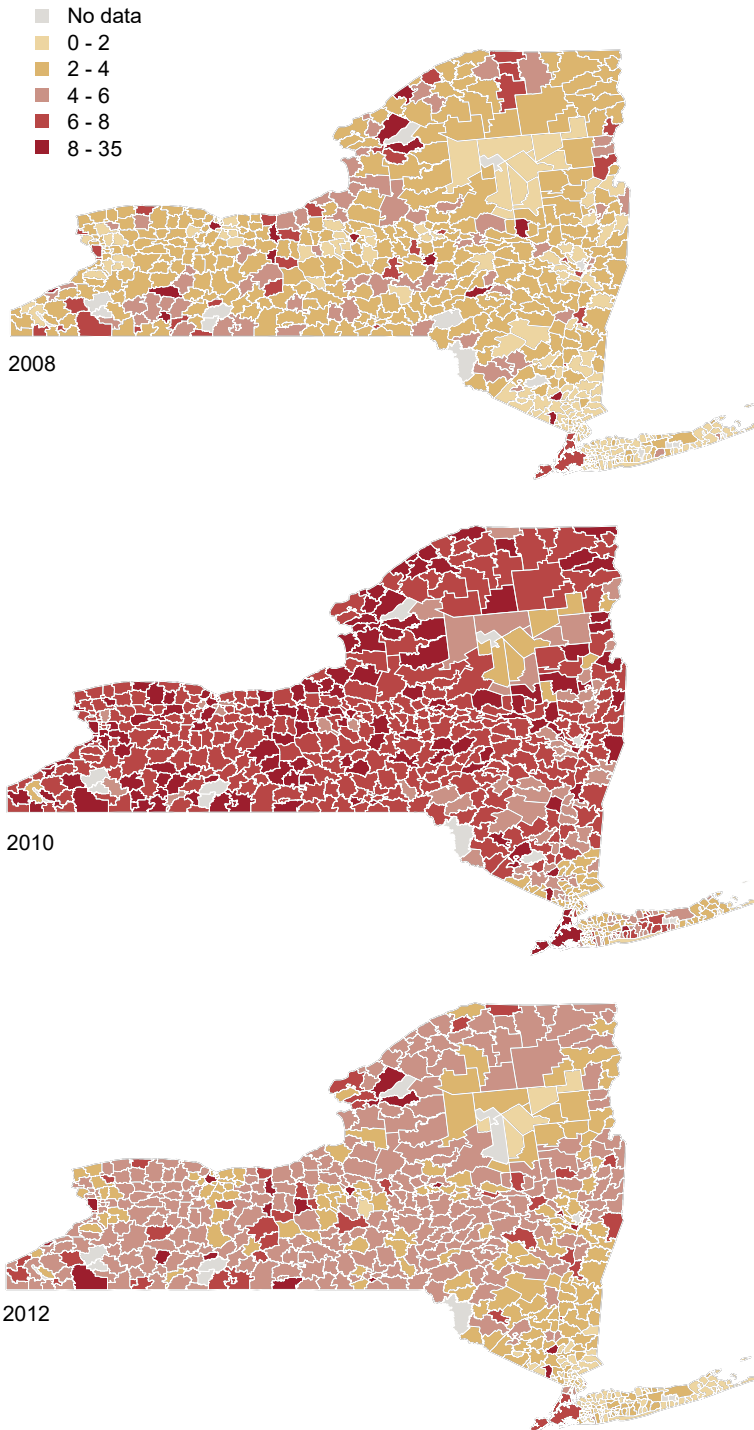
Source: Authors' calculations.

However, of note here is that federal aid makes up a relatively small percentage of school funding (as Table 2 shows, the average in 2008 was 3.1 percent). Looking at state and local funding in Chart 3, we find statistically significant declines in 2010 through 2012. Local funding shows a statistically significant decline in 2010, too. What is interesting is that in 2012, even as local funding fell significantly, its share of districts' total funding increased, indicating a compositional shift in how school districts were funded caused by the state's continued downward shifts in aid.

Table 3 and Chart 4 present the effects on various components of expenditure. There is no evidence of any statistically significant decline in instructional expenditure per pupil before 2012. However, the story in 2012 is different, with a statistically and economically significant decline in instructional expenditure per pupil (from trend) in 2012 evident. Instructional support per pupil shows large (and statistically significant) declines in both 2011 and 2012.

Notably, while instructional and instructional support expenditures per pupil showed statistically significant declines from trend only in the last year and the last two years, respectively, most noninstructional expenditures evidenced declines even earlier and were economically larger. Transportation and utilities per pupil experienced statistically and economically significant declines starting in 2010 and 2009, respectively. A possible interpretation is that when the recession hit, districts began cutting the expenditure categories that have less of a direct impact on student learning. But once the stimulus funding started drying up and state funding experienced even sharper cuts, school districts resorted to cuts in instructional expenditure as well. Also of importance here is that a part of instructional expenditure (specifically, teachers' salaries) is relatively inelastic. The districts have less immediate flexibility as far as teacher contracts are concerned. Although the districts are unable to lay off most existing teachers, they are able to slow down hiring, institute pay freezes, or renegotiate contracts. These strategies would cut down on instructional expenditure, but not immediately.

3.2 How Were Different Metropolitan Areas Affected?

In this section, we examine heterogeneities in effects by metropolitan area. Here, we present separate tables for the percentage shifts and the regression coefficients: Tables 4 and 5 present the percentage shifts and Tables 1A and 2A in the Appendix present the corresponding coefficient estimates. Charts 5 and 6 show the percentage shifts for the metro areas we focus on. Most metro areas did not see a statistically significant fall in total funding per pupil (relative to trend) in 2009 or 2010 (NYC and Nassau were exceptions), but most saw a decline in the latter two years (2011 and 2012). While there were variations across metro areas in total expenditures, in general total expenditure per pupil was more immune to cuts. Only Nassau had a statistically significant drop (relative to trend). NYC also showed a decline, but it was not statistically different from zero. For all metro areas, the effects were relatively more negative in the latter two years, especially in 2012.[6]

The pattern of federal aid per pupil is the same for all of the metro areas, with a large and statistically significant shift (relative to trend) in 2010 when the federal stimulus took effect, and smaller positive shifts in 2011 and 2012. Notably, state aid per pupil exhibited a negative shift for every metro area since 2010. However, Nassau sustained the largest declines in all years, while Syracuse sustained the smallest. Local funding per pupil fell for all metro areas in all four years we examine, and most of these declines are statistically significant.

CHART 4
Shifts in Expenditure Components from the Pre-Recession Trend
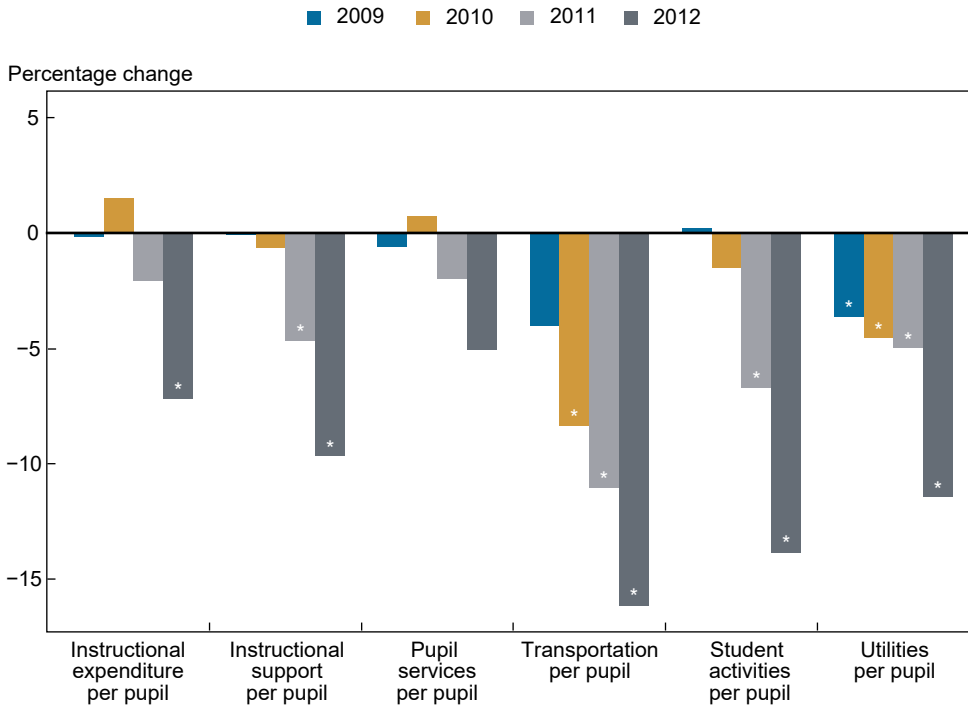
■ 2009   ■ 2010   ■ 2011   ■ 2012

Percentage change

Source: Authors' calculations.

Note: Asterisk (*) indicates statistical significance at the 10 percent level.

The share of federal funding more than doubled in all metro areas with the inception of the federal stimulus. While the share declined in the later years of our review period, it still remained above trend. The increase in Buffalo was the most prominent, and in NYC the least. While the share of state funding declined in the later three years in all metro areas, with the most pronounced declines in all metro areas coming in 2012, there were interesting variations. Nassau had the steepest declines, while Syracuse had the least steep. The local funding share, however, saw a significant positive shift in 2012 even as the dollar amount shifted significantly down for most metro areas. This is because local funding declined the least, leading to an increase in its share. NYC's and Nassau's local funding shares were less affected by the recession.

Chart 5

Shifts in Funding and Expenditure by Metropolitan Area

Relative to the Pre-Recession Trend

■ 2009   ■ 2010   ■ 2011   ■ 2012
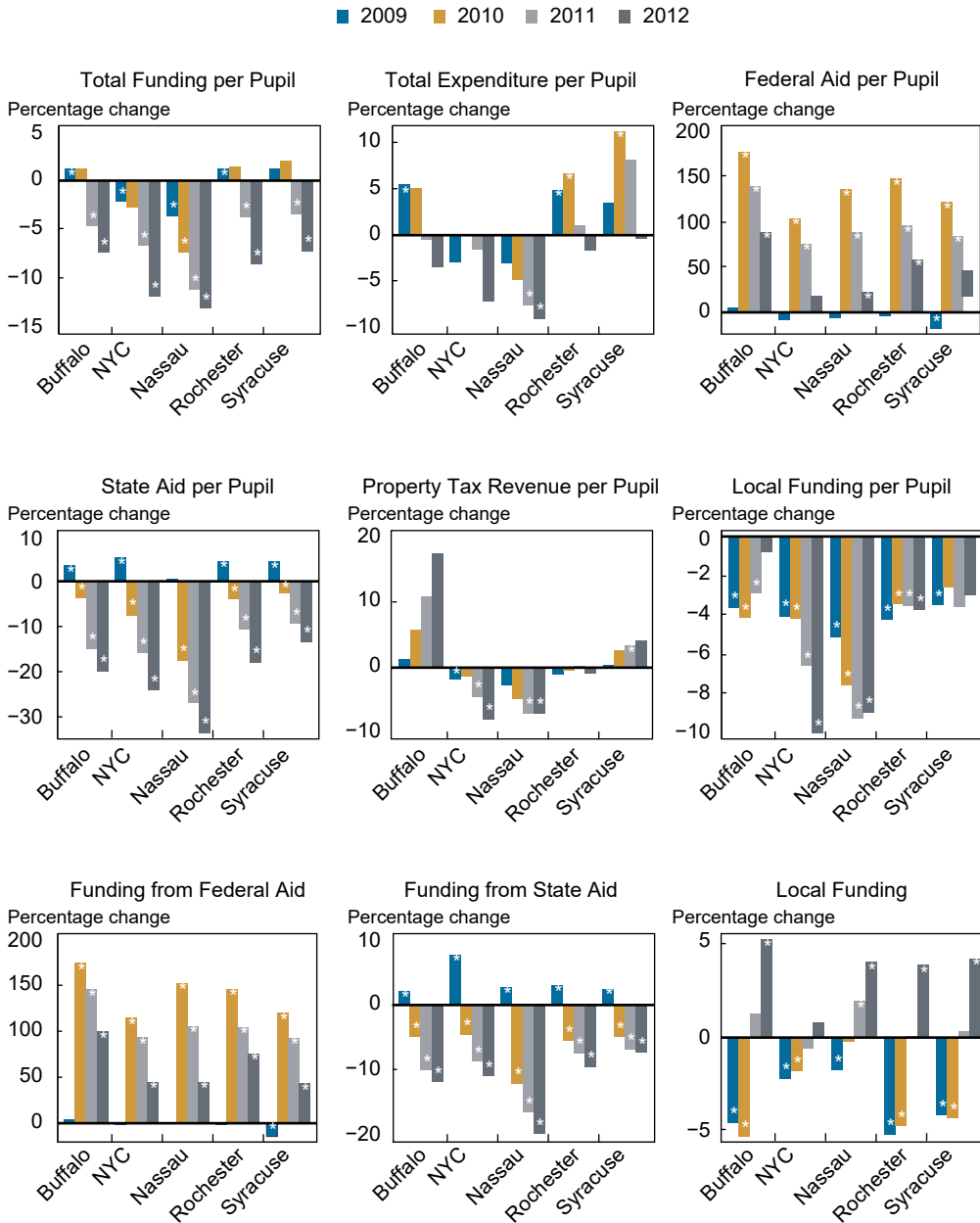
Source: Authors' calculations.

Notes: The chart plot shifts from the pre-recession trend by region. Asterisk (*) indicates statistical significance at the 10 percent level.

Chart 6

Shifts in Expenditure Components by Metropolitan Area

Relative to the Pre-Recession Trend
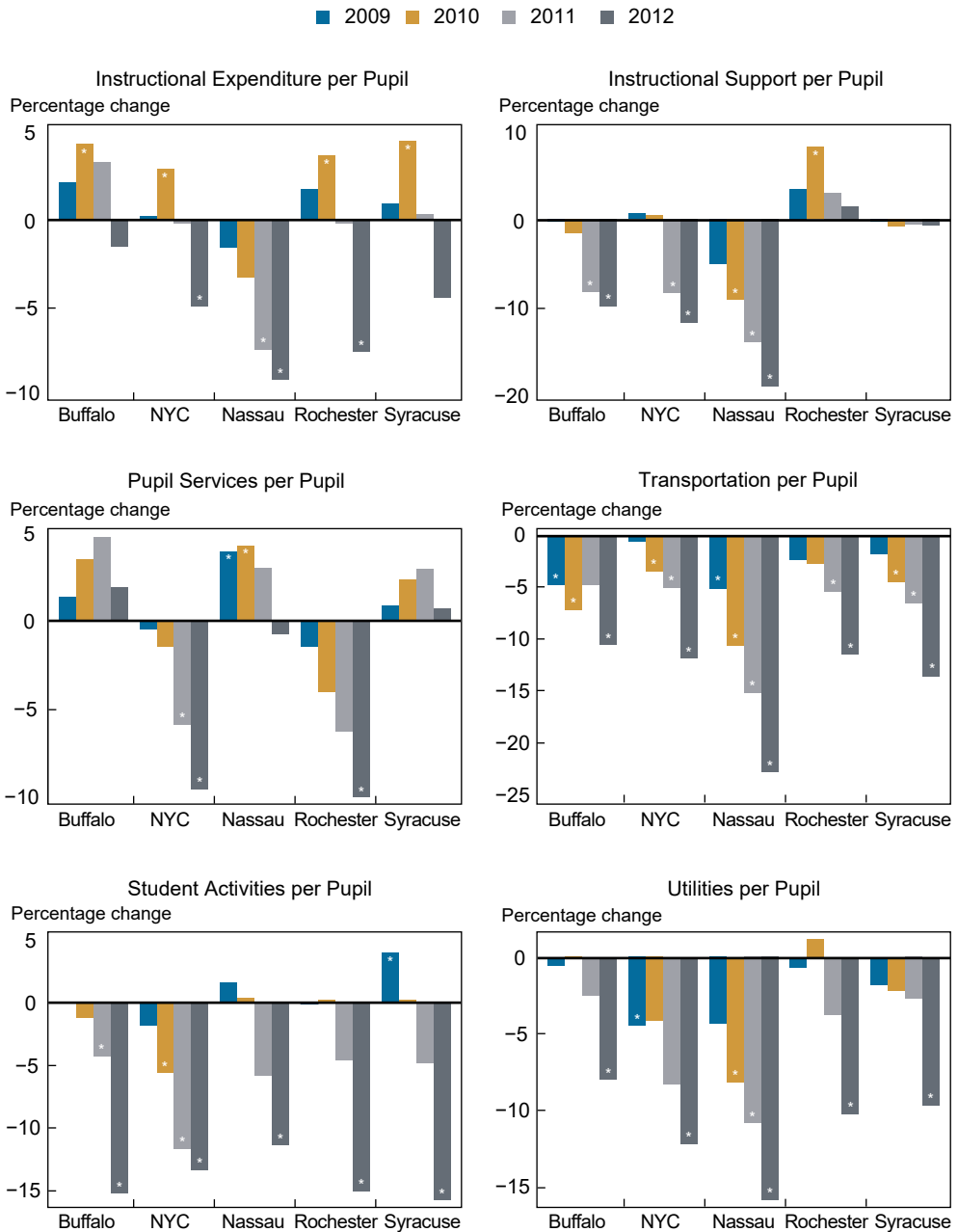
Source: Authors' calculations.

Notes: The chart plots the shifts from the pre-recession trend by region. Asterisk (*) indicates statistical significance at the 10 percent level.

TABLE 4
Examining Heterogeneities in Funding and Expenditure by Metropolitan Area

Panel A

	Total Funding per Pupil					Total Expenditure per Pupil				
	Buffalo	Nassau	NYC	Rochester	Syracuse	Buffalo	Nassau	NYC	Rochester	Syracuse
Percentage shift in 2008-09	1.24*	-3.58*	-2.17**	1.18*	1.24	5.53*	-3.02	-2.82	4.91**	3.56
Percentage shift in 2009-10	1.21	-7.29***	-2.74*	1.38	2.00	5.14	-4.73	-0.01	6.71**	11.24**
Percentage shift in 2010-11	-4.65***	-11.10***	-6.58***	-3.72***	-3.46**	-0.46	-7.47**	-1.50	1.06	8.15
Percentage shift in 2011-12	-7.32***	-13.00***	-11.76***	-8.47***	-7.15***	-3.34	-8.98***	-7.06	-1.64	-0.34
Pre-recession base	$17,682.41	$29,386.12	$26,916.80	$19,033.94	$18,806.60	$18,049.55	$29,688.85	$28,005.98	$19,340.24	$19,502.24
R^2	0.95	0.95	0.96	0.91	0.92	0.72	0.94	0.87	0.62	0.70

Panel B

	Federal Aid per Pupil					State Aid per Pupil				
	Buffalo	Nassau	NYC	Rochester	Syracuse	Buffalo	Nassau	NYC	Rochester	Syracuse
Percentage shift in 2008-09	5.66	-4.49	-7.20	-3.14	-16.57*	3.47***	0.47	5.36***	4.54***	4.40***
Percentage shift in 2009-10	176.73***	136.09***	103.72***	147.60***	121.54***	-3.76*	-17.66***	-7.55*	-4.01***	-2.59
Percentage shift in 2010-11	139.66***	88.25***	75.41***	96.70***	84.78***	-14.89***	-26.96***	-15.82***	-10.72***	-9.38***
Percentage shift in 2011-12	89.22***	22.95*	18.78	58.72***	28.67	-19.98***	-33.67***	-24.10***	-17.93***	-13.49***
Pre-recession base	$525.76	$457.74	$516.37	$641.71	$687.27	$8,237.17	$5,169.66	$3,781.35	$9,299.74	$9,873.53
R^2	0.92	0.77	0.84	0.92	0.82	0.97	0.95	0.97	0.97	0.97

Table 4 (*Continued*)

Panel C

	Property Tax Revenue per Pupil						Local Funding per Pupil				
	Buffalo	Nassau	NYC	Rochester	Syracuse		Buffalo	Nassau	NYC	Rochester	Syracuse
Percentage shift in 2008-09	1.33	-2.72	-1.74**	-1.00	0.44		-3.78***	-5.33**	-4.24***	-4.42***	-3.63***
Percentage shift in 2009-10	5.73	-4.69	-1.27	-0.43	2.60		-4.33***	-7.87**	-4.35***	-3.60***	-2.72
Percentage shift in 2010-11	10.78	-6.92*	-4.42**	0.18	3.38*		-3.04*	-9.61**	-6.84***	-3.70***	-3.74
Percentage shift in 2011-12	17.38	-6.93*	-7.81***	-0.85	4.04		-0.87	-9.31**	-10.41***	-3.88**	-3.12
Pre-recession base	$5,317.75	$20,183.28	$18,063.93	$6,128.23	$5,324.93		$8,677.17	$23,639.10	$22,495.46	$8,861.07	$7,983.63
R^2	0.78	0.97	0.97	0.98	0.97		0.97	0.96	0.97	0.98	0.97

Panel D

	Percentage Federal Aid						Percentage State Aid				
	Buffalo	Nassau	NYC	Rochester	Syracuse		Buffalo	Nassau	NYC	Rochester	Syracuse
Percentage shift in 2008-09	4.30	1.05	-1.45	-1.79	-14.40*		2.08***	2.77***	7.68***	2.99***	2.48***
Percentage shift in 2009-10	174.70***	152.19***	115.08***	145.77***	120.48***		-4.84***	-11.95***	-4.52*	-5.39***	-4.82***
Percentage shift in 2010-11	145.37***	105.52***	92.94***	104.56***	92.77***		-9.90***	-16.27***	-8.62***	-7.30***	-6.73***
Percentage shift in 2011-12	99.53***	44.78***	44.17*	75.29***	43.60**		-11.75***	-19.60***	-10.74***	-9.41***	-7.15***
Pre-recession base	2.88	1.68	1.87	3.29	3.56		45.77	20.54	14.50	48.51	52.09
R^2	0.89	0.80	0.87	0.89	0.77		0.98	0.98	0.98	0.99	0.99

Table 4 (*Continued*)

Panel E

	Percentage Local Funding				
	Buffalo	Nassau	NYC	Rochester	Syracuse
Percentage shift in 2008-09	-4.57***	-1.72***	-2.22***	-5.22***	-4.14***
Percentage shift in 2009-10	-5.31***	-0.21	-1.81***	-4.72***	-4.30***
Percentage shift in 2010-11	1.28	1.97***	-0.57	0.10	0.34
Percentage shift in 2011-12	5.27***	4.06***	0.80	3.90***	4.24**
Pre-recession base	50.01	77.31	83.16	47.00	42.98
R^2	0.99	0.99	0.99	0.99	0.99
Observations	336	929	449	464	343

Source: Authors' calculations.

Notes: *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively. All regressions control for racial composition and percentage of students eligible for free or reduced-price lunch. All financial variables are inflation-adjusted to 2012 dollars.

TABLE 5
Examining Heterogeneities in Expenditure Components by Metropolitan Area

	Instructional Expenditure per Pupil					Instructional Support per Pupil				
	Buffalo	Nassau	NYC	Rochester	Syracuse	Buffalo	Nassau	NYC	Rochester	Syracuse
Percentage shift in 2008-09	2.08	-1.66	0.16	1.68	0.85	-0.31	-5.15	0.62	3.45	-0.31
Percentage shift in 2009-10	4.33***	-3.36	2.85*	3.63***	4.50*	-1.60	-9.26**	0.45	8.24*	-0.79
Percentage shift in 2010-11	3.24	-7.50*	-0.26	-0.27	0.26	-8.41**	-14.13**	-8.53**	3.02	-0.56
Percentage shift in 2011-12	-1.60	-9.26***	-5.05**	-7.63***	-4.55	-10.00**	-19.22***	-11.89**	1.46	-0.73
Pre-recession base	$8,510.27	$15,364.07	$13,374.20	$8,847.00	$8,578.78	$782.41	$1,013.94	$969.34	$910.54	$873.67
Observations	336	929	449	464	343	336	929	449	464	343
R^2	0.88	0.95	0.96	0.84	0.86	0.82	0.90	0.88	0.78	0.90

	Pupil Services per Pupil					Transportation per Pupil				
	Buffalo	Nassau	NYC	Rochester	Syracuse	Buffalo	Nassau	NYC	Rochester	Syracuse
Percentage shift in 2008-09	1.39	4.08**	-0.57	-1.56	0.88	-4.71**	-5.04**	-0.49	-2.23	-1.71
Percentage shift in 2009-10	3.62	4.40**	-1.58	-4.26	2.39	-7.04**	-10.52***	-3.33*	-2.65	-4.38*
Percentage shift in 2010-11	4.95	3.12	-6.21**	-6.65	3.04	-4.69	-14.99***	-4.92*	-5.30*	-6.41*
Percentage shift in 2011-12	1.94	-0.86	-10.07***	-10.51**	0.66	-10.43**	-22.64***	-11.71***	-11.37***	-13.47**
Pre-recession base	$472.32	$843.41	$891.22	$502.28	$434.54	$1,004.32	$1,546.17	$1,321.54	$1,006.74	$1,045.86
Observations	336	929	449	464	343	336	929	449	464	343
R^2	0.90	0.93	0.92	0.84	0.71	0.86	0.97	0.97	0.74	0.79

Table 5 (*Continued*)

	Student Activities per Pupil					Utilities per Pupil				
	Buffalo	Nassau	NYC	Rochester	Syracuse	Buffalo	Nassau	NYC	Rochester	Syracuse
Percentage shift in 2008-09	-0.03	1.54	-1.84	-0.12	3.91**	-0.56	-4.37	-4.50*	-0.68	-1.83
Percentage shift in 2009-10	-1.24	0.32	-5.58**	0.17	0.18	0.03	-8.20*	-4.19	1.16	-2.21
Percentage shift in 2010-11	-4.25*	-5.80	-11.65***	-4.62	-4.85	-2.51	-10.90**	-8.33	-3.76	-2.73
Percentage shift in 2011-12	-15.16***	-11.34***	-13.34***	-14.96***	-15.68***	-8.02*	-15.95***	-12.28**	-10.28***	-9.73**
Pre-recession base	$206.65	$345.02	$356.60	$269.10	$268.15	$4,127.96	$7,603.41	$6,266.24	$4,396.62	$4,046.05
Observations	336	929	449	464	343	336	929	449	464	343
R^2	0.95	0.95	0.97	0.90	0.93	0.93	0.97	0.96	0.91	0.94

Source: Authors' calculations.

Notes: *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively. All regressions control for racial composition and percentage of students eligible for free or reduced-price lunch. All financial variables are inflation-adjusted to 2012 dollars.

Looking at the components of expenditure (Table 5 and Chart 6), we see some differences in how districts in the various metropolitan areas allocated their funds. Metro areas maintained or increased their instructional expenditure (relative to trend) in the first two years. However, most metro areas subsequently experienced drops in 2011 and 2012. Nassau experienced the largest percentage decline from trend in 2012, followed by Rochester and then NYC.

Noninstructional categories were affected differently across the metro areas, but there were some commonalities. Utilities and transportation experienced the most consistent cuts over time and across metro areas. In some cases, there were increases in some categories without a subsequent decrease, such as Rochester's increase in instructional support per pupil or Nassau's increase in pupil services per pupil, but such cases were exceptions to the overall trend of cuts.

Overall, Nassau experienced the largest reductions, followed by NYC. Buffalo experienced the smallest declines in funding and was able to maintain instructional expenditure. We see that 2012 was the hardest year for all metro areas, with the ebbing of federal stimulus funds. Although most districts were able to avoid cuts to instructional expenditure per pupil in the earlier years, all districts experienced sharp cuts to instructional expenditure in 2012, with most of the shifts being statistically significant.

4. Conclusion

This article investigates school finance patterns in New York during and following the Great Recession, years characterized by the influx of the federal stimulus funding and its subsequent withdrawal. We find that school funding and expenditure remained on trend during the recession and immediately after when the stimulus funding was in effect (consistent with the findings of Chakrabarti, Livingston, and Setren [2015]). But in fiscal years 2011 and 2012, especially in 2012, there were significant cuts to both funding and expenditure. This reduction is in line with the drawdown of the stimulus aid and the relative lack of improvement in the economy.

Looking at the composition of school district expenditures, we find that districts preserved their instructional expenditure during and immediately following the Great Recession. But in 2012, as the stimulus waned and state aid continued to decline, instructional expenditure per pupil saw sharp declines. In contrast, many noninstructional expenditure categories were cut during and immediately following the recession, even during the stimulus period. These categories not only continued to be below trend through 2012, but the cuts were markedly deeper in the medium term than in the short term.

By conducting separate analyses for individual metro areas, we are able to see some interesting variations across the state. NYC and Nassau experienced the largest reductions in funding. All metro areas experienced perceptible declines in instructional expenditure per pupil by 2012, although they were not statistically significant for Syracuse and Buffalo. The stimulus was meant to stave off tough decisions. While the stimulus seems to have helped (especially in maintaining instructional expenditure), it was only temporary and ended before the state and local economies had fully recovered, leaving districts with tight budget restrictions. Widespread cuts in all expenditure categories followed in 2011 and 2012, especially in 2012. This included economically (and statistically) meaningful cuts in instructional expenditure, the category most relevant for student learning.

Building on Chakrabarti, Livingston, and Setren (2015), which looks at the short-term effects of the Great Recession on school finances, this article investigates whether the picture continued to be similar in the medium term, too. The goal of this analysis has been to shed light on the dynamics of school district finances during crises in the medium term, especially whether school districts are able to sustain the trend in school finances as federal support recedes. Interestingly, we find that instructional expenditure per pupil as well as total funding and total expenditure per pupil continued to be on trend when the federal stimulus was in effect. In contrast, deep cuts were seen in later years when the federal support eroded and the economy continued to be weak. This pattern highlights the importance of federal support at critical times when other forms of government funding are tight. An important takeaway is that similar fiscal intervention might be useful in future economic downturns for softening the blow of fiscal crises on school districts. As for the most recent crisis, we expect that as the economy improves and state and local funding increase, school district funding will also improve. But it remains to be seen what effect the multi-year cuts in expenditure will have on student learning and development.

TABLE 1A
Coefficient Estimates for Trend Shifts in Funding and Expenditure by Metropolitan Area

Total Funding per Pupil

	Buffalo	Nassau	NYC	Rochester	Syracuse
2009	219.57* (124.76)	-1,052.19* (590.68)	-584.68** (224.57)	225.03* (127.59)	232.73 (195.16)
2010	213.92 (161.54)	-2,143.37*** (806.76)	-738.27* (388.48)	262.88 (174.26)	376.26 (280.73)
2011	-821.93*** (188.27)	-3,262.85*** (951.00)	-1,771.37*** (474.77)	-708.28*** (237.66)	-650.40** (313.60)
2012	-1,293.48*** (239.31)	-3,819.27*** (909.06)	-3,165.98*** (474.73)	-1,612.93*** (310.79)	-1,345.07*** (378.98)

Total Expenditure per Pupil

	Buffalo	Nassau	NYC	Rochester	Syracuse
2009	997.85* (561.89)	-895.19 (560.57)	-790.76 (536.37)	949.92** (363.68)	694.97 (417.18)
2010	928.36 (603.89)	-1,404.71 (868.69)	-2.69 (1139.80)	1,298.05** (534.16)	2,192.23** (941.13)
2011	-82.89 (635.24)	-2,217.46** (1,079.09)	-419.10 (1,324.15)	204.71 (629.37)	1,589.09 (977.22)
2012	-603.49 (749.37)	-2,666.33*** (991.98)	-1,978.39 (1,328.57)	-316.23 (873.88)	-65.77 (1,029.98)

Federal Aid per Pupil

	Buffalo	Nassau	NYC	Rochester	Syracuse
2009	29.74 (18.85)	-20.56 (31.34)	-37.18 (65.09)	-20.16 (25.63)	-113.88* (61.18)
2010	929.17*** (29.83)	622.94*** (43.99)	535.59*** (104.04)	947.17*** (41.89)	835.34*** (102.28)
2011	734.30*** (53.48)	403.96*** (48.34)	389.41*** (119.14)	620.54*** (58.41)	582.69*** (120.92)
2012	469.10*** (49.19)	105.03** (52.32)	96.99 (160.06)	376.80*** (77.92)	197.06 (139.20)

State Aid per Pupil

	Buffalo	Nassau	NYC	Rochester	Syracuse
2009	286.15*** (84.37)	24.29 (88.65)	202.67*** (72.12)	422.16*** (82.55)	434.77*** (117.50)
2010	-309.43* (155.27)	-913.21*** (121.59)	-285.53*** (111.98)	-373.07*** (112.89)	-255.80 (173.88)
2011	-1,226.27*** (171.38)	-1,393.68*** (172.13)	-598.28*** (155.36)	-997.02*** (152.06)	-926.17*** (204.52)
2012	-1,645.67*** (240.20)	-1,740.42*** (207.86)	-911.19*** (182.77)	-1,667.31*** (182.75)	-1,331.88*** (251.76)

TABLE 1A (CONTINUED)

Property Tax Revenue per Pupil

	Buffalo	Nassau	NYC	Rochester	Syracuse
2009	70.67 (86.26)	-549.99 (479.39)	-314.34** (119.19)	-61.16 (49.42)	23.54 (61.96)
2010	304.89 (248.03)	-945.78 (659.70)	-229.17 (255.97)	-26.26 (68.09)	138.34 (89.78)
2011	573.00 (385.33)	-1,396.27* (715.62)	-798.19** (306.96)	11.00 (89.62)	179.87* (105.82)
2012	924.14 (618.98)	-1,399.34* (813.50)	-1,411.56*** (274.21)	-52.15 (122.58)	214.95 (188.40)

Percentage Federal Aid

	Buffalo	Nassau	NYC	Rochester	Syracuse
2009	0.12 (0.10)	0.02 (0.18)	-0.03 (0.12)	-0.06 (0.28)	-0.51* (61.96)
2010	5.04*** (0.20)	2.56*** (0.16)	2.16*** (0.33)	4.79*** (0.21)	4.28*** (0.51)
2011	4.19*** (0.27)	1.77*** (0.16)	1.74*** (0.38)	3.44*** (0.30)	3.30*** (0.59)
2012	2.87*** (0.29)	0.75*** (0.17)	0.83* (0.47)	2.47*** (0.40)	1.55** (0.68)

Local Funding per Pupil

	Buffalo	Nassau	NYC	Rochester	Syracuse
2009	-327.86*** (80.46)	-1,259.01** (562.10)	-954.42*** (149.82)	-391.49*** (64.34)	-289.75*** (103.95)
2010	-376.12*** (101.72)	-1,861.52** (777.60)	-978.32*** (299.22)	-319.00*** (95.20)	-217.46 (183.06)
2011	-263.73* (135.81)	-2,271.00** (913.74)	-1,539.13*** (363.84)	-328.15*** (121.37)	-298.66 (178.54)
2012	-75.76 (183.32)	-2,200.00** (841.40)	-2,340.88*** (338.75)	-343.90** (160.59)	-248.97 (233.83)

Percentage State Aid

	Buffalo	Nassau	NYC	Rochester	Syracuse
2009	0.95*** (0.33)	0.57*** (0.20)	1.11*** (0.23)	1.45*** (0.24)	1.29*** (0.37)
2010	-2.22*** (0.55)	-2.45*** (0.25)	-0.66* (0.34)	-2.62*** (0.36)	-2.51*** (0.63)
2011	-4.53*** (0.68)	-3.34*** (0.36)	-1.25*** (0.42)	-3.54*** (0.47)	-3.50*** (0.73)
2012	-5.38*** (0.93)	-4.03*** (0.43)	-1.56*** (0.46)	-4.56*** (0.60)	-3.73*** (0.84)

TABLE 1A (CONTINUED)

Percentage Local Funding

	Buffalo	Nassau	NYC	Rochester	Syracuse
2009	-2.28***	-1.33***	-1.84***	-2.46***	-1.78***
	(0.31)	(0.32)	(0.32)	(0.22)	(0.28)
2010	-2.65***	-0.17	-1.51***	-2.22***	-1.85***
	(0.49)	(0.26)	(0.45)	(0.33)	(0.41)
2011	0.64	1.52***	-0.47	0.05	0.15
	(0.60)	(0.35)	(0.51)	(0.41)	(0.52)
2012	2.64***	3.14***	0.66	1.83***	1.82**
	(0.82)	(0.44)	(0.67)	(0.48)	(0.69)
Observations	336	929	449	464	343

Source: Authors' calculations.

Notes: The table presents coefficients from our regressions using specification (1).
*, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.
Robust standard errors adjusted for clustering by school district are in parentheses.
All regressions control for racial composition and percentage of students eligible for free or reduced-price lunch.

TABLE 2A
Coefficient Estimates for Trend Shifts in Expenditure Components by Metropolitan Area

	Instructional Expenditure per Pupil					Instructional Support per Pupil				
	Buffalo	Nassau	NYC	Rochester	Syracuse	Buffalo	Nassau	NYC	Rochester	Syracuse
Trend	118.66*** (28.15)	285.26* (147.49)	180.23*** (53.38)	148.30*** (33.12)	151.65** (58.43)	21.51*** (5.98)	38.44*** (10.70)	19.53** (9.63)	23.53* (12.75)	19.85*** (7.18)
2009	177.37 (122.52)	-255.32 (309.69)	21.42 (131.56)	148.50 (95.39)	72.91 (122.02)	-2.40 (20.22)	-52.24 (32.32)	6.06 (19.12)	31.37 (21.88)	-2.71 (22.90)
2010	368.81*** (116.67)	-516.08 (484.93)	381.42* (192.28)	321.38*** (100.05)	385.98* (215.69)	-12.49 (23.67)	-93.88** (45.07)	4.37 (30.38)	75.02* (40.39)	-6.94 (35.17)
2011	275.89 (203.19)	-1,151.73* (631.29)	-34.27 (223.70)	-24.16 (133.46)	22.32 (249.23)	-65.79** (26.32)	-143.30** (56.74)	-82.69** (38.86)	27.51 (50.78)	-4.93 (51.93)
2012	-136.46 (187.54)	-1,422.17*** (439.94)	-674.78** (282.80)	-675.05*** (187.05)	-390.05 (287.80)	-78.21** (34.39)	-194.84*** (65.98)	-115.26** (52.63)	13.32 (74.82)	-6.34 (54.24)
Observations	336	929	449	464	343	336	929	449	464	343
R^2	0.88	0.95	0.96	0.84	0.86	0.82	0.90	0.88	0.78	0.90

TABLE 2A (CONTINUED)

	Pupil Services per Pupil					Transportation per Pupil				
	Buffalo	Nassau	NYC	Rochester	Syracuse	Buffalo	Nassau	NYC	Rochester	Syracuse
Trend	6.67** (3.00)	6.65 (6.85)	33.32*** (8.43)	16.07*** (4.20)	7.92 (5.09)	26.14*** (8.37)	58.95*** (16.02)	33.80*** (8.62)	37.02*** (5.83)	39.20*** (10.90)
2009	6.56 (6.91)	34.38** (16.69)	-5.11 (10.09)	-7.83 (10.70)	3.83 (12.86)	-47.32** (22.29)	-77.96** (36.63)	-6.52 (17.01)	-22.46 (24.65)	-17.84 (23.87)
2010	17.12 (10.96)	37.09** (17.33)	-14.04 (16.50)	-21.41 (28.15)	10.39 (23.30)	-70.66** (30.70)	-162.73*** (55.40)	-44.03* (24.95)	-26.69 (27.25)	-45.82* (23.20)
2011	23.38 (14.24)	26.29 (23.63)	-55.35** (21.77)	-33.38 (25.18)	13.22 (31.90)	-47.09 (42.44)	-231.84*** (65.91)	-65.06* (35.27)	-53.39* (27.23)	-67.06* (37.66)
2012	9.18 (17.77)	-7.24 (30.19)	-89.78*** (24.52)	-52.79** (25.43)	2.86 (33.45)	-104.72** (46.64)	-350.12*** (78.69)	-154.70*** (42.03)	-114.48*** (34.92)	-140.86** (54.98)
Observations	336	929	449	464	343	336	929	449	464	343
R^2	0.90	0.93	0.92	0.84	0.71	0.86	0.97	0.97	0.74	0.79

TABLE 2A (CONTINUED)

	Student Activities per Pupil					Utilities per Pupil				
	Buffalo	Nassau	NYC	Rochester	Syracuse	Buffalo	Nassau	NYC	Rochester	Syracuse
Trend	7.57*** (1.32)	10.53*** (2.59)	11.27*** (2.91)	13.04*** (1.78)	9.72*** (1.81)	91.74** (36.43)	131.34 (132.51)	203.63*** (69.12)	145.71*** (20.03)	121.64*** (37.19)
2009	-0.06 (2.59)	5.31 (5.24)	-6.55 (5.87)	-0.32 (4.19)	10.48** (4.93)	-23.08 (59.09)	-332.55 (234.49)	-281.87* (152.52)	-29.98 (55.68)	-73.98 (71.37)
2010	-2.57 (3.50)	1.10 (8.93)	-19.90** (9.87)	0.46 (6.81)	0.49 (7.58)	1.43 (95.52)	-623.24* (333.50)	-262.70 (170.59)	51.21 (81.99)	-89.59 (107.10)
2011	-8.77* (5.01)	-20.02 (12.46)	-41.56*** (12.54)	-12.43 (8.67)	-13.01 (9.44)	-103.77 (132.73)	-828.74** (353.41)	-522.14 (342.59)	-165.41 (101.38)	-110.57 (127.27)
2012	-31.33*** (7.02)	-39.11** (16.39)	-47.56*** (15.09)	-40.26*** (10.35)	-42.06*** (12.13)	-331.20* (171.59)	-1,212.60*** (394.14)	-769.24** (368.42)	-451.91*** (155.76)	-393.49** (172.98)
Observations	336	929	449	464	343	336	929	449	464	343
R^2	0.95	0.95	0.97	0.90	0.93	0.93	0.97	0.96	0.91	0.94

Source: Authors' calculations.

Notes: The table presents coefficients from our regressions using specification (1). *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively. Robust standard errors adjusted for clustering by school district are in parentheses. All regressions control for racial composition and percentage of students eligible for free or reduced-price lunch.

Notes

[1] Authors' calculations, using data from the Common Core of Data of the National Center for Education Statistics (NCES).

[2] The effects for Buffalo and Syracuse were not statistically significant.

[3] See, for example, Duncombe and Yinger (2000, 2011), Rubenstein et al. (2007), Baker (2009), and Stiefel and Schwartz (2011).

[4] These estimates include State Fiscal Stabilization Funds, Title I Part A–Supporting Low-Income Schools; IDEA Grants, Part B & C–Improving Special Education Programs; and Education Technology Grants. This total does not include competitive grants such as Race to the Top. Source: http://www2.ed.gov/policy/gen/leg/recovery/state-fact-sheets/index.html (accessed March 20, 2019).

[5] We consider 2007-08 as the immediate pre-recession year.

[6] School districts can move funds across years or can resort to borrowing to finance expenses. For these reasons, total expenditure does not necessarily equal total funding.

References

Baker, B. D. 2009. "Within-District Resource Allocation and the Marginal Costs of Providing Equal Educational Opportunity: Evidence from Texas and Ohio." Education Policy Analysis Archives 17, no. 3 (February): 1-31.

Bhalla, R., R. Chakrabarti, and M. Livingston. 2017. "A Tale of Two States: The Recession's Impact on N.Y. and N.J. School Finances." Federal Reserve Bank of New York Economic Policy Review 23, no. 1 (February): 31-42.

Chakrabarti, R., M. Livingston, and J. Roy. 2014. "Did Cuts in State Aid During the Great Recession Lead to Changes in Local Property Taxes?" Education Finance and Policy 9, no. 4 (Fall): 383-416.

Chakrabarti, R., M. Livingston, and E. Setren. 2015. "The Great Recession's Impact on School District Finances: Evidence from New York." Federal Reserve Bank of New York Economic Policy Review 21, no. 1 (October): 45-66.

Chakrabarti, R., and S. Sutherland. 2013a. "Precarious Slopes? The Great Recession, Federal Stimulus, and New Jersey Schools." Federal Reserve Bank of New York Economic Policy Review 19, no. 2 (December): 41-65.

———. 2013b. "New Jersey's Abbott Districts: Education Finances during the Great Recession." Federal Reserve Bank of New York Current Issues in Economics and Finance 19, no. 4: 1-11.

Duncombe, W., and J. Yinger. 2000. "Alternative Paths to Property Tax Relief." Syracuse University working paper.

———. 2011. "Making Do: State Constraints and Local Responses in California's Education Finance System." International Tax and Public Finance 18, no. 3 (June): 337-68.

Dye, R., and A. Reschovsky. 2008. "Property Tax Responses to State Aid Cuts in the Recent Fiscal Crisis." Public Budgeting and Finance 28, no. 2 (Summer): 87-111.

Rubenstein, R., A. E. Schwartz, L. Stiefel, and H. B. Hadj Amor. 2007. "From Districts to Schools: The Distribution of Resources across Schools in Big City School Districts." Economics of Education Review 26, no. 5: 532-45.

Stiefel, L., and A. E. Schwartz. 2011. "Financing K-12 Education in the Bloomberg Years, 2002-2008." In J. A. O'Day, C. S. Bitter, and L. M. Gomez, eds., Education Reform in New York City: Ambitious Change in the Nation's Most Complex School System. Cambridge, Mass.: Harvard Education Press.