Economics of Education Review 66 (2018) 167–182

Contents lists available at ScienceDirect

Economics of Education Review

journal homepage: www.elsevier.com/locate/econedurev

Educational resources and student achievement: Evidence from the Save Harmless provision in New York State

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ARTICLE INFO

JEL Codes:
I22
C36
H75

ABSTRACT

A long-standing debate in the economics of education literature is whether increasing educational resources moves the needle on student achievement. Education finance reformers advocate delivering extra resources to disadvantaged school districts to close academic achievement gaps, but their efforts are subject to criticism from skeptics who believe that extra resources do not actually improve performance. This study leverages variation in per-pupil expenditures from a specific provision of the state aid formula in New York State that allows districts to maintain prior levels of total state aid even as their student enrollment declines. We uncover achievement gains of approximately 0.047 standard deviations in math and 0.042 standard deviations in English corresponding to $1000 in additional per-pupil spending. This study strengthens the case that school resources matter, and that sustained financial investments can help districts maintain and improve quality of public education.

1. Introduction

Disparities between disadvantaged students and their wealthy counterparts are a regular empirical finding in the education literature. Racial minorities have on average lower scores on standardized achievement tests and lower graduation rates (Fryer & Levitt, 2006; Hanushek & Rivkin, 2006; Heckman & LaFontaine, 2010). Research suggests that much of this gap reflects underlying socioeconomic differences (Clotfelter, Ladd, & Vigdor, 2009; Fryer & Levitt, 2004). Today, individuals in the lowest income decile have four years less educational attainment than individuals in the highest income decile, at a time when education has become even more essential to financial stability. Between 1997 and 2007, wages grew by 25% for college graduates, while they stagnated for high school graduates and declined by 13% for high school dropouts (Duncan & Murnane, 2011). If education and income are causally linked, achievement gaps will lead to widening socioeconomic disparities and income inequality.

While consensus exists on the presence and consequences of academic achievement gaps, solutions remain more controversial. Many reform efforts have focused on delivering extra funding to low-performing schools. The first series of U.S. education finance reforms focused on equalizing educational expenditures between districts, and the second series then attempted to deliver supplementary resources to low-performing districts to account for high need student populations. But while states nationwide have been largely successful in these instrumental goals, disparities in performance persist (Lafortune, Rothstein, & Schanzenbach, 2016; Yinger 2004). Hanushek (1994) documents 3.5% real annual increases in per-pupil expenditures (PPE) between 1970 and 1990, and Bifulco (2005) documents that, since 1987, PPE in the average black student's district have outpaced those in the average white student's district by approximately $400. Despite these massive investments, there have been few obvious improvements in disadvantaged public school districts, and a complicated empirical history has left researchers unconfident in claiming a definitive causal link between educational expenditures and student performance.

Dating back to early attempts in the 1960′s (Coleman, 1966) scholars struggled to link educational resources to a definitive positive impact on student achievement. In the late 1990′s, two teams conducted a famous pair of metanalyses on the topic, with Hanushek (1997) claiming no relationship and Greenwald, Hedges, and Laine (1996) claiming a positive relationship. As this history pre-dated the widespread adoption of quasi-experimental methods in economics research, it is now clear that the early body of research failed to identify the nature of this relationship. Jackson, Johnson, and Persico (2016) suggest that direct estimates of the effect of educational resources on student performance are likely to be biased downwards, since educational policymakers often invest additional resources to low performing schools. This phenomenon creates a simultaneity issue that cannot be directly controlled for and which must be addressed through experimental or quasi-experimental methods.

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https://doi.org/10.1016/j.econedurev.2018.08.004
Received 2 April 2018; Received in revised form 2 August 2018; Accepted 14 August 2018
Available online 20 August 2018

More recent research, focusing mostly on the impacts of state level school finance reforms (SFRs) has found evidence that is suggestive of a positive relationship between educational resources and student achievement which develops over time (Lafortune et al., 2016; Card & Payne, 2002; Guryan, 2001). An influential study on this subject by Jackson et al. (2016), measures the effect of per pupil educational expenditures on long term student outcomes and finds a positive effect that is stronger for disadvantaged students. Papke (2005) estimates the effect of per-pupil expenditures on immediate academic achievement estimate, using exogenous variation in state educational aid resulting from Michigan's school finance reform to identify positive impacts on student outcomes. She finds that a 10% increase in current year per-pupil expenditures is associated with a 2 percentage point increase in the pass rate on year end examinations. More recently, Lafortune et al. (2016) explore the impacts of statewide school finance reforms on immediate academic outcomes in a national sample and estimate treatment effects of 0.01 to 0.024 standard deviations per $1000 of per-pupil expenditures, one of the most clear and intuitive estimates currently available.

While scholars are now beginning to accept a positive relationship between spending and student achievement, it is important to explore how this relationship holds up in different contexts. The literature is mostly comprised of SFR studies, which examine the effects of delivering large exogenous increases of funding to low-performing school districts. However, there are many other circumstances in school finance systems that can lead to variation in educational spending. For instance, a recent working paper by Jackson, Wigger and Xiong (2018) explores the effect of budgetary cuts on student achievement, an effect that may plausibly differ from the effects of a budgetary increase. Once again, they find evidence of a positive relationship between spending and achievement.

This paper contributes to the literature by employing quasi-experimental methods to investigate variation in educational spending resulting from another unique budgetary circumstance. During the 2007-08 school year, NYS reformed its education finance system and implemented a need-based foundation aid formula that included a number of idiosyncratic rules and policies. One of these provisions was the continuation of a policy called “Save Harmless”, which stipulated that districts could not lose money if their estimated need declined. The largest impact of this provision was that districts did not lose funding when their enrollment decreased, leading districts with declining enrollment to have systematically higher per-pupil expenditures. While this policy was in place, New York experienced the highest levels of population loss in the country, causing significant changes in enrollment and rapidly compounding increases in resources available per pupil. The confluence of these factors offers an opportunity to explore a new budgetary dynamic that has not yet been examined: What happens when schools maintain constant levels of funding, but distribute them to student populations that are rapidly fluctuating in size?

By controlling for demographic changes associated with these enrollment losses, we can isolate plausibly exogenous variation in school resources associated with enrollment change. Leveraging this variation through instrumental variable estimation, we find positive effects of expenditures on elementary and middle school test scores. Our estimates are comparable in magnitude to those of Lafortune et al. (2016). We probe the validity of these inferences, specifically the validity of our exclusion restriction assumptions, through a series of robustness checks assessing key threats to validity and emerge confident that we have identified a true spending effect. We conclude that the Save Harmless policy treatment provides reasonably exogenous variation in school resources, conditional on district and year fixed effects, district enrollment and district level demographic composition.

This study is the first to our knowledge to assess the impact of a Save Harmless provision on student achievement. In addition, it is the first to estimate the impacts of educational resources in New York State following their 2007 school finance reform, and the most recent estimate of the impact of current year educational resources on immediate academic outcomes. Since the New York reform has been noteworthy to scholars for both the magnitude of its investments, and the political controversies surrounding it, identification of the effects of these investments can inform arguments about optimal levels of spending and possible adjustments to state aid formulas.

2.1. Background on school finance reforms

Traditionally districts serving poor students have weaker property tax bases and therefore less revenue available per pupil. These funding gaps between socioeconomically disadvantaged and wealthy public school districts have acted as a common target for educational reforms. Such efforts led to state-level school finance reforms (SFR's) beginning in that 1970′s, which sought to equalize spending across districts, and adequacy-based SFR's beginning in the 1980′s and 1990′s which delivered extra resources to low-performing districts. Hanushek (1994) charts the trajectory of the early equity-based finance reforms, documenting 3.5% annual increases in expenditures between 1970 and 1990. Lafortune et al. (2016) analyze later adequacy-based reforms and document a 40% increase in spending between 1990 and 2012, which was concentrated in low-performing districts.

An extensive literature now examines the impacts of SFR's not only on funding levels but also on student achievement. Card and Payne (2002) analyze a national sample of pre-1992 data and suggest that SFR's led to reduction in achievement gaps between rich and poor students. Guryan (2001) found mixed evidence that SFR's improved test scores in Massachusetts. SFR's in California, Kansas, Kentucky, and Michigan were also examined, with mixed results (Clark, 2003; Deke, 2003; Downes, 1992; Roy, 2011). The heterogeneity of results across different contexts led most to consider the effect of SFR's an open question until recently. Two national quasi-experimental analyses have recently changed this perception, leading to a broader consensus that SFR's improve student performance. Lafortune et al. (2016) analyze post-1990 reforms and found effects on student achievement that develop incrementally over time. Jackson et al. (2016), summarized in more detail below, looked broadly at historical school finance reforms and long-term student outcomes using an event study design. However, now that these precedents have been established, new research is needed to demonstrate that these findings hold up in different institutional contexts.

A parallel line of inquiry attempts to parameterize the relationship between per-pupil educational spending and student achievement. An extensive associational literature has attempted to document this relationship; however, it has been subject to persistent controversy as researchers disagree over whether the evidence conclusively demonstrates that this connection exists. In the late 1990′s, several independent research teams analyzed the existing literature, and arrived at different and contradictory conclusions about the relationship between school spending and school performance (Greenwald et al., 1996; Hanushek, 1997; and Verstegen & King, 1998). High quality experimental and quasi-experimental research has shown that reducing class size increases student achievement (Angrist & Lavy, 1999; Krueger 1999), but some have shown null effects (Hoxby, 2000). Others have warned that the benefits of class size reductions when implemented at scale may be tempered by general equilibrium effects on teacher quality (Jepsen and Steven 2002).

Many of the earliest studies on school resources employed education production function designs with endogenous operationalization of school resources. Because education policy-makers commonly deliver extra resources to low-performing schools or cohorts of students with higher need, direct estimates of this relationship, even with district fixed effects, will likely be biased downwards. More sophisticated contemporary research has used quasi-experimental methods to estimate effects of educational expenditures on student outcomes. Using state aid reforms as an instrument for educational expenditures,