ESSER Funding and School System Jobs: Evidence from Job Posting Data

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Abstract

The Elementary and Secondary School Emergency Relief Fund (ESSER) was the largest one-time federal investment in K–12 schools in history, funneling almost $200 billion to states and school districts. We use novel data from Washington State to investigate the extent to which ESSER funding causally influenced spending on school personnel. We argue one cannot infer this directly from ESSER claims data because of the fungibility of school budgets. Thus, we rely on a more direct signal of district hiring decisions: public education job postings scraped from district hiring websites. To address endogeneity concerns, our preferred approach employs an instrumental variables strategy that exploits a formula mechanism used to determine Title I funding for 2020–21 (and thus ESSER allocations in 2022) based on the number of Title I formula-eligible children. We find strong, arguably causal, evidence that public school hiring increased in response to the availability of ESSER funding. Specifically, we estimate that each $1,000 in ESSER allocations caused districts to seek to hire $206 in additional staff, disproportionately teachers. These estimates suggest that roughly 12,000 new staff (including 5,100 teachers) were hired in Washington because of ESSER. In the absence of new funding, school staffing budgets will likely need to contract substantially following the sunset of ESSER.

1. Introduction

In response to the COVID-19 pandemic, the federal government approved nearly $200 billion in funding for states and school districts as part of the Elementary and Secondary School Emergency Relief Fund (ESSER). ESSER is the largest one-time federal investment in K–12 schools in history. This unprecedented influx of federal dollars to school systems was designed to help schools safely restart in-person instruction and recover from significant pandemic-related learning losses.[1] School districts (local education agencies, LEAs) received 90% of ESSER allocations, 20% of which was mandated to be spent to address learning loss.[2] Understanding the ways school districts used these funds and to what end is an important issue for policymakers and the public about which surprisingly little is known.[3] Moreover, ESSER spending on staffing represents a vital policy issue because the number of jobs *created* by ESSER provides an estimate of the number of jobs, in the absence of additional funding, that may need to be *reduced* once ESSER expires.

The core question in this paper is the extent to which ESSER funding fueled new hiring by school districts *that would not have happened otherwise*.[4] But assessing ESSER's effects on staffing decisions is complicated by three issues. First, school spending is often fungible across

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[1] There is evidence of widespread test score declines, relative to prepandemic levels of achievement, in math and reading/ELA on state assessments, National Assessment of Educational Progress (NAEP) tests, and other widely administered tests (Goldhaber, Kane, et al., 2023; Jack et al., 2023; Lewis et al., 2021; National Center for Education Statistics, 2022a, 2022b).
[2] The remaining 10% of ESSER allocations went to state education agencies (SEAs) to support administrative costs, as well as statewide initiatives and support for districts (U.S. Department of Education, 2022).
[3] For example, there is limited empirical evidence about the extent to which school system ESSER investments are helping students recover from pandemic-era learning loss (Shores & Steinberg, 2022a). Evidence on the efficacy of specific ESSER-funded initiatives is mixed (Callen et al., 2023), but several studies conclude that, overall, students are still not achieving at prepandemic levels (Jack & Oster, 2023; Lewis & Kuhfeld, 2023). On the other hand, a recent report suggests that ESSER spending helped the U.S. mitigate learning losses relative to other nations (White House Council of Economic Advisors, 2023).
[4] An analysis of a large national sample of school district spending plans suggests that a major area of ESSER investment has been personnel (DiMarco & Jordan, 2022). Indeed, the Bureau of Labor Statistics and Census Bureau data show that K–12 employment has grown over the last three years, with public schools now employing more full-time instructional staff than before the pandemic (Aldeman, 2023a, 2023b).

funding sources (Brunner et al., 2022; Gordon, 2004; Lauth & Robbins, 2002), so districts may have claimed ESSER funds for positions that still would have existed in the absence of ESSER funding. As a concrete example of this issue, we argue there is little reason to think that availability of ESSER would impact school districts' posting positions for new superintendents, and we would assume all superintendent positions are staffed and funded in the absence of ESSER. And yet we still observe about $288,000 of ESSER funds claimed for superintendent salaries. This anecdote suggests that some district expenses that would have been funded through a typical operating budget were supported by ESSER, at least in an accounting sense.

A second issue is that limitations in the timing and coverage of administrative data for hiring means that we cannot observe all hires, and certainly not all hires across job categories, with administrative data alone. And a final analytic issue is that, because ESSER funds targeted schools on some unobservable (to us) dimensions, it is not straightforward to causally identify ESSER's influence above and beyond other factors that drive spending and hiring.

We address these issues using a more direct measure of district hiring: novel job postings data gathered from school system websites in Washington State. We also use an instrumental variables (IV) identification strategy that uses the number of "formula-eligible children" (FEC) in a district as an instrument for ESSER allocations. More specifically, we explore the effects of ESSER on school staffing in Washington by addressing the following questions:

1. What was the impact of ESSER on school district hiring in Washington State?
2. To what extent did ESSER impacts on hiring vary across job categories?

To address our first research question, our goal is to provide causal evidence on how ESSER funding impacted school hiring. Because of limitations in the data capturing school districts' ESSER expenditure claims, we utilize novel job postings data gathered from school system websites in Washington State to directly measure district hiring and link this to publicly available administrative data about school districts and ESSER allocations. First, we estimate descriptive ordinary least squares (OLS) models that compare across observably similar districts that received different ESSER allocations. The results suggest that a $1,000 increase in ESSER allocations predicts a $229 increase in district *presumed* hiring costs (i.e., the cost of salaries implied by all jobs posted in a district, which we call "projected post costs"). We should, however, be wary of interpreting these estimates as causal because of the likelihood that ESSER (and Title I) allocations are correlated with omitted variables that also impact hiring. For example, if districts with more children in the high-need categories that go into Title I formula calculation (that consequently receive more ESSER funding) would have hired more staff *in the absence of ESSER funds*—either to meet the needs of these children or because of greater prior attrition that is also unobservable—then the naïve estimates would overstate the effects of ESSER on presumed hires.

We therefore use an instrumental variables (IV) approach to isolate the plausibly causal impact of ESSER on district hiring. Specifically, we use counts of FEC for the 2020–21 school year—the measure predominantly used to determine Title I funding—to instrument for district ESSER allocations.[5] The identifying assumption in these models is that the number of FEC living in a district, the majority of which come from 2018 Census counts of children in poverty, does not affect district hiring plans in 2022 once we control for district enrollment, free or reduced price lunch (FRPL) qualification, demographic representation, and historical district

[5] Title I funding is only partly determined by formula-eligible child counts; it is also influenced by factors such as hold harmless (from reductions in formula-eligible children) provisions and decisions by districts about participation in Title I. Hold harmless adjustments are the preservation of a certain portion of Title I funding from the prior fiscal year once a district has fallen below a qualification threshold. Importantly, these adjustments not only bump up the funding of districts that no longer qualify for a given Title I grant but also bump down the allocations promised to remaining districts, as the state makes these adjustments within a budget. For more details on Title I funding, the underlying formula, see Gordon and Reber (2023).

revenue.[6] The estimates from these models are slightly smaller than the OLS models but still statistically significant. They suggest each $1,000 in additional ESSER allocations caused districts to seek to hire about $206 in additional staff who they would not have pursued otherwise.[7]

Both our naïve OLS and IV estimates interrogate the aggregate effect of ESSER across all job types, but we do not expect that ESSER funding uniformly affected hiring across different positions in school systems. Our second research question prompts us to empirically assess heterogeneity across job categories. For example, we would not expect access to additional school funding via ESSER to impact the likelihood that an LEA would hire a new superintendent, but this funding may prompt LEAs to expand their health staff to provide additional services such as contact tracing. To disaggregate the marginal impact of ESSER funding across position types, we use a seemingly unrelated regression (SUR) framework to estimate the separable impact of ESSER across 11 employment categories. This estimation allows us to predict category-specific job posting outcomes as a function of the district characteristics used in our initial OLS models. We observe meaningful differences in the magnitude of the association between ESSER and presumed hires across categories, with ESSER allocations disproportionately driving increases in postings for teaching positions. This finding is consistent with a recent analysis of about 3,000 district plans for ESSER III funds from the spring of 2021 (Brooks & Springer, 2024).

[6] Because Washington State determines district funding using a resource-driven formula, these measures capture differences in funding attributable to state policies. Specifically, the majority of district funding is based on assumed ratios of teachers (and other types of staff) per pupil, with corrections for cost of living affecting some districts (Knight et al., 2022).

[7] A lower bound of this estimate—reported in Table C.2 column 2—suggests that an additional $1,000 of ESSER allocations caused districts to seek to hire an additional $168 of staff.

This paper contributes to our understanding of the ways school systems are responding to student needs in the wake of the COVID pandemic, a topic over which there is significant speculation but little quantitative evidence. More broadly, we contribute to the literature on how school systems allocate resources when provided with a large increase in revenue (Lauth & Robbins, 2002; Sun et al., 2022). Because we examine hiring across a range of position types, our findings reflect what school systems value in the absence of constraints that might link spending to any specific areas or student types.[8]

Our results also have practical implications. Understanding the ways school systems responded to ESSER funding can shed light on what we might expect when ESSER funding ends (in the absence of other supplemental funding). Our analysis of the impact of ESSER suggests that roughly 12,000 new staff (including 5,100 teachers) were hired because of ESSER. Although it is likely that, just as in the aftermath of the Great Recession, some of the necessary downsizing of the state's teacher workforce in the absence of these funds can be managed through attrition, it is also likely (as in the Great Recession) that the end of ESSER will also lead to significant staff and teacher layoffs.

2. Background on ESSER Allocations and the Washington State Context

ESSER funding temporarily increased federal funding for public schools to deal with the consequences of the COVID-19 pandemic. Across three waves of grants (ESSER I, II, and III). the ESSER program allocated a total of $190 billion to K–12 school systems.[9] ESSER represents

[8] Fisher & Papke (2000) summarize literature on the impacts of various types of education funding grants, noting that categorical restrictions on funding "will 'matter' to the recipient only if the district would prefer to spend less," (p. 160). That is, because funding from local or state budgets is fungible across spending areas, federal categorical grants should only impact spending on that area if it is not a district priority. Categorical grants, however, increase district spending more than unrestricted grants (Fisher & Papke, 2000). Some examples of categorical grants include funding provided through the Individuals with Disabilities Education Act and court-mandated funding adequacy reforms that targeted low-income districts.

[9] More generally, federal contributions to public K–12 education—about 8% of annual education revenue nationwide—vary across LEAs because much of this funding is tied to measures of student poverty.

more than triple the $60 billion of federal funding allocated to districts in the 2019–20 school year (Cornman et al., 2022) and nearly four times the Great Recession relief funding provided as part of the American Recovery and Reinvestment Act of 2009 (Shores & Steinberg, 2022b).[10] In Washington State, ESSER boosted district budgets by about $2,300 per pupil, or about 20% of state funding for districts in 2019–20.

The Department of Education allocated ESSER in proportion to Title I funding for 2019–20 (ESSER I) and 2020–21 (ESSER II & III). Title I allocations aggregate four distinct grant formulas, all of which are based on the number and percentage of FEC in a school district area, where counts of FEC are primarily the number of children in poverty between ages 5 and 17 in a school district area (Snyder et al., 2019).[11] To be eligible for each of the four Title I grants, LEAs must be above a threshold number and threshold percentage of qualifying children. Allocations are scaled by the number of FEC and adjusted by state per-pupil expenditures, hold harmless provisions, and state minimum provisions (Snyder et al., 2019). Recent research finds some evidence of LEAs' manipulating the poverty measures they use to determine Title I eligibility of *schools* (Matsudaira et al., 2012); however, this is not a concern for Title I allocations to LEAs, because LEA allocations are based on Census Bureau data (we revisit this in greater detail in Section 4).

The majority of ESSER funds were distributed through the American Rescue Plan, or ESSER III. ESSER III required LEAs to earmark 20% of their allocation for recovering learning loss, whereas uses for the remaining 80% were quite flexible. ESSER provided LEAs with the financial capacity to accommodate additional staffing needs because of the pandemic, as well as

[10] Dividing ESSER funds across the timeframe they're meant to be spent within—approximately three years from initial disbursement of ESSER I to the spending deadline for ESSER III—translates annual ESSER to about $760 per student per year—about 6% of state funding to districts in 2019–20.
[11] This is regardless of whether these children are enrolled in public schools.

provide more learning supports to help students recover from pandemic-related learning loss. Federal guidance explicitly notes that districts could use the funds to support activities such as "continuing to employ existing staff of the LEA" (U.S. Department of Education, 2022, p. 12). Since definitions for what kinds of LEA investments meet the "academic recovery" criteria are not concrete, many existing staff positions could be construed as supporting academic recovery (U.S. Department of Education, 2022). As a result, it is likely LEAs used some ESSER funds to maintain staffing levels in the face of contracting enrollments (Schwartz et al., 2023) or hire new staff.

Indeed, analyses of ESSER spending priorities and allocations according to school district proposals (as distinct from actual expenditures) suggests districts planned to use some ESSER funds on staffing. DiMarco and Jordan (2022) identify the three largest budget priorities by dollar amount across a sample of 5,004 school districts nationwide as staffing, academic recovery, and facilities and operations, with staffing accounting for 27% of the total $64 billion budgeted by these districts.[12] Spending priorities also appear to differ according to district poverty level (Jordan & DiMarco, 2022b) and geography (Jordan & DiMarco, 2022a). For example, the highest poverty quartile of districts is the only group for which the most common funding priority is HVAC investment—for all other quartiles the most common priority is staffing (Jordan & DiMarco, 2022b).[13]

Elsewhere, two reports from Rhode Island provide further insight into differences between allocations and realized spending. One uses districts' line-item ESSER proposed

[12] This this sample underrepresents rural and suburban districts and overrepresents ELL and low-income student populations. Less than 10% of districts in Washington are included in this analysis (DiMarco & Jordan, 2022).
[13] There is also survey evidence that ESSER funding priorities have changed over time: a longitudinal survey of superintendents found a shift from early interest in spending ESSER dollars on staffing to spending on curriculum and other materials that can be used after ESSER ends (AASA, the School Superintendents Association, 2023).

spending data to identify similar spending priorities to DiMarco and Jordan (2022) and projects that ESSER staffing budgets, if directed entirely toward new hires, would fund about 1,100 full-time equivalent (FTE) instructional staff throughout Rhode Island, or approximately 10% of instructional staff (Schwartz & Bolves, 2022). A follow-up report, using ESSER expense data from Rhode Island, finds that ESSER spending supports some new positions, but predominantly pays for existing staff. Approximately 49% of ESSER personnel spending went toward paying existing teachers, a distinction not observable in the prior report, while overall staffing levels in the state remained constant (Schwartz et al., 2023). Similarly, recent evidence based on reported ESSER spending in North Carolina (DiMarco & Kelleher, 2023) finds that much of the spending on staff went toward onetime bonuses (e.g., retention incentives) rather than increases in staff positions. Although the findings from these specific states may not be generalizable to other contexts, it is possible that the high volume of ESSER dollars originally budgeted for staffing provide a smaller staffing boost than initially expected (Schwartz et al., 2023).

Districts in Washington began claiming reimbursements for ESSER-funded expenses in July 2020, March 2021, and August 2021 for ESSER I, II, and III, respectively.[14] The three waves' deadlines for fund obligations are September 30 of 2022, 2023, and 2024. Importantly for our purposes, 98% of ESSER I funds had been claimed (i.e., spent) by districts by January of 2022 (Washington Office of Superintendent of Public Instruction, 2023a), meaning that most of this allocation was spent well before the September deadline. In contrast, in January of 2022, districts in Washington had claimed 50% of ESSER II allocations and 7% of ESSER III. By January 2023, districts had claimed an additional 38% of ESSER II and 36% of ESSER III.

[14] ESSER III funds must be exhausted or surrendered by September of 2024. We only observe job posts from 9 of the 30 months districts had to spend ESSER III funds; however, districts in Washington spent approximately 36% of ESSER III by January 2023, suggesting that we would observe a proportional impact of ESSER III relative to the amount of time districts have to spend it.

Claims for 2022 total about $885 million, or 34% of the state's total allocation across all waves (Washington Office of Superintendent of Public Instruction, 2023a). It is difficult to pin down exactly when districts incur expenses because funds flow through a chain of reporting in order to appear on state summaries (Silberstein & Roza, 2023). Accordingly, we conceptualize ESSER claims as a lagged measure of district spending.

To provide additional context, Figure 1 shows per-pupil ESSER funding across Washington.[15] As is clear from this figure, ESSER funding varies greatly and constitutes a much more important source of revenue in some districts than others. Specifically, because ESSER funding is allocated per FEC, the relative poverty of the district or share of the local population that FEC represent lead to large differences in funds per enrolled pupil. Top-quartile districts are receiving more than $3,700 per student, whereas most bottom-quartile districts are receiving less than $1,600.

Understanding the impact of these resources on school staffing is challenging because of the flow and structure of ESSER funding, as well as the general fungibility of education spending. ESSER funds flow first to SEAs, which are required to reserve 10% (but no more) of ESSER dollars for their own use and then pass the remaining 90% to LEAs (National Conference of State Legislatures, 2022). However, funds reserved by the SEA may still influence district-level staffing. For instance, Tennessee dedicated $200 million ESSER funds to install full-time tutors and cover teacher vacancies at every school in the state (Stanford, 2023). Washington State has its own funding priorities, consisting of (a) student and staff well-being, (b) student engagement and attendance, and (c) accelerating learning. Accordingly, some

[15] In Washington, school funding comes predominantly from state revenue (75% on average in 2019–20), with only relatively small shares coming from local levies and federal sources. Recent changes implemented in the wake of the 2012 *McCleary v. Washington* ruling increased state property taxes to provide higher funding per pupil while lowering the cap on local levy revenue (Knight et al., 2022).

Washington SEA funds went toward staffing 21st Century Learning Centers, afterschool programs predominantly managed by LEAs, and community groups; the state also supported health services provided by Educational Service Districts (Washington Office of Superintendent of Public Instruction, 2023b). Arrangements like these pose an issue for studying the impacts of ESSER funding on districts because, although postings for new positions likely appeared at the district level, the funding for some positions might come from the state budget. Moreover, district reports on ESSER spending use broad categories that do not distinguish expenses related to new positions from those for existing positions. Finally, flexibility of spending across budget categories at the local level (Fisher & Papke, 2000; Gordon, 2004) also makes it hard to know the degree to which reported ESSER funded positions (new or existing) represent positions that would not have been supported in the absence of ESSER funding.

To identify the impact of ESSER on staffing more rigorously, we need to look to new data sources. A related area of research on job postings as a measure of school district hiring intentions suggests a promising strategy for gathering real-time data on district job posting and hiring behavior that could help shed light on ESSER's impact on hiring (Goldhaber, Brown, et al., 2022; Goldhaber, Falken, et al., 2023). Goldhaber et al. (2022) study Washington job postings in the 2021–22 school year, finding that districts post more teaching positions when they have higher enrollments and when allocated more ESSER funds than neighboring districts.[16] And in a second analysis of Washington job postings over the 2022 calendar year, Goldhaber et al. (2023) find that teaching positions in special education and STEM appear to take longer to fill and are posted at greater rates—scaled by current staffing in those subjects—

[16] There is also a small but growing line of research exploring labor market dynamics among nonteaching staff. Bisht et al. (2021) and Theobald et al. (2023) place particular emphasis on the growing staff of paraeducators across the United States and long-term trends in staffing dynamics in Washington State, respectively. Penner et al. (2023) explored school-level predictors of staff turnover across different school staff categories in Oregon.

than elementary teaching positions, suggesting greater staffing challenges in these areas. The authors also find that schools serving higher proportions of students of color face greater staffing challenges.[17] These findings suggest the need to be sensitive to differences across districts when considering the ways ESSER influences hiring—for example, higher poverty districts may have more postings because of greater attrition of teachers regardless of ESSER funds (Nguyen et al., 2020). Of particular import to our focus is the finding by Goldhaber et al. (2023) that teacher job postings provide a strong signal of new teacher hires. Specifically, the correlation between the number of jobs posted in districts in 2022 and the number of new staff reported in those districts in the fall of 2022 was about 0.9.

3. Data and Measures

The data sources for this analysis include a novel dataset of job postings from Washington school district websites collected via web scraping, as well as several sources of publicly available data on district characteristics and ESSER funding.[18] Districts websites were scraped twice weekly (Mondays and Fridays), starting in December of 2021. We exclude from this analysis posts that were already on district websites prior to 2022 because we want to isolate posts that we can observe appearing online.[19] Because we continuously scrape district websites, we also observe when postings are removed, although the specific days of these observations are censored to the Mondays and Fridays of each week. We use this information about the duration a

[17] James et al. (2023) explored data from applications to teaching positions in Boston Public Schools, finding that, even comparing within schools, hiring teachers earlier in the hiring cycle yielded better matches, a finding that was highly relevant to our analysis of posting volume over time. In particular, this study finds that positions posted late in the hiring window—here, 17 weeks or more after the start of the hiring cycle—are 6.5 percentage points less likely to be filled than jobs posted in the first week of the cycle and that staff hired late are 13 percentage points less likely to be retained (James et al., 2023).

[18] For a more thorough discussion of the scraping methods involved in collecting these data and the characteristics of the postings, refer to Goldhaber, et al. (2022; 2023).

[19] As an additional robustness check, we reestimate all models on a sample of posts that include December 2021 posts and find that our results are robust to this sample.

post was online to identify posts removed from district websites, which we assume represent positions being filled and refer to as "filled posts" or "presumed hires."[20] Because of our interest in the impacts of ESSER on school district hiring (and relatedly the threat of layoffs with the end of ESSER funding), we focus on filled posts throughout our analysis.

One important aspect of our data is that scraping all job postings allows us to observe presumed hires across different position types. This means that differences in the association between ESSER and posting volume, for example, implicitly include the budgetary trade-offs districts are making in their staffing decisions—an issue we explore empirically with our second research question. Using listed job titles on postings, consistent with Goldhaber et al. (2023), we categorize each post into one of 11 categories: administration, athletics, facilities, food services, health, paraeducator, principal, superintendent, teaching, transportation, and a catch-all, other. We constructed this categorization on the basis of the distinct job types identifiable in Washington's public school personnel data (described below) and categories captured by the NCES in its Schools and Staffing Survey (school questionnaire); these generally line up with distinct job functions of staff in public school systems. Positions that did not clearly fall into one of the ten named job categories were binned into a general "other" with the intent of isolating the types of work staff do and approximating differences in qualifications across job functions. We present the average post volume—weighted by district enrollment—across each of these categories in column 1 of Table 1.

The Washington Office of Superintendent of Public Instruction (OSPI) maintains several publicly available datasets we use for this analysis. First, we use OSPI's personnel dataset that tracks all staff positions in Washington public schools over time, called the S-275, to estimate

[20] Our results are robust to using total posts (instead of "filled posts") as our outcome measure, but we use filled posts for our main tables for the conceptual clarity it provides.

the typical pay across different job functions in each district. Because this dataset is created for accounting purposes, it disaggregates the compensation of each staff member across each distinct job function they hold. Job functions are identified using program, activity, and duty root codes, as well as certification status; we provide a detailed breakdown of which activity codes and certification categories we align with each of our job posting categories in Appendix A.

Once we assign each position to one of our 11 categories, we calculate the *average* pay for positions within each category for all Washington districts. To do this, we utilize information about educator pay based on the S-275 for 2021–22, which is a snapshot of school district staff from October 2021.[21] Because individuals may hold multiple position types—for example, a classroom teacher may also coach a sports team—we include the portion of annual pay attributed to each position category in the calculations for average pay in each separate category.[22] This means that we calculate the cost *per position*, rather than per FTE. For many job types, this is a more appropriate cost estimation method because nonteaching positions are often coded as part time (see Theobald et al., 2023), extracurricular positions often do not have an associated FTE estimate, and it is common for staff to span multiple positions in a school. We present the pay for each job category—averaged across all districts in our sample—in the second column of Table 1.

The average pay is likely to overstate the costs of posted positions because incumbent employees in a district are likely to earn higher than average salaries. Thus, we also calculate a lower bound estimate of salaries across these job categories by limiting the S-275 to staff who were new (in our data) to each position type in October 2021. We average these new-to-category

[21] The October 2022 data were not available at the point that analysis took place; however, the October 2021 salaries are likely a good measure of the salaries in place in the spring of 2022, when much of the hiring was taking place.
[22] In other words, if individuals hold multiple position types in the same year, such as the teacher–coach example, we count their teaching and coaching roles as separate positions. This means the portion of their total pay attributed to teaching counts as their teaching position salary, and likewise for their coaching position.

salaries across Education Service Districts[23] and present these lower salary estimates in Column 3 of Table 1.[24] Using this alternative measure, we replicate all our main set of results and report these results in Appendix C, Tables C.2, C.3, and C.6; estimates from these models are attenuated in magnitude. Differences between these and our mainline results reflect differences in these estimated salary measures.

Because not all job posts reflect equal implied cost, our primary outcome scales each filled job post by the average salary for that position type in that district. We multiply our counts of filled posts in each category and district by the associated salary (using both the average salary, and lower bound salary measures) to approximate the future staffing costs associated with job posts. We summarize these "projected post costs" in Columns 4 and 5 of Table 1, using our average and lower bound salary measures, respectively. We conceptualize these measures as the implied future salary costs to districts of the positions we presume are filled. This is our preferred outcome for ease of interpretation. OSPI has also published ESSER allocations and claims data that allow us to observe differences in funding and spending across districts, which we use as a point of comparison with our projected measures of cost.

As we noted above, district context may influence job postings; hence, in the models described below, we also use district-level characteristics from Washington State Report Card data. These include overall district enrollment, counts of students qualifying for FRPL, student demographics, district urbanicity, and district average scores on the Washington State standardized assessment (Smarter Balance Assessment Consortium assessment, SBAC). We also

[23] We average to the Education Service District level (there are nine of these in Washington, each of which serves local areas) because there were some school districts that did not have new staff in some categories according to the October 2021 S-275.
[24] Note that our salary estimates are only inclusive of gross take-home salary and do not account for associated benefits costs to school systems. The same is true of our projected post cost outcome measures. In the 2019–20 school year, employee benefits (~$3,500 per pupil) were approximately 30% of total staff compensation inclusive of both salaries and benefits (National Center for Education Statistics, 2023).

calculate and include district distances to the nearest Teacher Education Program (TEP) using data from the Education Demographic and Geographic Estimates (EDGE) given evidence that this proximity influences vacancies outside of a pandemic context (Goldhaber et al., 2020). Lastly, to account for labor market dynamics (Rucinski, 2023), we use county-level unemployment data from the Local Area Unemployment Statistics dataset maintained by the Bureau of Labor Statistics.[25] Our data on 2019–20 district revenue is from the Common Core of Data.

Our IV analysis depends on data that the U.S. Department of Education (ED) uses to calculate Title I allocations. ED allocates Title I funds across districts according to the count of FEC in the district's geographic area. [26] These FEC counts include children in poverty between the ages of 5 and 17, children receiving Temporary Assistance for Needy Families (TANF), neglected and delinquent children, and foster children. The lion's share of FEC children (97%) fall into the first category (Stephenson & Kaiser, 2018), calculated each year by the Census' Small Area Income and Poverty Estimates (SAIPE) Program. Importantly, SAIPE data are published with a slight delay relative to when Title I allocations are calculated. SAIPE data from 2018 determined Title I allocations in the 2020–21 school year which, in turn, impacted ESSER II and III allocations. We use district-level data on the counts of FEC in Washington to instrument for the final two waves of ESSER funding. We expand on the identifying variation that remains when we use this instrument below.

Our analytic sample includes 276 districts (of 295 districts in Washington) whose job postings we observe for the 2022 calendar year. These districts serve 99.6% of students in

[25] Districts in Washington are all nested within counties, with their home county identifiable from the state administrative ID.
[26] District-level counts of FEC are available upon request from the Office of Formula Grants/School Support and Accountability in the Office of Elementary and Secondary Education.

Washington public schools. In Figure 1, we visually present differences in per-pupil ESSER allocations across Washington State districts; in Table 2, we describe the characteristics of these districts, weighted by enrollment. Because there are vast differences in ESSER allocations (by design) per pupil across districts, Table 2 also presents differences across the subsamples of districts in the bottom quartile of total ESSER allocations per pupil (Column 2) and the top quartile of total ESSER allocations per pupil (Column 3).[27] The average ESSER allocation per pupil among districts in our sample was $3,075. Districts in the top quartile by ESSER allocations per pupil received $6,105 per student, whereas those in the bottom quartile received $1,009 on average.

Clearly, there are meaningful differences in district characteristics associated with their ESSER allocation. Districts that received the highest ESSER allocations per pupil tended to be larger than the typical Washington district, were more commonly in urban settings or towns, and served higher rates of students of color, English-language learners, and students receiving FRPL. Generally, districts receiving the lowest ESSER allocations per pupil present the inverse of these patterns, with a notable overrepresentation of suburban districts relative to state averages. These differences across districts are driven partly by differences in the relative poverty of the district—that is, what share of the school-age population are FEC—but also by nonlinearities in and adjustments to Title I allocations. Important for our purposes, high-ESSER districts posted more than twice as many positions in 2022 as their low-ESSER counterparts, but at least part of this gap is attributable to differences in enrollment, on average. We further explore methods for

[27] Because the districts in the top quartile of ESSER allocations per pupil have higher enrollments, students in these districts are much more likely to be in urban centers than their peers in districts that received the lowest ESSER allocations per pupil. When we do not weight by student enrollment, districts in the top quartile appear equally likely to be in urban environments and post fewer positions than the typical district in Washington.

overcoming these differences in characteristics—particularly those that may be correlated with ESSER and hiring patterns—in the following section.

4. Empirical Methods

We use two empirical approaches to understand the relationship between ESSER funding and district hiring in Washington and address our first research question. We begin with a naïve model to assess the relationship between ESSER allocations and hiring:

$$Post\ Costs_d = \beta_0 + \beta_1 ESSER_d^{allocations} + \beta_2 X_d + \varepsilon_d \qquad (1)$$

The outcome variable in the model in Equation 1, $Post\ Costs_d$, is the estimated cost of positions posted (or the number of posts) in district *d*, aggregated across the job categories. Our primary predictor of interest is the ESSER II and III allocations to district d, $ESSER_d^{allocations}$. We also include a vector, X_d, of covariates thought to be correlated with ESSER funding and district staffing needs, including a cubic of district enrollment, district-level counts of students receiving FRPL, the number of underrepresented minority (URM) students, the 2019–20 total district revenue, average SBAC scores, the change in enrollment between the 2020–21 and 2021–22 school years (standardized), the county unemployment rate, indicators for district urbanicity, and a log of the distance to the nearest TEP.[28] We intend for these covariates to capture some district-level variation in both labor market environment (e.g., unemployment and proximity to a supply of teachers) and school environments associated with variation in staffing patterns (e.g., the household income and demographic composition of enrolled students). We control for lagged district revenue to capture any potential associations between sustained

[28] Districts with increasing student enrollment, for instance, will need to hire more staff. Workforce attrition, which would also lead to more job postings, is also correlated with district characteristics such as the demographics of the students (e.g., Goldhaber & Theobald, 2022).

differences in funding (e.g., through Title I funds also influenced by our instrument) and staffing, the drivers of which would be funding from federal and local sources, given the strong equalization embedded in the state funding structure. We weight this and all following models by district enrollment so that estimates can be interpreted as those for the average student in Washington; however, our results across all models are qualitatively similar without including these enrollment weights.

The coefficient β_1 represents the expected increase in districts' posted positions' costs associated with a \$1 increase in ESSER funding (or, in some specifications, the number of postings associated with an increase in ESSER funding). For this coefficient to be interpreted as the causal effect of ESSER funding on presumed hires, we would need to account for all aspects of districts that are related to the amount of ESSER funds allocated and to hiring. There are good reasons to worry that "observably similar" districts according to the variables in X_d may differ in ways that impact their ESSER allocations and job postings, suggesting that these estimates will suffer from omitted variable bias. Our specific concern is that if districts that receive more funds because of variation in other unobservable (to us) factors also would have more job postings in the absence of ESSER funds, then these omissions could bias our estimates of the relationship between ESSER allocations and posts.

Our solution is to instrument for ESSER allocations with a variable that determined ESSER funding amounts: the number of FEC within district boundaries.[29] Using a two-stage least squares model (2SLS), our first stage of this estimation takes the following form:

$$ESSER_d^{allocations} = \beta_0 + \beta_1 FEC_d + \beta_2 X_d + \varepsilon_{dc} \qquad (2)$$

[29] As we noted above, the lion's share (approximately 97%) of these were children in poverty in 2018 from the SAIPE.

Where all variables are defined as above and we include the count of FEC in a district (FEC_d) as an instrument for ESSER allocations. FEC_d proves to be a strong instrument in terms of predicting ESSER; the first-stage regression has an F-statistic of 17,704, and an individual F-test of the instrument is 914.[30]

Our identifying variation comes from three main sources. First, the number of FEC in a district's geographic area, which is predominantly the number of children living in poverty in 2018, differs from 2021–22 district poverty because of the time lag and enrollment subscription in the district.[31] Second, the Title I formula is not a linear allocation of funds per formula-eligible child; instead, some of the grants have kinks that allocate more funds as the portion of the FEC population increases in that district (Gordon & Reber, 2023). Third, Title I allocations are also adjusted for districts facing a decline in FEC and/or not meeting the qualification thresholds of FEC and formula-eligible percentage if they qualified in the last 4 years. These adjustments to protect districts from a downward shock in revenue are funded by proportionally reducing funding for districts that do not qualify for hold harmless provisions.

We assume that, after accounting for factors like the number of students qualifying for FRPL in 2021–22 and lagged district revenue (including Title I revenue, which is also determined in part by our instrument), FEC in a district does not directly or indirectly affect district staffing decisions in 2022. If this exclusion restriction holds—and if this variable is sufficiently predictive of ESSER allocations—then we can estimate 2SLS models that isolate the causal effect of ESSER allocations on district postings.

[30] In Appendix Table C.1, we present the results from our first-stage regressions for each wave of ESSER separately, for our preferred sum of ESSER II and III, and the sum total of ESSER allocations across all waves.

[31] For example, in districts with high rates of private education enrollment, formula-eligible counts, and formula-eligible percentages from 2018 will not necessarily align with the relative poverty of students enrolled in a district in 2021–22. We conceptualize 2021–22 FRPL enrollment as a measure of district poverty that is more visible to the job market and thus more relevant to hiring outcomes.

One weakness of this IV approach is that we cannot estimate category-specific causal impacts of ESSER on presumed hires. To disaggregate this overall effect across job categories and address our second research question, we estimate a seemingly unrelated regression (SUR) specification. This estimation involves a system of 11 equations, each of which takes the following generalized form:

$$Post\ Costs_{cd} = \beta_0 + \beta_1 ESSER_d^{allocations} + \beta_2 X_d + \varepsilon_{cd} \qquad (3)$$

The outcome of Equation 3, $Post\ Costs_{cd}$, are the projected position costs of filled posts in a category, c, and $ESSER_d^{allocations}$ are district-level ESSER II and III allocations. The entire system includes 11 equations predicting this outcome for each observed category in a district.[32]

5. Results

5.1 The Impact of ESSER on Job Postings

As We present estimates of the impact of ESSER funding on presumed hires in Table 3. We begin by presenting the coefficient estimates from models predicting the number of filled job postings from a naïve OLS regression (Column 1) and using our preferred 2SLS models (Column 2). We then show coefficients from analogous models that substitute the number of filled posts with our preferred outcome, projected costs of filled posts. We also present both naïve OLS estimates (Column 3) and 2SLS estimates (Column 4) for this outcome. In addition, to underscore the robustness of our results to the assumptions we describe in our construction of

[32] We have, in addition, specified a version of this model in which we estimate a 2SLS version of the SUR, first estimating ESSER allocations using the specification in Equation 2 and then estimating the SUR using that estimate as a control instead of observed ESSER allocations. To obtain standard errors from this specification, we bootstrap 1,000 replications of each stage of the estimation. The results of this exercise are reported in Appendix Tables C.2 and C.3. Unfortunately, the estimated coefficients are quite imprecise, so we focus below on the findings from Equation 3.

the post cost measure, we report both the OLS and 2SLS estimates, using the lower bound post costs in Appendix Table C.2.

Before turning to the estimated impact of the main variable of interest, ESSER funding, it is worth noting that, of the non-ESSER controls, only district enrollment is statistically significant. As expected, we find that larger school districts have both more filled job postings and a higher postings cost. For instance, we estimate that the associations between enrollment and post outcomes in a district at the 25th percentile of enrollment (310 students) are not statistically different from zero, while enrollment in a 75th-percentile district (4,247 students) is associated with $25,493 higher post costs.

Turning to the main variable of interest, ESSER funding, we find consistently significant evidence that ESSER funding influences filled posts. The OLS point estimates in Columns 1 and 3 suggest that a $1,000 increase in ESSER allocations is associated with about 0.005 more filled postings and a $229 increase in posted position costs, respectively. This association with post costs suggests that nearly a quarter of ESSER funding in Washington is going toward staffing positions that would not have existed in the absence of ESSER. Although this estimate is dwarfed by the 50% of ESSER being spent on personnel in one analysis of 22 states (Silberstein & Roza, 2023), that figure includes spending both on new hires *and existing staff,* the latter of whom are the greater expense in many districts (DiMarco & Kelleher, 2023; Schwartz et al., 2023; Silberstein & Roza, 2023). Similarly, OSPI claims data suggest that 39% of ESSER spending through February 2023 went toward certificated and classified salaries, but that figure includes funds supporting staff whose positions would exist even in the absence of ESSER.

As we note above, the OLS coefficients may be biased by omitted variables. Instrumenting for ESSER allocations using FEC,[33] we find 2SLS estimates that are only slightly smaller and not statistically distinguishable from the OLS estimates:[34] a $1,000 increase in ESSER allocations is estimated to increase filled posts by about the same amount (Column 2), but only increase the cost of these filled posts by about $206 (Column 4).[35] We find that these effects are further dampened—specifically, to a $168 increase in filled post costs for a $1,000 increase in ESSER—when we use a more conservative estimate of position costs based on the salaries of staff new to their positions, shown in Appendix Table C.2. Knowing that the typical district in Washington received $8,675,580 across ESSER II and III, the average estimated impact of this stimulus on hiring translates to an increase of 44 posted positions and between a $1,457,497 (lower bound post costs estimate) and $1,787,170 (average post costs) increase in projected position costs ($33,275–$40,780 per position).

5.2 Heterogeneous Impacts of ESSER on Job Postings by Job Category

Although this overall estimate of the impact of ESSER on presumed hires is important for understanding the high-level impacts of this funding, it seems highly unlikely that ESSER funds would equally impact all the job categories we observe. To address our second research question, we estimate the SUR described above to predict category-specific postings as a function of ESSER allocations. We present these results in Table 4.

Predictably, we find mixed impacts of ESSER allocations on category-specific posted position costs, suggesting that the impact of ESSER varies across job types. For example, we

[33] In the first-stage regression, shown in Appendix C, Table C.1, we find that FEC is highly predictive of ESSER allocations, with the model returning an *F*-statistic of over 17,000 and FEC individually returning an *F*-statistic of 914.
[34] This is based on a *t*-test comparing the ESSER coefficients of the models (Clogg et al., 1995).
[35] We also estimate these models both with a quadratic and cubic form of the instrument to account for potential nonlinearity in the relationship between the SAIPE counts and ESSER allocations; these results are almost identical to those presented in Table 4 but are no longer significant because of loss of precision.

find the largest magnitude of effect for teaching positions, relative to all other position types, with a suggestive impact of $169 higher posted position costs for a $1,000 increase in ESSER allocations. We also find significant positive associations between ESSER allocations and projected position costs for facility ($27 increase per $1,000 of ESSER) and paraeducator ($24 per $1,000 increase in ESSER) staff. We find three negative associations between ESSER allocations and projected posting costs; both athletic and health staff position costs are $20 lower with a marginal increase of $1,000 ESSER allocations and transportation position costs are $3 lower. All other categories have no significant associations between ESSER and projected post costs. We take these results as evidence that the impact of ESSER on school hiring was greatest for teaching positions. We replicate this model using our lower bound cost outcomes in Table C.3, finding the effect for teaching positions projected costs attenuated to $116 for a $1,000 increase in ESSER allocations.

Our identification of negative associations between ESSER allocations and health staff, in particular, is surprising and at odds with widely reported issues with student mental health. One possible explanation is that districts leverage third-party contactors to deliver health services, which would not appear as school system job postings or ESSER claims data.[36] The state legislature also expanded funding specifically for health staff (including counselors) in 2022 (Knight et al., 2022), the effects of which would likely appear in our job-posting data but not in ESSER claims. As a third confounding factor for health staff, because the first of three statewide priorities for state-reserved ESSER funds, was student and staff well-being; state offices—in collaboration with the Department of Health—supported high-need districts in hiring

[36] In the Seattle area, for instance, some mental health services are provided by nonschool personnel; see https://kingcounty.gov/en/dept/dph/health-safety/health-centers-programs-services/childrens-health/school-health-resources

additional health staff (Washington Office of Superintendent of Public Instruction, 2023b, pp. 76–77), which may not appear in either dataset.

6. Discussion and Conclusions

We find strong, arguably causal, evidence that public school districts hired more staff in response to the availability of ESSER funding. To put the financial magnitude of these hires into perspective, our estimates suggest that districts in Washington hired $497 million worth of *new* school staff over the course of the 3 years that districts could claim these funds.[37] As is consistent with a recent review of ESSER proposed spending data (Brooks & Springer, 2024), it appears that much of this hiring activity focused on teaching positions.

Nationwide, the per pupil drop in ESSER funding is likely to be comparable in a single year to the drops seen after the Great Recession that were seen over 3 years—about $1,400 per student from the 2011–12 to 2013–14 school years (Roza & Silberstein, 2023; Shores & Steinberg, 2022b). There are multiple ways to translate the way drops of that magnitude may translate into job loss. Schwartz and Bolves (2022), for instance, estimate the number of positions would not have been funded if ESSER had not happened by dividing budgeted ESSER funds by the typical salary in a position type. Dividing teacher salary claims in Washington by our teacher salary measure would suggest that roughly 5,600 teaching positions were supported by ESSER in Washington. However, this may overstate the number of positions that are likely at risk because it assumes (a) that all funds went to support new hires rather than existing staff, and (b) that budgets are not fungible.

[37] We arrive at this number by scaling our estimate of a $1,000 increase in ESSER allocations yielding $206 of additional post costs (Table 3, Column 4) by the $2.4 billion in ESSER II and III funds that districts received in Washington.

Aldeman (2023b) takes a different approach, exploiting changes in student–teacher ratios between the 2018–19 and 2021–22 school years. By his method, Washington's teaching workforce needs to be reduced by 3,404 teaching positions to return to pre-pandemic staffing levels.[38] But this likely *understates* the number of teachers at risk because there is good reason to believe that student–teacher ratios would have risen in the absence of ESSER funding. Specifically, in recent years, teacher salaries rose faster than what was guaranteed by increases in state funding in the wake of the state's McCleary reforms (Knight & Fujioka, 2023). In the absence of supplemental ESSER funding, this arguably would have necessitated increases in student–teacher ratios.

Our alternative is to estimate the impact of ESSER allocations on filled job postings to estimate the number of *positions* that were created by ESSER, positions that potentially will be at risk when ESSER ends. We use the coefficient for ESSER funding on job postings (from the 2SLS model; Table 3, Column 2) and the total of ESSER II and III allocations in Washington (about $2.4 billion) to estimate the likely statewide impact of ESSER funds on the employment over the 3 years that districts could use the funds. We find that ESSER II and III allocations will have increased the number of posted positions in Washington districts by 12,200 jobs over that time period, with a 90% confidence interval ranging from 7,012 to 17,388.[39] Using the point estimate from our SUR estimation, we expect this includes about 5,103 teaching positions, with a 90% confidence interval of 4,268 to 5,938. These figures are below the number implied by the method of Schwartz and Bolves (2022) but higher than those calculated by Aldeman (2023). Our

[38] This estimate is from applying Aldeman's method to staffing ratios from the 2022–23 school year relative to 2018–19, provided by personal correspondence with Aldeman.
[39] When we apply this to our post cost estimates, we estimate that ESSER II and III led to between a $406 (lower bound post costs; Table C2, Column 2) and $497 (average post costs, Table 3, Column 4) million increase in projected post costs across all districts and categories.

lower bound represents about 40% of the total number of the roughly 10,600 new positions filled by Washington in the 2021–22 school year (Goldhaber et al., in press).

For some additional perspective, the lower bound of our confidence interval, 4,268 teaching positions, represents roughly 6% of the current Washington State public teaching workforce. However, our *position*-based estimates likely overstate the number of *FTEs* at risk because some posted positions may be less than full time. Moreover, our estimate of ESSER-created positions also likely overstates the number of *current staff* whose jobs are at risk because districts can address some staffing reductions through attrition. For example, between 2008–09 and 2011–12 and in the wake of the Great Recession, the number of teachers in Washington declined by 3,030. The state's school districts managed much of this decline by hiring fewer new teachers (Goldhaber, Krieg, et al., 2022). Of the 15,080 teachers who left the workforce during this time period, districts hired only 12,050 new teachers to replace them. Only 561 teachers (i.e., about 18% of the 3,030 reduction in the state teaching workforce) were actually laid off statewide (Goldhaber et al., 2016).

Of course, in practice, layoffs occur within districts, not statewide. This complicates the extent to which policymakers can use attrition to address possible ESSER-related staffing problems. For example, as shown in Figure 1, many districts received small ESSER allocations; attrition in these districts will not address the need to reduce staff in districts where large allocations were associated with ESSER-induced hires. Similarly, within districts, attrition may not occur in the right subjects. If a district has hired elementary teachers with its ESSER funds, it cannot manage reductions with retirements in high school math departments. If districts are unable to manage reductions via attrition, it is likely that the end of ESSER funding will be followed by significant layoffs, as was the case with the Great Recession. That is concerning because typical approaches to layoffs (e.g., seniority-based, last-in-first-out layoffs and overissuing "pink slips"), can have direct and indirect negative effects on student achievement (Goldhaber et al., 2016; Goldhaber & Theobald, 2013; Kraft, 2015).

To the degree that the end of ESSER leads to teacher layoffs, school districts should be exploring ways to mitigate their harm. For example, they may consider protecting teachers (and their students) from layoffs in specific shortage areas, like special education and STEM subjects; or school districts may protect teachers in hard-to-staff schools that can least afford to lose their teachers (Bleiberg & Kraft, 2023). District and union leaders also need to be concerned about the process that governs layoff *notices*. After the Great Recession, districts in Washington issued roughly five times more layoff *notices* than there were actual layoffs. That is because collective bargaining agreements often specify that districts must send layoff notices to any teacher who *could* be laid off before the next school year (Goldhaber et al., 2016). Yet, studies suggest that the receipt of a layoff notice induces greater mobility among teachers (Goldhaber et al., 2016), which can harm student achievement (Ronfeldt et al., 2013).[40] Admittedly, layoffs seem unthinkable, given the way teacher shortages dominated the news during the pandemic. If, however, the end of ESSER, budget constraints, and enrollment shifts create the need for layoffs, district leaders will need to find better ways to deal with them if they want to avoid unintentionally harming teachers and students.

[40] Strunk et al. (2018) also finds drops in the performance of individual teachers receiving notices.

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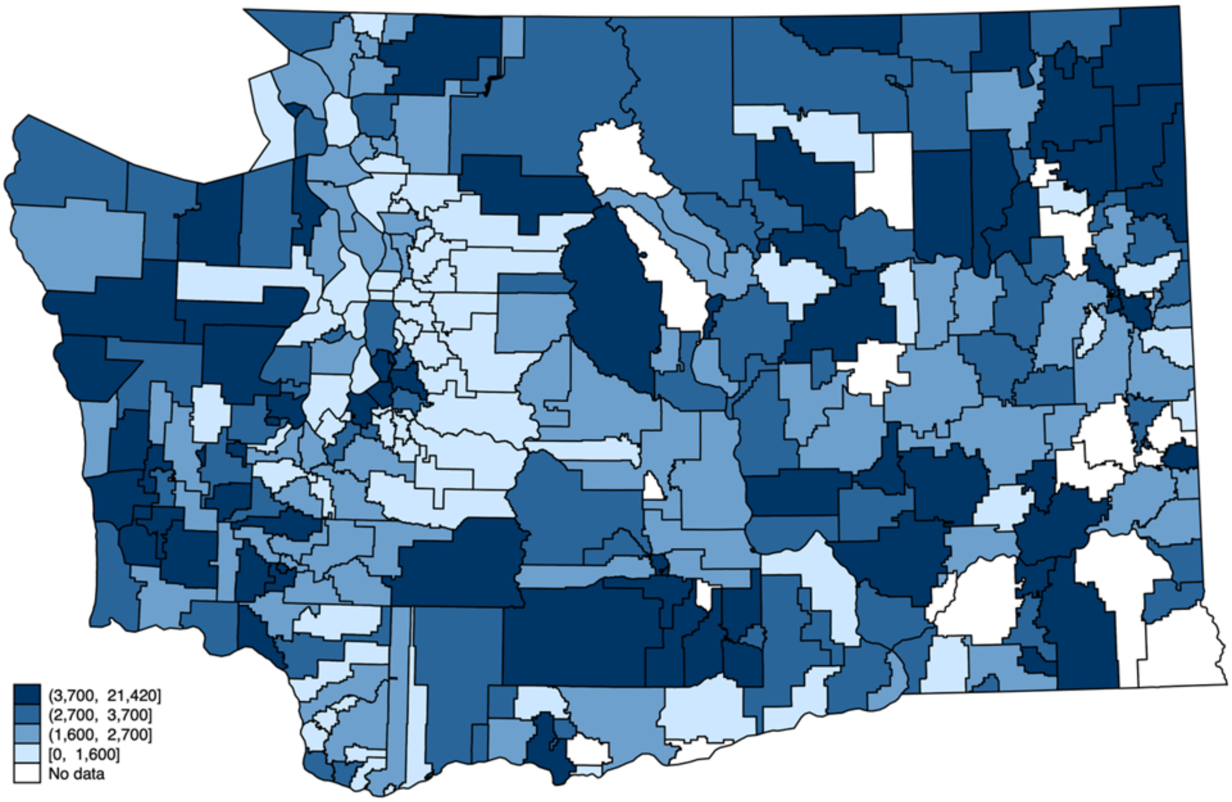
Figures and Tables

Figure 1. Total ESSER Allocations per Pupil Across Washington Districts



Notes: Color scale aligns with quartiles of per-pupil ESSER allocations, with the darkest shade representing the highest quartile of allocation per pupil.

Table 1. District Position Salaries, Posts, and Post Costs

Category	Average Number of Filled Posts	Salary Per Position		Projected Post Costs	
		Average	Lower Bound	Average	Lower Bound
	(1)	(2)	(3)	(4)	(5)
Administration	47.0	54,964	41,914	2,678,210	2,020,866
Athletics	57.9	17,916	4,407	1,031,961	248,538
Facilities	24.6	54,395	44,442	1,336,815	1,061,892
Food	29.6	24,262	15,764	736,395	457,986
Health	26.3	67,537	48,270	1,828,423	1,259,769
Other	75.4	24,187	10,850	2,633,615	935,153
Paraeducator	132.1	28,357	24,604	3,832,920	3,232,020
Principal	7.9	128,001	85,731	941,191	648,686
Superintendent	0.7	224,053	141,809	161,844	100,614
Teaching	135.4	83,678	60,756	11,615,521	8,138,553
Transportation	7.0	37,009	28,049	230,540	182,254
Total	543.9			27,027,435	18,286,332

Note. Each cell presents the district-level average outcome measure for each job category, weighted by district enrollment. Projected post costs are the district-by-category product of the number of posts an estimate of position salary. Columns 2 and 4 use the district-by-job category average position salary as the salary estimate. Columns 3 and 5 use the average position salary among first-year employees in that category within that Education Service District.

Table 2. District Characteristics and Job Posts, Weighted by Enrollment

	All Districts	Bottom Quartile ESSER districts	Top Quartile ESSER districts
City district (%)	39.40	13.24	52.07
Rural district (%)	7.53	3.38	7.97
Suburban district (%)	39.27	72.62	21.31
Town district (%)	13.80	10.76	18.65
District enrollment (1,000s)	14.99	13.25	17.54
	(12.00)	(8.94)	(10.76)
Underrepresented minority (%)	41.32	28.87	56.10
	(18.57)	(8.69)	(21.37)
English language learners (%)	12.48	7.22	19.24
	(9.49)	(4.29)	(11.90)
Special education (%)	14.51	13.21	15.28
	(2.27)	(2.38)	(2.09)
Free or reduced-price lunch (%)	46.31	27.92	66.98
	(20.53)	(13.08)	(11.91)
ESSER II & III allocations ($1,000,000s)	34.19	10.50	68.23
	(37.37)	(8.85)	(39.79)
ESSER II & III claims ($1,000,000s)	21.21	7.90	35.17
	(25.17)	(6.21)	(20.93)
District per pupil spending ($1,000s)	15.90	15.38	16.42
	(1.58)	(1.36)	(1.39)
Total filled job posts	543.90	373.85	777.01
	(401.04)	(226.70)	(484.39)
Administration filled posts	47.00	34.10	72.58
	(42.21)	(23.44)	(63.50)
Athletics filled posts	57.89	45.94	104.03
	(48.94)	(28.68)	(75.44)
Facilities filled posts	24.56	20.73	36.80
	(25.25)	(15.63)	(39.42)
Food services filled posts	29.65	18.91	46.62
	(31.25)	(22.61)	(34.28)
Health filled posts	26.34	19.21	29.10
	(20.26)	(11.07)	(16.96)
Other filled posts	75.39	35.76	127.60
	(110.11)	(21.60)	(160.43)
Paraeducator filled posts	132.07	94.58	155.55
	(106.36)	(80.81)	(115.12)
Principal filled posts	7.94	7.38	9.91
	(7.65)	(7.87)	(9.68)
Superintendent filled posts	0.67	0.44	0.97
	(0.87)	(0.68)	(1.07)
Teacher filled posts	135.36	91.84	186.02
	(125.49)	(71.77)	(113.69)
Transportation filled posts	7.04	4.95	7.82
	(10.80)	(5.32)	(10.16)
N	276	69	69

Note. All averages are weighted by district enrollment. The first column presents average characteristics across all observed districts. The second column reports averages for districts in the bottom quartile of total ESSER allocations per pupil; the final column reports averages for districts in the top quartile of total ESSER allocations per pupil. Underrepresented minority category includes American Native, Black, Hispanic, and Multiracial students.

Table 3. Predicted Impacts of ESSER Allocations on Job Post Outcomes

Outcome	Filled Posts		Filled Post Costs ($1,000s)	
Specification	OLS (1)	2SLS (2)	OLS (3)	2SLS (4)
ESSER II & III allocations ($1,000s)	0.005* (0.002)	0.005* (0.002)	0.229* (0.102)	0.206* (0.095)
District enrollment (1,000s)	59.356** (20.534)	59.401** (20.058)	412.228 (1563.416)	373.446 (1564.473)
District enrollment^2 (1,000s)	-0.876 (0.618)	-0.879 (0.629)	-3.416 (51.146)	-0.780 (54.135)
District enrollment^3 (1,000s)	0.008 (0.009)	0.008 (0.009)	-0.162 (0.735)	-0.186 (0.754)
2018-19 Total district revenue ($1,000s)	-0.001 (0.001)	-0.001 (0.001)	0.033 (0.056)	0.032 (0.054)
District n low-income students (1,000s)	-0.319 (9.455)	-0.419 (9.204)	-389.460 (495.707)	-303.823 (434.551)
District n URM students (1,000s)	5.294 (12.542)	5.247 (12.129)	1340.549 (849.286)	1380.438 (852.772)
District SBAC Scores	86.740 (195.096)	87.049 (191.264)	10378.904 (11451.479)	10112.886 (11105.140)
Enrollment change in SDs (21–22)	71.776* (31.219)	71.777* (30.295)	3226.835* (1638.053)	3226.138* (1582.081)
County unemployment rate	3703.923 (3013.795)	3710.526 (2923.084)	226183.338 (175737.689)	220504.881 (167181.016)
District suburb (ref. city)	-43.452 (60.372)	-43.079 (59.319)	-4843.703 (3193.905)	-5164.271 (3295.191)
District town (ref. city)	-84.061 (53.596)	-83.770 (52.790)	-6586.902* (3012.467)	-6836.884* (3185.600)
District rural (ref. city)	-63.165 (62.836)	-62.776 (62.579)	-6672.891 (3826.649)	-7006.704 (4170.497)
Log distance to nearest TEP	13.487 (18.572)	13.465 (18.002)	904.873 (894.785)	923.670 (867.375)
N	276	276	276	276
Adjusted *R*-squared	0.881	0.881	0.876	0.876

Note. Two-stage least squares (2SLS) regressions use the count formula-eligible children within a school district boundary instrument for ESSER allocations weighted by district enrollment. Standard errors are heteroskedasticity robust. OLS=ordinary least squares; SBAC=Smarter Balance Assessment Consortium (test scores); SD=standard deviation; TEP=teacher education program; URM=underrepresented minority. *P*-values from two-sided *t*-tests: *p<.05; **p<.01; ***p<.001.

Table 4. Seemingly Unrelated Regression Model Predicting Category-Specific Posted Position Costs ($1,000s)

	Admin Staff Post Costs	Athletic Staff Post Costs	Facilities Staff Post Costs	Food Services Post Costs	Health Staff Post Costs	Other Staff Post Costs	Para-educator Post Costs	Principal Post Costs	Super-intendent Post Costs	Teacher Post Costs	Transpor-tation Post Costs
ESSER II & III	0.005	-0.020*	0.027***	0.001	-0.020**	0.042	0.024*	0.006	-0.002	0.169***	-0.003*
allocations ($1,000s)	(0.006)	(0.010)	(0.005)	(0.003)	(0.006)	(0.026)	(0.012)	(0.004)	(0.001)	(0.029)	(0.001)
District enrollment	-161.6*	54.6	430.9***	85.6**	121.2	-1823.9***	1055.4***	133.0**	-23.0	473.3	66.8***
	(70.1)	(112.7)	(60.8)	(31.4)	(73.7)	(299.0)	(137.5)	(47.1)	(14.0)	(327.8)	(15.6)
District enrollment^2	12.6***	-2.0	-10.6***	-0.117	-9.8***	53.1***	-30.4***	-2.4	0.724	-13.1	-1.6**
	(2.5)	(4.1)	(2.2)	(1.138)	(2.7)	(10.8)	(5.0)	(1.7)	(0.507)	(11.9)	(0.6)
District enrollment^3	-0.181***	-0.017	0.108***	-0.004	0.103**	-0.729***	0.383***	0.003	-0.015*	0.160	0.026***
	(0.033)	(0.053)	(0.028)	(0.015)	(0.034)	(0.139)	(0.064)	(0.022)	(0.007)	(0.153)	(0.007)
2019–20 total district	0.001	0.005	-0.005*	-0.004***	0.006*	0.037***	-0.010*	-0.001	0.001*	0.006	-0.003***
revenue ($1,000s)	(0.003)	(0.004)	(0.002)	(0.001)	(0.003)	(0.011)	(0.005)	(0.002)	(0.001)	(0.012)	(0.001)
District n low-income	0.164***	0.194**	0.170***	0.037*	0.204***	-0.213	0.180*	-0.065**	-0.002	-1.077***	0.018*
students	(0.038)	(0.061)	(0.033)	(0.017)	(0.040)	(0.161)	(0.074)	(0.025)	(0.008)	(0.177)	(0.008)
District n URM	0.060	-0.035	-0.364***	0.110***	0.030	0.818***	-0.391***	0.055	0.029***	0.982***	0.045***
students	(0.042)	(0.068)	(0.037)	(0.019)	(0.045)	(0.181)	(0.083)	(0.029)	(0.008)	(0.199)	(0.009)
District SBAC Scores	3221.0***	466.6	308.4	1073.5**	750.1	6448.6	-4661.8**	620.1	-251.0	1754.8	648.6***
	(863.047)	(1386.9)	(748.8)	(387.1)	(906.9)	(3680.8)	(1692.3)	(580.4)	(172.4)	(4035.7)	(191.5)
Enrollment change in	11.8	-610.1	377.6	131.0	333.9	385.6	370.2	207.7	13.8	2000.5	4.8
SDs (21–22)	(224.8)	(361.3)	(195.1)	(100.8)	(236.2)	(958.9)	(440.9)	(151.2)	(44.9)	(1051.3)	(49.9)
District	-4893.7	35705.6*	9017.8	18311.1***	-1961.8	1355212***	4391.0	22297.5***	1467.4	-1514.4	7841.3***
unemployment rate	(8989.9)	(14446.2)	(7799.4)	(4031.8)	(9446.5)	(38341.4)	(17628.2)	(6045.4)	(1795.6)	(42038.2)	(1995.2)
District suburb	-1015***	-984.8***	634.3***	-149.4	-745.6***	-1703.1*	328.1	-182.5	-56.7	-835.4	-133.8***
(ref. city)	(170.4)	(273.9)	(147.9)	(76.4)	(179.1)	(726.9)	(334.2)	(114.6)	(34.0)	(797.0)	(37.8)
District town	-811.1***	-945.4*	442.4*	-210.6	-613.8*	-2725.0**	-257.5	-268.8	-30.2	-1067.3	-99.6
(ref. city)	(245.8)	(395.0)	(213.3)	(110.3)	(258.3)	(1048.5)	(482.1)	(165.3)	(49.1)	(1149.6)	(54.6)
District rural	-960.0**	-915.5	876.4**	-134.9	-452.1	-4133.9**	563.5	-151.7	-70.5	-1217.6	-76.6
(ref. city)	(338.8)	(544.4)	(293.9)	(151.9)	(356.0)	(1444.8)	(664.3)	(227.8)	(67.7)	(1584.1)	(75.2)
N	276										
R-squared	0.862	0.279	0.634	0.705	0.561	0.547	0.675	0.451	0.339	0.848	0.378

Note. District-level logged distance to nearest TEP is also included as a covariate but not shown in the table due to space constraints. Models are weighted by district enrollment. URM=underrepresented minority; SBAC=Smarter Balance Assessment Consortium (test scores); SD=standard deviation; TEP=teacher education program. *P*-values from two-sided *t*-tests: *p<.05; **p<.01; ***p<.001.

Appendix A. Aligning S-275 Activity Codes with Job Posting Categories

To estimate typical costs per position type at the district-level, we have assigned activity codes in the S-275 to the 11 position categories we created for our job posting data. We also assign individuals within each activity code an indicator for certificated staff or classified staff because some activity codes (e.g., 27 Teaching) include multiple job posting categories that can be distinguished by their certification status. In the example of teaching, classroom teachers are identified as certificated staff whereas paraprofessionals are classified as teaching staff.

Table A.1 Assignment of activity codes to job posting categories

Activity Code	Classified / Certificated	Position Category
11 – Board of Directors	Classified	Administration
	Certificated	Administration
12 – Superintendent's Office	Classified	Administration
	Certificated	Superintendent
13 – Business Office	Classified	Administration
	Certificated	Administration
14 – Human Resources	Classified	Administration
	Certificated	Administration
15 – Public Relations	Classified	Administration
	Certificated	Administration
21 – Teaching & Learning Supervision	Classified	Teaching
	Certificated	Teaching
22 – Learning Resources	Classified	Other (nonteaching)
	Certificated	Other (nonteaching)
23 – Principal's Office	Classified	Administration
	Certificated	Principal
24 – Guidance & Counseling	Classified	Health
	Certificated	Health
25 – Pupil Management & Safety	Certificated	Other (nonteaching)
	Classified	Other (nonteaching)
26 – Health & Related Services	Classified	Health
	Certificated	Health
27 –Teaching	Classified	Paraeducator
	Certificated	Teaching
28 – Extracurricular	Classified	Athletics
	Certificated	Athletics
31 – Instructional Professional Development	Classified	Other (nonteaching)

	Certificated	Other (nonteaching)
32 – Instructional Technology	Classified	Other (nonteaching)
	Certificated	Other (nonteaching)
33 – Curriculum	Classified	Other (nonteaching)
	Certificated	Other (nonteaching)
41 – Food Service Supervision	Classified	Food Service
	Certificated	Food Service
44 – Food Service Operations	Classified	Food Service
	Certificated	Food Service
51 – Transportation Supervision	Classified	Transportation
	Certificated	Transportation
52 – Transportation Operations	Classified	Transportation
	Certificated	Transportation
53 – Transportation Maintenance	Classified	Transportation
	Certificated	Transportation
58 – Remote Learning	Classified	Other (nonteaching)
	Certificated	Other (nonteaching)
61 – Building Supervision	Classified	Facilities
	Certificated	Facilities
62 – Grounds Maintenance	Classified	Facilities
	Certificated	Facilities
63 – Operation of Buildings	Classified	Facilities
	Certificated	Facilities
64 – Building Maintenance	Classified	Facilities
	Certificated	Facilities
67 – Building and Property Security	Classified	Other (nonteaching)
	Certificated	Other (nonteaching)
72 – Information Systems	Classified	Other (nonteaching)
	Certificated	Other (nonteaching)
73 – Printing	Classified	Other (nonteaching)
	Certificated	Other (nonteaching)
74 – Warehousing & Distribution	Classified	Facilities
	Certificated	Facilities
75 – Motor Pool	Classified	Other (nonteaching)
	Certificated	Other (nonteaching)
91 – Public Activities	Classified	Other (nonteaching)
	Certificated	Other (nonteaching)

Appendix B. Methods for Estimating ESSER Impact on Hiring and Positions at Risk

Schwartz and Bolves (2022) use line-item data from ESSER budgets in Rhode Island to project the number of FTE positions that ESSER-budgeted funds could support. This estimate assumes all budgeted funding would go toward new hires rather than existing staff. Although we do not observe budgets disaggregated by expense type, we do have detailed data on ESSER claims, which we can use to apply this method in Washington State. Schwartz and Bolves's (2022) approach provides the number of positions that could be funded by budgeted ESSER dollars, whereas applying this approach to claims data provides the number of positions funded by ESSER dollars (not accounting for the spread of partial funding across multiple positions but for the cost of funding that the positions represent). In addition, whereas Schwartz and Bolves (2022) scale positions by the typical cost per FTE in a job type, we scale by the typical cost per position due to the nonstandard, part-time nature of several job categories we have observed. Because we use two different salary estimates in our analysis—a lower bound of average salaries among first-year staff in a category within each ESD and an average measure of salaries in a category in a district—we estimate that between 4,105 and 5,598 teaching positions are funded by ESSER using this method.[41]

Aldeman (2023b) uses student–teacher ratios from the Common Core of Data to estimate how much teacher FTE staff would need to contract to return to prepandemic (2018–19) ratios. In personal correspondence, he shared Washington state totals for applying this methodology to

[41] Schwartz et al. (2023) provides a follow-up to Schwartz and Bolves (2022), who also use a distinct approach to looking at the impact of ESSER. Schwartz et al. (2023) use line-item ESSER expense data from districts in Rhode Island to better understand the rate at which districts were spending funds and what districts were using ESSER funds for. One distinct finding from this review is that much of the funding budgeted toward paying staff (salaries, additional compensation, and/or benefits) went toward supporting existing staff rather than funding new hires. The authors found only 67 new hires in Rhode Island between 2020–21 and 2021–22. Because of the timing of our study, we consider new hires between the 2021–22 and 2022–23 school years (i.e., October 2021 and October 2022, the interval closest to our study period) and identify 5,386 new teaching positions in Washington.

the contrast between the 2018–19 and 2022–23 school year ratios, identifying a 3,404 teaching position difference necessary to return to prepandemic student–teacher ratios.

For our own approach, we multiply our 2SLS estimate of the impact of ESSER allocations on job postings (0.00505, not rounded, Column 2 of Table 3) by total allocations for ESSER II and III in Washington ($2.42 billion[42]) to estimate the impact of ESSER on total job postings. We use the 90% confidence interval on our model's 0.00505 estimate to calculate a range of possible impacts. This totals 12,200 positions, with a 90% confidence interval ranging from 7,012 to 17,388 positions. To estimate the portion of these estimates that is specific to teaching jobs, we use the point estimate from our seemingly unrelated regression specification predicting the impact of ESSER on category-specific posts (0.02113, Appendix Table C.3). With this scaling factor, we estimate that 5,103 teaching positions were created because of the availability of ESSER funding; our 90% confidence interval for this estimate ranges from 4,268 to 5,938.

[42] To put this figure in context, total state revenue in Washington in 2021–21 was $20.6 billion. See https://nces.ed.gov/programs/digest/d23/tables/dt23_235.20.asp?current=yes

Appendix C. Additional Tables and Figures

Table C.1 First Stage Results Predicting District-Level ESSER II and III Allocations

	(1)
Formula-eligible children	20.220***
	(0.688)
District enrollment	-1308.993**
	(484.910)
District enrollment^2	27.476
	(19.797)
District enrollment^3	-0.224
	(0.266)
2019–20 total district revenue	0.007
	(0.015)
District *n* low-income students	0.431*
	(0.193)
District *n* URM students	0.400
	(0.279)
District SBAC scores	792.036
	(3463.252)
Enrollment change in SDs (21–22)	141.082
	(719.994)
County unemployment rate	21059.097
	(39719.684)
District suburb (ref. city)	-2647.587*
	(1097.099)
District town (ref. city)	-1533.315
	(1084.525)
District rural (ref. city)	-2650.556
	(1455.703)
Log distance to nearest TEP	749.972**
	(241.888)
N	276
Adjusted R^2	0.995
F	119609.864

Note. Each column presents first-stage ordinary least squares (OLS) estimates of the relationship between our instrument (formula-eligible children) with ESSER II and III weighted by district enrollment. URM=underrepresented minority; SBAC=Smarter Balance Assessment Consortium (test scores); SD=standard deviation; TEP=teacher education program. *P*-values from two-sided *t*-tests: *p<.05; **p<.01; ***p<.001.

Table C.2 Predicted Impacts of ESSER Allocations on Job Post Outcomes

Outcome	Filled Post Costs Lower Bound ($1,000s)	
Specification	OLS (1)	2SLS (2)
ESSER II & III allocations ($1,000s)	0.124	0.168*
	(0.085)	(0.081)
District enrollment (1,000s)	1493.183*	1568.678*
	(696.461)	(660.181)
District enrollment^2 (1,000s)	-29.480	-34.611*
	(16.549)	(15.885)
District enrollment^3 (1,000s)	0.260	0.307
	(0.241)	(0.233)
2018–19 total district revenue ($1,000s)	-0.006	-0.004
	(0.036)	(0.036)
District n low-income students (1,000s)	-218.486	-385.192
	(426.956)	(371.829)
District n URM students (1,000s)	569.071	491.420
	(359.443)	(328.347)
District SBAC scores	1348.221	1866.068
	(6790.648)	(6577.241)
Enrollment change in SDs (21–22)	2451.173*	2452.530*
	(1156.372)	(1122.440)
County unemployment rate	27648.040	38702.055
	(100620.919)	(95619.509)
District suburb (ref. city)	-1348.050	-724.014
	(2275.416)	(2088.947)
District town (ref. city)	-2062.778	-1576.150
	(1742.766)	(1629.521)
District rural (ref. city)	-1591.772	-941.952
	(1958.177)	(1775.607)
Log distance to nearest TEP	459.767	423.177
	(694.314)	(667.169)
N	276	276
Adjusted *R*-squared	0.847	0.846

Note. Two-stage least squares (2SLS) regressions use the count formula-eligible children within a school district boundary instrument for ESSER allocations weighted by district enrollment. Standard errors are heteroskedasticity robust. OLS=ordinary least squares; SBAC=Smarter Balance Assessment Consortium (test scores); SD=standard deviation; TEP=teacher education program; URM=under-represented minority. P-values from two-sided t tests: *p<.05; **p<.01; ***p<.001.

Table C.3 Seemingly Unrelated Regressions Predicting Lower Bound Post Costs, by Category ($1,000s)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Admin Staff LBPC	Athletic Staff LBPC	Facilities Staff LBPC	Food Services LBPC	Health Staff LBPC	Other Staff LBPC	Para-educator LBPC	Principal LBPC	Super-intendent LBPC	Teacher LBPC	Transpor-tation LBPC
ESSER II & III	0.003	0.002**	0.015***	0.001	-0.017***	0.008	0.002	-0.002	-0.001	0.116***	-0.002
allocations ($1,000s)	(0.006)	(0.001)	(0.004)	(0.002)	(0.004)	(0.005)	(0.011)	(0.003)	(0.001)	(0.020)	(0.001)
District enrollment	-130.169	5.245	275.05***	97.108***	69.692	-321.36***	792.682***	60.101	-12.188	585.410*	71.610***
	(66.972)	(9.461)	(50.051)	(21.208)	(50.389)	(59.092)	(123.517)	(33.051)	(7.810)	(228.111)	(14.068)
District enrollment^2	10.453***	0.264	-7.922***	-1.629*	-6.155***	8.891***	-18.685***	0.567	0.106	-13.634	-1.737***
	(2.423)	(0.342)	(1.811)	(0.767)	(1.823)	(2.138)	(4.469)	(1.196)	(0.283)	(8.254)	(0.509)
District enrollment^3	-0.157***	-0.011*	0.076**	0.017	0.067**	-0.113***	0.209***	-0.024	-0.003	0.170	0.027***
	(0.031)	(0.004)	(0.023)	(0.010)	(0.023)	(0.028)	(0.058)	(0.015)	(0.004)	(0.106)	(0.007)
2019–20 total district	0.001	-0.000	-0.001	-0.003***	0.004*	0.008***	-0.010*	-0.001	0.001*	-0.001	-0.003***
revenue	(0.002)	(0.000)	(0.002)	(0.001)	(0.002)	(0.002)	(0.004)	(0.001)	(0.000)	(0.008)	(0.001)
District *n* low-income	0.161***	0.002	0.123***	-0.005	0.143***	-0.012	0.147*	-0.026	-0.000	-0.769***	0.016*
students	(0.036)	(0.005)	(0.027)	(0.011)	(0.027)	(0.032)	(0.067)	(0.018)	(0.004)	(0.123)	(0.008)
District *n* URM students	0.035	0.009	-0.206***	0.087***	0.031	0.132***	-0.184*	0.038	0.019***	0.583***	0.026**
	(0.041)	(0.006)	(0.030)	(0.013)	(0.031)	(0.036)	(0.075)	(0.020)	(0.005)	(0.138)	(0.009)
District SBAC scores	2891.100***	303.510**	316.581	638.829*	377.980	667.987	-3766.770*	548.805	-44.226	-1086.214	500.642**
	(824.410)	(116.459)	(616.117)	(261.061)	(620.272)	(727.412)	(1520.467)	(406.853)	(96.141)	(2808.000)	(173.168)
Enrollment change in SDs	-78.552	-0.834	291.119	117.957	185.498	67.114	396.768	110.289	12.397	1341.037	8.381
(21–22)	(214.758)	(30.338)	(160.498)	(68.006)	(161.580)	(189.490)	(396.080)	(105.985)	(25.045)	(731.481)	(45.110)
District unemployment	-16159.347	3576.971**	4315.872	13534.29***	-541.130	25257.3***	-10210.127	8511.403*	8.768	-6586.003	5940.06***
rate	(8587.450)	(1213.097)	(6417.776)	(2719.339)	(6461.056)	(7577.075)	(15837.91)	(4237.978)	(1001.447)	(29249.482)	(1803.802)
District suburb (ref. city)	-682.146***	-38.033	457.73***	-54.275	-571.15***	-246.863	478.217	-349.24***	-9.515	-216.096	-116.676***
	(162.816)	(23.000)	(121.679)	(51.558)	(122.500)	(143.659)	(300.283)	(80.351)	(18.987)	(554.563)	(34.200)
District town (ref. city)	-374.271	-51.848	330.659	-108.162	-485.382**	-544.399**	-45.421	-316.664**	5.037	-383.840	-88.488
	(234.833)	(33.173)	(175.501)	(74.363)	(176.685)	(207.203)	(433.105)	(115.892)	(27.386)	(799.859)	(49.327)
District rural (ref. city)	-573.169	-54.904	635.463**	-15.388	-406.624	-827.611**	407.786	-217.852	-8.952	-477.440	-53.081
	(323.605)	(45.714)	(241.844)	(102.474)	(243.475)	(285.531)	(596.828)	(159.702)	(37.738)	(1102.222)	(67.974)
N						276					
R-squared	0.787	0.614	0.563	0.652	0.554	0.734	0.598	0.466	0.390	0.837	0.333

Note. District-level regressions predicting category post costs as a function of ESSER II & III allocations and district characteristics weighted by district enrollment. The model also includes a control for logged distance to nearest TEP. Standard errors are heteroskedasticity robust. LBPC=lower bound post costs; URM=under-represented minority; SBAC=Smarter Balance Assessment Consortium (test scores); SD=standard deviation; TEP=teacher education program. *P*-values from two-sided *t*-tests: *p<.05; **p<.01; ***p<.001.

Table C.4 Seemingly Unrelated Regressions Predicting Posts, by Category

	(1) Admin Staff Posts	(2) Athletic Staff Posts	(3) Facilities Staff Posts	(4) Food Services Posts	(5) Health Staff Posts	(6) Other Staff Posts	(7) Para-educator Posts	(8) Principal Posts	(9) Super-intendent Posts	(10) Teacher Posts	(11) Transpor-tation Posts
ESSER II & III allocations ($10,000s)	0.003*	0.007***	0.005***	0.001	-0.003***	0.011**	0.006	0.000	-0.000	0.021***	-0.001
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.004)	(0.004)	(0.000)	(0.000)	(0.003)	(0.001)
District enrollment (1,000s)	1.893	0.813	9.211***	6.847***	1.526	-19.51***	42.920***	0.445	-0.052	11.021**	4.245***
	(1.359)	(2.268)	(1.200)	(1.475)	(0.972)	(4.122)	(5.010)	(0.417)	(0.051)	(3.764)	(0.693)
District enrollment ^2 (1,000s)	0.144**	0.127	-0.222***	-0.108*	-0.120***	0.570***	-0.957***	0.028	0.000	-0.229	-0.109***
	(0.049)	(0.082)	(0.043)	(0.053)	(0.035)	(0.149)	(0.181)	(0.015)	(0.002)	(0.136)	(0.025)
District enrollment ^3 (1,000s)	-0.002***	-0.003**	0.002***	0.001	0.001**	-0.007***	0.011***	-0.001**	-0.000	0.003	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.002)	(0.002)	(0.000)	(0.000)	(0.002)	(0.000)
2019–20 total district revenue ($1,000s)	-0.000**	-0.000	-0.000**	-0.000***	0.000	0.000**	-0.001***	-0.000	0.000	-0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
District *n* low-income students	0.004***	-0.000	0.003***	0.000	0.003***	-0.000	0.005	-0.001*	-0.000	-0.014***	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)	(0.000)	(0.000)	(0.002)	(0.000)
District *n* URM students	-0.001	0.003*	-0.007***	0.004***	0.001	0.005*	-0.012***	0.001**	0.000***	0.011***	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)	(0.000)	(0.000)	(0.002)	(0.000)
District SBAC scores	57.975***	86.947**	9.645	32.780	9.077	44.107	-171.1**	8.001	-0.498	-6.625	16.428
	(16.724)	(27.920)	(14.770)	(18.154)	(11.965)	(50.746)	(61.673)	(5.129)	(0.629)	(46.332)	(8.535)
Enrollment change in SDs (21–22)	-1.311	1.540	7.840*	9.704*	3.766	10.319	14.873	1.472	0.085	21.995	1.492
	(4.357)	(7.273)	(3.848)	(4.729)	(3.117)	(13.219)	(16.066)	(1.336)	(0.164)	(12.069)	(2.223)
District unemployment rate	-212.288	785.047**	153.709	788.493***	-39.049	2083.6***	-75.065	74.449	0.015	-76.375	221.408*
	(174.205)	(290.827)	(153.849)	(189.098)	(124.638)	(528.590)	(642.417)	(53.425)	(6.549)	(482.611)	(88.904)
District suburb (ref. city)	-15.238***	-7.258	11.295***	-2.673	-11.29***	-12.737	5.789	-3.430***	-0.142	-2.591	-5.174**
	(3.303)	(5.514)	(2.917)	(3.585)	(2.363)	(10.022)	(12.180)	(1.013)	(0.124)	(9.150)	(1.686)
District town (ref. city)	-8.400	-9.502	8.766*	-5.620	-9.057**	-38.537**	-11.648	-3.062*	0.017	-4.379	-2.637
	(4.764)	(7.953)	(4.207)	(5.171)	(3.408)	(14.455)	(17.568)	(1.461)	(0.179)	(13.198)	(2.431)
District rural (ref. city)	-9.637	-11.359	17.610**	0.212	-7.904	-55.775**	12.516	-2.737	-0.095	-5.697	-0.299
	(6.565)	(10.959)	(5.798)	(7.126)	(4.697)	(19.919)	(24.208)	(2.013)	(0.247)	(18.186)	(3.350)
N						276					
R-squared	0.842	0.717	0.686	0.667	0.741	0.697	0.734	0.629	0.183	0.854	0.273

Note. District-level regressions predicting category post costs as a function of ESSER II & III allocations and district characteristics weighted by district enrollment. The model also includes a control for logged distance to nearest TEP. Standard errors are heteroskedasticity robust. URM=underrepresented minority; SBAC=Smarter Balance Assessment Consortium (test scores); SD=standard deviation; TEP=teacher education program. *P*-values from two-sided *t*-tests: *$p<.05$; **$p<.01$; ***$p<.001$.

Table C.5 Two-Stage Seemingly Unrelated Regressions Predicting Post Costs, by Category ($1,000s)

	(1) Admin Staff Post Costs	(2) Athletic Staff Post Costs	(3) Facilities Staff Post Costs	(4) Food Services Post Costs	(5) Health Staff Post Costs	(6) Other Staff Post Costs	(7) Para-educator Post Costs	(8) Principal Post Costs	(9) Super-intendent Post Costs	(10) Teacher Post Costs	(11) Transpor-tation Post Costs
ESSER II & III	-0.008	-0.048	0.046	-0.001	-0.017	-0.095	0.036	0.006	-0.007	0.298	-0.014
allocations ($1,000s)	(0.048)	(0.113)	(0.046)	(0.019)	(0.053)	(0.250)	(0.106)	(0.026)	(0.009)	(0.213)	(0.010)
District enrollment	-268.169	3.661	611.890*	35.153	-186.861	-4443.433	1034.942	-74.872	-95.040	-1444.122	120.478
	(339.007)	(610.746)	(254.603)	(112.816)	(466.049)	(2341.08)	(845.929)	(180.483)	(66.718)	(1653.169)	(65.341)
District enrollment^2	24.247	-12.351	-14.522	3.276	-12.155	165.029	-53.385	0.710	5.018	-10.199	-1.720
	(20.491)	(34.001)	(15.022)	(6.204)	(17.893)	(188.331)	(62.531)	(12.195)	(4.408)	(78.154)	(3.729)
District enrollment^3	-0.312	0.078	0.164	-0.049	0.087	-2.213	0.603	-0.059	-0.071	-0.089	0.037
	(0.508)	(0.908)	(0.397)	(0.152)	(0.437)	(4.563)	(1.484)	(0.285)	(0.106)	(1.891)	(0.095)
2019–20 total district	-0.006	0.020	-0.009	-0.003	0.025	0.060	0.018	0.008	0.001	0.100	-0.006*
revenue	(0.014)	(0.026)	(0.012)	(0.004)	(0.020)	(0.051)	(0.023)	(0.008)	(0.002)	(0.074)	(0.002)
District *n* low-income	0.096	0.340	0.095	-0.021	0.238	-0.291	0.425	-0.078	-0.017	-1.321	0.054
students	(0.302)	(0.716)	(0.305)	(0.162)	(0.454)	(1.580)	(0.951)	(0.211)	(0.064)	(1.566)	(0.073)
District *n* URM students	0.183	-0.073	-0.480	0.115	0.109	1.987	-0.678	0.120	0.052	0.985	0.083
	(0.250)	(0.648)	(0.250)	(0.098)	(0.239)	(1.646)	(0.476)	(0.125)	(0.053)	(1.019)	(0.068)
District SBAC scores	2947.495	-946.611	-725.858	720.237	2540.517	8435.279	-4033.428	1802.682	-506.698	9592.858	159.448
	(1770.623)	(4083.606)	(1662.48)	(701.085)	(2725.07)	(8000.01)	(4421.35)	(1445.02)	(406.767)	(9437.372)	(430.496)
Enrollment change in SDs	187.533	-1044.299	-117.596	87.812	421.290	4883.618*	-1324.676	405.294	66.012	3576.288	-82.633
(21–22)	(339.505)	(1198.079)	(368.413)	(126.522)	(474.906)	(2398.14)	(902.591)	(260.359)	(90.380)	(1874.431)	(118.971)
District unemployment	-31872.590	57703.154	3107.182	22717.833*	-2070.780	128432.65	11605.668	47197.86*	-1333.580	33222.492	1827.751
rate	(27428.1)	(61798.3)	(22763.4)	(10996.7)	(28365.5)	(117308)	(64468.5)	(19468.0)	(4985.1)	(117007.0)	(6439.8)
District suburb (ref. city)	-1118.154	-2788.499	1361.612	-190.802	-1270.939	-5763.564	-614.449	-442.411	-112.357	-1118.627	-332.851
	(779.3)	(1971.3)	(750.7)	(247.7)	(893.1)	(4023.9)	(1335.6)	(414.0)	(150.9)	(3573.4)	(185.4)
District town (ref. city)	-1200.291	-2815.958	1079.446	-248.990	-704.365	-8322.39*	169.195	-617.739	-117.481	-1896.848	-240.429
	(722.703)	(1662.656)	(678.871)	(234.272)	(748.695)	(3931.58)	(1252.66)	(397.685)	(158.775)	(3109.805)	(176.051)
District rural (ref. city)	-1470.275	-2794.837	1684.93*	-272.899	-619.132	-12557.1*	1014.066	-588.955	-294.750	-2441.964	-282.786
	(849.258)	(1941.310)	(780.796)	(258.330)	(849.876)	(5446.11)	(1730.75)	(493.928)	(184.290)	(3482.332)	(198.721)
N						274					
R-squared	0.896	0.408	0.716	0.826	0.625	0.675	0.655	0.625	0.591	0.862	0.629

Note. District-level regressions predicting category post costs as a function of ESSER II & III allocations and district characteristics weighted by district enrollment. The model also includes a control for logged distance to nearest TEP. Standard errors are heteroskedasticity robust. URM=under-represented minority; SBAC=Smarter Balance Assessment Consortium (test scores); SD=standard deviation; TEP=teacher education program. *P*-values from two-sided *t*-tests: *p<.05; **p<.01; ***p<.001.