

Data Appendix

A.1 Data Sampling

We began with a baseline data file covering schools in all California Local Education Agencies (LEAs) as of 2017.¹ From this file, we removed charter LEAs², LEAs without enrollment data from the 2013-14 school year, and LEAs with fewer than 1500 students as of the 2013-14 school year. We chose the 2013-14 school year for initial conditions because 2013-14 is the year before legislated increases to California State Teachers' Retirement System (CalSTRS) contribution rates, per Assembly Bill 1469.

After imposing these exclusion conditions, we were left with a sample of 494 California LEAs. Next we implemented a stratified random sampling procedure based on LEA deciles in the total enrollment distribution based on 2013-14 data. Our sampling procedure targets collection from 150 of the remaining 494 districts. First, we split the data into five strata. Next, we randomly selected 30 districts from each stratum to attain our initial sample of 150 districts. The sampling by strata was as follows:

- Strata 1 consists of the bottom 30 percent of remaining districts; 148 districts (30th percentile enrollment: 3366)
- Strata 2 consists of the 31-60 percentile range; 149 districts (60th percentile enrollment: 8442)
- Strata 3 consists of the 61-80 percentile range; 99 districts (80th percentile enrollment: 15434)
- Strata 4 consists of the 81-90 percentile range; 49 districts (90th percentile enrollment: 23198)
- Strata 5 consists of the 91+ percentile range; 49 districts

These strata were selected to ensure that our 150-district sample includes districts over the full range of remaining enrollment values (all of which exceed 1500 students in 2013-14, per above), but with overrepresentation of larger districts. We targeted a sample with disproportionate representation of larger districts because (a) this leads to greater student coverage among districts in our sample conditional on the sample size, and (b) we anticipated that larger districts have cleaner and more-accessible budget documents. The 150 initially selected districts are reported in Appendix Table 1.

Once the list of 150 districts was generated, we collected data from unaudited actual budgets over the years 2010-11 through 2016-17 using publicly available annual financial data.³ We then manually collected projected/adopted budgets directly from districts from 2016-17 through 2019-20. The overlap between the projected budget documents we collected and the unaudited actual budgets in

¹ California Department of Education, "Enrollment by School, 2017," <https://www.cde.ca.gov/ds/sd/sd/filesenr.asp>.

² We used this data file to determine which schools were charters: California Department of Education, "Local Control Funding Formula - Funding Snapshot, 2017," <http://ias.cde.ca.gov/lcffsnapshot/lcff.aspx>.

³ California Department of Education, "Annual Financial Data, 2016-17," <https://www.cde.ca.gov/ds/fd/fd/index.asp>.

2016-17 is used to identify discrepancies in projected budgets that may require adjustments or corrections (see Section A.2).

CalSTRS contribution rates are legislated to rise annually between 2014-15 and 2020-21. Thus, our budget data go through the year prior to the last year of legislated rate increases in CalSTRS. We did not collect data from years beyond 2019-20 because no such projected budget documents were available at the time of our data collection, which was during the winter/spring of 2018.

A.2 Data Cleaning & Adjustments

A.2.1 General Information

Cleaning and adjustments were necessary after initial data collection. This section documents notable cleaning and adjustment processes and outcomes.

First, we focus our report on districts' total expenditures and expenditures on budget codes below the 5000 level. We did not clean codes at level-5000 or above. The codes we cleaned contain the following information:

1000-level codes: Certified personnel salary expenditures
2000-level codes: Classified personnel salary expenditures
3000-level codes: Employee benefit expenditures
4000-level codes: Books and supplies expenditures

The combined expenditures on items covered by 1000-to-4000 level codes account for 87-89 percent of total district expenditures, on average, for districts in our sample between 2010-11 and 2019-20. Expenditures on items covered by 1000-to-3000 codes alone account for 81-85 percent. In our report we separate out spending on 1000-, 2000-, and 3000-level codes, and refer to expenditures on other non-personnel codes as "other expenditures" (defined in our analysis as the value of the total budget minus the sum of expenditures on 1000-, 2000-, and 3000-level codes).

A.2.2 Dropped Data and Basic Corrections

We dropped data from two LEAs from our sample entirely.⁴ We also made a number of small, basic adjustments to budget information when our district-by-district review of the data suggested an obvious error. As one such example, the unaudited actual budget for Palm Springs Unified School District (LEA #3367163) indicates an infeasibly large change in other post-employment benefit (OPEB) costs for certified and classified employees in 2016-17, and only in that year. In this and other such instances, we treat the budget data for that district and year as missing. There are few such instances in the data; SAS code is available from the authors upon request documenting all changes to the individual district budgets.

A.2.3 Budget Adjustments Due to On-Behalf State Pension Contributions

⁴ The LEAs are #4970912 (Santa Rosa Elementary) and #3868478 (San Francisco Unified), which we dropped from the sample because of significant missing data in both sets of longitudinal budget records.

The most substantive issue that came up in our data cleaning is with regard to state contributions to CalSTRS on behalf of district employees. Beginning with the 2014-15 school year, California LEAs are required to report on-behalf contributions by the state in their budgets as pension expenditures. In the unaudited actual data through 2016-17, these on-behalf contributions are separable from districts' own expenditures, but in the projected/adopted budgets they are not. It was not clear *ex ante* how LEAs were handling on-behalf contributions in their projected/adopted budgets.

Overview

Using the overlapping year of data – 2016-17 – for which we have both the unaudited actual budgets and the adopted budgets, we examined whether districts report state on-behalf contributions in their adopted budgets. This is made possible by the fact that we can separate out on-behalf contributions in the 2016-17 unaudited actuals. We can use the separated values to ascertain whether the adopted budgets include the state on-behalf contributions. Because on-behalf contributions from the state do not require direct district expenditures, and our interest is in how district budgets are being affected by rising pension costs, our goal was to build a data panel so that all district budgets in all years exclude the state on-behalf contributions.

Using the unaudited actual budgets through 2016-17 this was straightforward for all districts. From 2017-18 onward there are two types of districts – those that we determined are likely not reporting state on-behalf contributions, and those that are. For districts not reporting state on-behalf contributions, we used their budgets as reported. For districts that do report on-behalf contributions as part of their pension expenditures in their projected budgets, we made an *ex post* adjustment to take these values out manually. Our process for making the adjustment is detailed in the remainder of this section of the appendix.

To identify which districts include on-behalf contributions in their projections and which districts do not, we proceeded as follows. First, during 2016-17, we know that the legislated district contribution rate to STRS was 12.58 percent of teacher salaries, and the state contribution rate was 6.33 percent. Thus, we know that the state on-behalf contribution is 50.3 (6.33/12.58) percent of the district contribution in that year.

We take the unaudited actual budget values, again reported without on-behalf contributions, and multiply them by 1.503. This calculation approximates the total contribution, inclusive of on-behalf contributions. Call the reported unaudited actual values without the on-behalf contributions X_1 , and the modified values X_2 .

We assess whether districts include on-behalf contributions in their adopted/proposed budgets by comparing the reported values on these budgets to X_1 and X_2 . If the value is closer to X_1 , we conclude that the district *is not* including on-behalf contributions in their projected budgets; if the value is closer to X_2 then we conclude that the district *is* including on-behalf contributions. Note that in most cases, either X_1 or X_2 is very close (within a couple of percentage points) of the value reported on the adopted/proposed budget, and the other number is far off, suggesting that the on-behalf contribution issue is the key driver of discrepancies in this regard between unaudited actual

and adopted budgets in 2016-17.⁵ Our approach suggests that about two-thirds (67 percent) of districts include state on-behalf contributions in their reporting, but one-third do not.

We assume that districts either always report or always fail to report on-behalf contributions in their proposed budgets in 2016-17 to 2019-20, based on our analysis of 2016-17 data.

After identifying which districts do and do not include on-behalf contributions using the above-described process, we took the following steps to remove the on-behalf contributions from the reported values for districts that include them in 2018, 2019, and 2020 (recall that for 2017 and previous years we have the unaudited actual budgets, which separate the values for us):

1. For each year through 2020, we know the ratio of district to state contributions legislated by AB 1469 (we ignore the variable state rate in these calculations, as it is not directly legislated and it is subject to fluctuation; thus it is unlikely to be included in district projections). The legislated rates are provided below:

	District	State
2017:	12.58	6.33
2018:	14.43	6.33
2019:	16.28	6.33
2020:	18.13	6.33

2. For districts that include on-behalf contributions in their adopted/proposed budgets, we can remove them by multiplying the values of their reported STRS contributions by the following formula:

$$\frac{1}{1 + \frac{SR}{DR}}$$

In the above equation, *SR* is the state rate and *DR* is the district rate. The value from this equation indicates the share of total STRS contributions, inclusive of on-behalf contributions, made by the district directly.⁶

3. However, a problem is that for 2018, 2019, and 2020, we do not have STRS projected spending for many districts because not all districts report at this level of detail. Instead, STRS spending is bundled with total benefit spending (i.e., all 3000-level codes).⁷

⁵ Of course the budgets do not match exactly for many reasons. But after our corrections, the gap between the unaudited actual budget and adopted/proposed budget is less than 10 percent for over 80 percent of school districts. The same gap is less than 10 percent for fewer than 20 (50) percent (50 districts) of school districts if we assume all districts do not (do) include the on-behalf contributions.

⁶ For example, if the state rate is 50 percent of the district rate (as it is roughly in 2016-17), then the value of the equation is 0.67. This indicates that of total reported pension expenditures, inclusive of state on-behalf contributions, 67% (two thirds) is from the district directly and 33% (one third) is from the state.

⁷ In 2018, some districts provide STRS specific spending, but many do not. No districts project STRS specific spending in 2019 or 2020. For consistency, we apply the same procedure to all districts in all three years regardless of whether 2018 STRS spending is separated out in budget documents.

In order to make the proper correction, we need to determine what fraction of total benefit spending (all 3000 codes) is for STRS, and then make the adjustment to just that value. Then we can get a revised estimate of total benefit spending net of the STRS on-behalf adjustment. If we call total benefit spending A , and the share that is STRS spending B , we can make the following calculation to remove STRS state on-behalf contributions from total benefit spending for each district:

$$A - B * \left[1 - \frac{1}{1 + \frac{SR}{DR}} \right]$$

4. The final problem is that we do not know B because it is not reported. To solve this problem, we use the 2017 unaudited actual budgets to estimate the STRS share of total benefit costs. In those budgets, call district STRS contributions P and total 3000-level expenditures Q . We add in STRS on-behalf contributions to both P and Q , which we can call P^* and Q^* , respectively. We then approximate the STRS share of total benefit costs for districts that include on-behalf contributions as P^*/Q^* .

In years 2018, 2019, and 2020, we assume this ratio stays constant. This means we can estimate B in each year t (where t indexes 2018, 2019, and 2020) as follows:

$$\hat{B}_t = \frac{P_{2017}^*}{Q_{2017}^*} * A_t$$

Note the assumption that the ratio P/Q is constant is very rough and surely not exactly accurate, although other benefit costs are also rising during this time period so it may be plausible. For the analysis in our report, we test to ensure that the qualitative findings are robust to relaxing this assumption by allowing STRS costs as a fraction of total benefit spending to rise.⁸

5. Following from step 4, the adjusted 3000-level benefit costs for school districts that include on-behalf contributions in their projected budgets are as follows:

$$A_t - \left\{ \frac{P_{2017}^*}{Q_{2017}^*} * A_t * \left[1 - \frac{1}{1 + \frac{SR_t}{DR_t}} \right] \right\}$$

And of course, we also make the same adjustment to the total budget numbers, which are inclusive of pension/benefit costs.

Note that because these corrections are clearly *ad hoc*, we also replicate our analysis only using districts that we determine do not include on-behalf contributions in their projected budgets (in

⁸ Specifically, we make alternative calculations where the STRS share of total benefit spending is assumed to increase by 1.5 or 2.5 percentage points annually over the period of projected budgets, and find results similar to what we show in the main report.

which case the correction we describe here is not required). As mentioned above, we estimate that about one third of districts in the balanced panel (32 districts) do not include on-behalf contributions in their adopted/proposed budgets. While the patterns are noisier with the smaller sample, the qualitative findings in our report are present in this restricted sample of districts as well.

Finally, we examine the data after our corrective procedure to look for evidence that it improves data quality. An instructive metric is the (level-adjusted) variance of benefit expenditures. Because the post-2017 raw budget data introduce variability in whether STRS on-behalf contributions are reported across districts, the variance of 3000-level expenditures should rise in these years, all else equal. Correspondingly, if our corrections reduce the variability in reporting, the corrected data should exhibit lower cross-district variance. This is precisely what we see.

A.3 The Balanced District Panel

Data for all districts in all years are not available. In some cases districts simply do not report the information—e.g., a district might omit the projection for 3000-level expenditures in 2018—and in others there is a data error that we cannot resolve and we manually remove the data from that year—e.g., as in the example of Palm Springs Unified School District above.

The data from the unaudited actual budgets are essentially clean, except for one-off issues such as the one with Palm Springs. Thus, except for the two districts we drop, we have nearly complete data through 2017 for our initial 150-district LEA sample. But starting in 2018 when we shift to the adopted budgets, we begin to lose data. The primary reason is non-reported values (i.e., not data errors; the data are simply missing). There are various sources of missingness in the data starting with 2018, and many districts with some missing information are missing all information.

Ultimately, 98 of the 148 LEAs in our initial sample have full data for all years covering 2010-11 through the 2019-20 projections. For the main report, we show output for these 98 districts, which we refer to as comprising the “balanced panel” dataset. The sample of districts from the balanced panel is shown below in Table 1, next to the originally sampled LEAs.

Table 2 provides basic descriptive statistics for all California LEAs from which we originally sampled, the initial 150-LEA sample, and the 98-district balanced panel. Note the initial shift toward large districts based on the sampling approach described above moving from columns (1) to (2). Also note that the sample further shifts toward coverage of large, unified school districts as we move from columns (2) to (3). This shift is explained by the fact that more complete budget information tends to be available for larger districts. Of note, the socioeconomic status of districts, proxied in our data by the share of students eligible for free/reduced-price meals and the unduplicated pupil share, is similar across all three samples in Table 2.

We have verified the qualitative robustness of the patterns we show in our report to using the “unbalanced panel,” which includes all available information in our dataset. The reason we do not lead with the unbalanced panel is that the missing data causes a shift in the composition of reporting districts beginning in 2018, as described above, and we want to ensure that the patterns we show are not confounded by changes to the composition of districts in the dataset over time.

Appendix Table 1. 150-LEA Initial Sample Districts and 98-LEA Balanced Sample Districts.
 Ordered by County-District-School (CDS) Code

150-LEA Sample		98-LEA Balanced Panel Sample	
<i>[CDS]</i>	<i>[District Name]</i>	<i>[CDS]</i>	<i>[District Name]</i>
161127	Albany City Unified	161127	Albany City Unified
161143	Berkeley Unified	161143	Berkeley Unified
161150	Castro Valley Unified	161150	Castro Valley Unified
161176	Fremont Unified	161176	Fremont Unified
161192	Hayward Unified	161192	Hayward Unified
161275	Piedmont City Unified	161275	Piedmont City Unified
761630	Acalanes Union High	761630	Acalanes Union High
761663	Byron Union Elementary	761663	Byron Union Elementary
761796	West Contra Costa Unified	761796	West Contra Costa Unified
1062117	Clovis Unified		
1062125	Coalinga-Huron Unified	1062125	Coalinga-Huron Unified
1062240	Kingsburg Elementary Charter		
1076778	Washington Unified		
1175481	Orland Joint Unified	1175481	Orland Joint Unified
1363123	El Centro Elementary	1363123	El Centro Elementary
1363164	Imperial Unified		
1476687	Bishop Unified		
1563313	Arvin Union		
1563461	Fairfax Elementary		
1563479	Fruitvale Elementary	1563479	Fruitvale Elementary
1563529	Kern High		
1563685	Muroc Joint Unified		
1563826	Tehachapi Unified	1563826	Tehachapi Unified
1563842	Wasco Union Elementary	1563842	Wasco Union Elementary
1613090	San Lorenzo Unified		
1964212	ABC Unified	1964212	ABC Unified
1964246	Antelope Valley Union High	1964246	Antelope Valley Union High
1964279	Azusa Unified	1964279	Azusa Unified
1964303	Bellflower Unified		
1964329	Bonita Unified	1964329	Bonita Unified
1964378	Charter Oak Unified		
1964394	Claremont Unified	1964394	Claremont Unified
1964451	Downey Unified	1964451	Downey Unified
1964485	East Whittier City Elementary	1964485	East Whittier City Elementary
1964501	El Monte City	1964501	El Monte City
1964527	El Rancho Unified	1964527	El Rancho Unified
1964642	Keppel Union Elementary		
1964691	Lawndale Elementary		
1964733	Los Angeles Unified	1964733	Los Angeles Unified
1964808	Montebello Unified	1964808	Montebello Unified
1964840	Norwalk-La Mirada Unified	1964840	Norwalk-La Mirada Unified
1964857	Palmdale Elementary	1964857	Palmdale Elementary
1964865	Palos Verdes Peninsula Unified	1964865	Palos Verdes Peninsula Unified
1964873	Paramount Unified	1964873	Paramount Unified
1964881	Pasadena Unified	1964881	Pasadena Unified
1964907	Pomona Unified	1964907	Pomona Unified
1964931	Rosemead Elementary	1964931	Rosemead Elementary
1964980	Santa Monica-Malibu Unified		
1965029	South Pasade. Unified		
1965136	William S. Hart Union High	1965136	William S. Hart Union High
1973437	Compton Unified	1973437	Compton Unified
1973445	Hacienda la Puente Unified		
1975309	Acton-Agua Dulce Unified		

1975713 Alhambra Unified	2065243 Madera Unified
2065243 Madera Unified	2076414 Yosemite Unified
2076414 Yosemite Unified	2165417 Novato Unified
2165417 Novato Unified	2265532 Mariposa County Unified
2265532 Mariposa County Unified	2465698 Hilmar Unified
2465698 Hilmar Unified	2465748 Livingston Union
2465748 Livingston Union	2465755 Los Banos Unified
2465755 Los Banos Unified	2465789 Merced Union High
2465789 Merced Union High	2475317 Dos Palos Oro Loma Joint Unified
2475317 Dos Palos Oro Loma Joint Unified	2766159 Salinas Union High
2766159 Salinas Union High	2775473 Gonzales Unified
2775473 Gonzales Unified	2866266 Napa Valley Unified
2866266 Napa Valley Unified	3066423 Anaheim Elementary
3066423 Anaheim Elementary	3066464 Capistrano Unified
3066464 Capistrano Unified	3066522 Garden Grove Unified
3066522 Garden Grove Unified	3066548 Huntington Beach Union High
3066548 Huntington Beach Union High	3066589 Magnolia Elementary
3066589 Magnolia Elementary	3066597 Newport-Mesa Unified
3066597 Newport-Mesa Unified	3066613 Ocean View
3066613 Ocean View	3066647 Placentia-Yorba Linda Unified
3066647 Placentia-Yorba Linda Unified	3073635 Saddleback Valley Unified
3073635 Saddleback Valley Unified	3073643 Tustin Unified
3073643 Tustin Unified	3073650 Irvine Unified
3073650 Irvine Unified	3073924 Los Alamitos Unified
3073924 Los Alamitos Unified	3166910 Roseville City Elementary
3166910 Roseville City Elementary	3166928 Roseville Joint Union High
3166928 Roseville Joint Union High	3166951 Western Placer Unified
3166951 Western Placer Unified	3366985 Banning Unified
3366985 Banning Unified	3367033 Corona-Norco Unified
3367033 Corona-Norco Unified	3367082 Hemet Unified
3367082 Hemet Unified	3367124 Moreno Valley Unified
3367124 Moreno Valley Unified	3367173 Palm Springs Unified
3367173 Palm Springs Unified	3375176 Lake Elsinore Unified
3375176 Lake Elsinore Unified	3375242 Val Verde Unified
3375242 Val Verde Unified	3467314 Elk Grove Unified
3467314 Elk Grove Unified	3467348 Galt Joint Union Elementary
3467348 Galt Joint Union Elementary	3467421 Robla Elementary
3467421 Robla Elementary	3467439 Sacramento City Unified
3467439 Sacramento City Unified	3467447 San Juan Unified
3467447 San Juan Unified	3473973 Center Joint Unified
3473973 Center Joint Unified	3476505 Twin Rivers Unified
3476505 Twin Rivers Unified	3667652 Chaffey Joint Union High
3667652 Chaffey Joint Union High	3667686 Colton Joint Unified
3667686 Colton Joint Unified	3667777 Morongo Unified
3667777 Morongo Unified	3667850 Rialto Unified
3667850 Rialto Unified	3667876 San Bernardino City Unified
3667876 San Bernardino City Unified	3673957 Snowline Joint Unified
3673957 Snowline Joint Unified	3767967 Alpine Union Elementary
3767967 Alpine Union Elementary	3768098 Escondido Union
3768098 Escondido Union	3768106 Escondido Union High
3768106 Escondido Union High	3768130 Grossmont Union High
3768130 Grossmont Union High	3768221 National Elementary
3768221 National Elementary	3768296 Poway Unified
3768296 Poway Unified	3768338 San Diego Unified
3768338 San Diego Unified	3768411 Sweetwater Union High
3768411 Sweetwater Union High	3773551 Carlsbad Unified
3773551 Carlsbad Unified	

3773569 Oceanside Unified	3773569 Oceanside Unified
3868478 San Francisco Unified	
3968593 Manteca Unified	3968593 Manteca Unified
3968650 Ripon Unified	3968650 Ripon Unified
3968676 Stockton Unified	3968676 Stockton Unified
4068700 Atascadero Unified	4068700 Atascadero Unified
4075457 Paso Robles Joint Unified	4075457 Paso Robles Joint Unified
4168882 Burlingame Elementary	4168882 Burlingame Elementary
4169013 San Bruno Park Elementary	4169013 San Bruno Park Elementary
4169070 South San Francisco Unified	4169070 South San Francisco Unified
4269229 Lompoc Unified	
4369401 Campbell Union High	4369401 Campbell Union High
4369484 Gilroy Unified	
4369526 Los Gatos Union Elementary	
4369583 Morgan Hill Unified	4369583 Morgan Hill Unified
4369641 Palo Alto Unified	
4369666 San Jose Unified	4369666 San Jose Unified
4369674 Santa Clara Unified	
4469799 Pajaro Valley Unified	4469799 Pajaro Valley Unified
4475432 Scotts Valley Unified	
4570110 Redding Elementary	
4870524 Benicia Unified	4870524 Benicia Unified
4870540 Fairfield-Suisun Unified	4870540 Fairfield-Suisun Unified
4870581 Vallejo City Unified	4870581 Vallejo City Unified
4970904 Roseland	
4970912 Santa Rosa Elementary	
4975358 Windsor Unified	4975358 Windsor Unified
5071043 Ceres Unified	5071043 Ceres Unified
5071076 Empire Union Elementary	5071076 Empire Union Elementary
5075556 Riverbank Unified	5075556 Riverbank Unified
5471860 Cutler-Orosi Joint Unified	5471860 Cutler-Orosi Joint Unified
5472231 Tulare City	
5472256 Visalia Unified	5472256 Visalia Unified
5475523 Porterville Unified	5475523 Porterville Unified
5672538 Oxnard	5672538 Oxnard
5672603 Simi Valley Unified	5672603 Simi Valley Unified
5672652 Ventura Unified	5672652 Ventura Unified
5673874 Oak Park Unified	5673874 Oak Park Unified
5772678 Davis Joint Unified	5772678 Davis Joint Unified
9619780 Rescue Union Elementary	

Appendix Table 2. Descriptive Statistics Overall and for Each Sample.

	All California Districts (non-charters)	150 District Initial Sample	98 District Balanced Panel
2013-14 Enrollment (Average)	6,046	18,575	21,452
2013-14 Enrollment (Median)	1,753	9,966	11,347
Share with 2013-14 Enrollment < 1500	0.47	0	0
2013-14 FRM Pupil Share (Average)	0.57	0.57	0.58
2013-14 Unduplicated Pupil Share (Average)	0.59	0.60	0.61
Basic Aid District Share	0.10	0.04	0.02
Unified School District Share	0.36	0.69	0.76
Share of Districts Covered	1.0	0.16	0.10
Share of Students Covered	1.0	0.49	0.37
N (Districts)	948	150	98