Web Appendix — The Effect of Charter Competition on Unionized District Revenues and Resource Allocation

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A Data Appendix

In this section, I cover details of the subjective data cleaning considerations underling my analyses. Table A.1 displays a summary of the source, important variables, year available and any miscellaneous notes for the data used in this paper.

A.1 ODE Restricted-Access Staff Data

In the staffing data, a teacher's education category can only take the following values: Non-Degree, Associate, BA, MA, Education Specialist, PhD, Other, less than HS Diploma, HS Diploma, and GED.

I only keep staff classified as "regular teachers" receiving annual salaries, with previous education categories: non-degree, BA, and MA. I truncate the sample and drop teacher-year observations with real ($2010) annual salaries less than $15,000 or greater than $85,000 as well as teachers reporting a null value for full-time equivalency units.

The next issue with these data is that teacher experience doesn't always increment properly. To fix this, I use the experience from the first year a teacher is observed in the dataset and then increment for all subsequent years that the teacher is observed in the data. For some teachers, they have valid experience for years later in their career. This information is utilized by decrementing to fill previous missing years. In the case where the incremented and decremented imputed experience disagree, I take the values of the decremented experience because they appear more accurate. Also, because 2012 is missing, but 2013 and 2014 are available, for teachers observed teaching after 2012, experience is incremented assuming they also taught in 2012.

A.2 SERB Collectively Bargained Contract Data

First, I only keep contracts from full-time, regular teachers. In Ohio, the school year typically runs from the end of August to the beginning of June, so for mid-year negotiations, I consider all contracts that begin being enforced from January through May as belonging to the current school year. For example, a contract with an enforcement date in February 2010 would be considered to be effective during the 2009-10 school year. Outliers in nominal entry- and top-level salaries are dropped. Specifically, I code as missing contract-education observations with starting salaries less than $10,000 and top salaries greater than $200,000. I also recode as missing the number of salary steps to reach the top of a pay scale for contracts with 40 or more steps. Finally, if the total

number of years required to ascend the pay scale was greater than 50, I set the variable capturing the number of years between each step to missing.[1] It is also worth noting that all monetary variables are brought into real 2010$ by using the BEA Personal consumption expenditures from Table 1.1.4. "Price Indexes for Gross Domestic Product".

A.3 Other Sample Restrictions

For my final analysis sample, I exclude any districts that are entirely made up of charter schools. In Ohio, charters are recorded as being in their own local area agency so this effectively limits the analysis to all non-chartered districts. I also drop special needs and other non-traditional regional education service agencies (including joint vocational districts) so that the analysis is only performed on traditional K-12 school districts. Lastly, the sample is limited to districts that report having more than 50 students enrolled and more than 5 teachers employed within the district.

[1] The total number of years required to ascend the pay scale is defined as the number of pay scale steps × number of years between each pay scale step.

Table A.1: Data Summary

Provider	Source	Relevant Variables	Years	Miscellaneous
Ohio Department of Education	District Foundation Settlement Reports: Community School Deduction	# Students Transferred to B&M and Digital Charters	2001-2012	• N/A
Ohio Department of Education	Restricted Access Staff Data	Teacher Education; Teacher Experience; School/District Employer (Including Charters); Payments; Teacher Transfers	1996-2011, 2013-2014	• Salary includes additional compensation e.g., coaching positions. • Experience doesn't increment properly, see Appendix A.1.
Ohio Department of Education	ODE–Advanced Reports: District Enrollment	Total district enrollment	1995-2011	• N/A
Ohio Department of Education	ODE–Advanced Reports: School Ratings	% AYP indicators met; rating (e.g., "Academic Watch")	1998-2011	• N/A
Ohio State Employment Relations Board	SERB Contract Clearinghouse	Entry/Top-level Salaries by education category; Pay scale steps; Contract start dates	1982-2012	• Top-level salaries are actually the first year that an additional year of experience does not increase the salary earned, regardless if pay would ever increase with more experience.
Ohio Department of Taxation	School District Property Tax Database	Total and residential district-level property values	1986-2013	• N/A
National Center of Educational Statistic's Common Core of Data	School District Universe Survey	Special Education Enrollment; Number of Teachers Employed	1987-2011	• N/A
National Center of Educational Statistic's Common Core of Data	School Building Universe Survey	Black student enrollment; Free/Reduced price lunch eligible student enrollment	1987-2011	• In 2007, free-lunch eligible student enrollment is unavailable.
National Center of Educational Statistic's Common Core of Data	School District Finance Survey	Aggregated and disaggregated revenues and expenditures; Payments to charter schools	1989-2011	• N/A

Table A.2: Example of Teacher Salary Contract

Experience	Non-Degree	BA	BA+150	MA	MA+30
0	22,013	25,898	26,934	28,488	29,524
1	22,790	26,934	28,099	29,783	30,948
2	24,085	27,970	29,265	31,078	32,373
⋮	⋮	⋮	⋮	⋮	⋮
7	28,229	33,149	35,092	37,552	39,494
8	**29,265**	34,185	36,257	38,847	40,919
9	29,265	35,221	37,423	40,142	42,343
10	29,265	36,257	38,588	41,437	43,768
⋮	⋮	⋮	⋮	⋮	⋮
13	29,265	39,365	42,084	45,322	48,041
14	30,042	**40,401**	**43,250**	**46,616**	**49,485**
15	30,042	40,401	43,250	46,616	49,485
⋮	⋮	⋮	⋮	⋮	⋮
28	30,042	45,348	49,014	52,067	54,578

Notes: This table presents a fictitious collectively bargained teacher's salary matrix. A teacher's pay can be determined simply by referring to the number of years they have taught in the district and the level of education they possess. Education categories are respectively no degree, Bachelor's degree, Bachelor's degree with 150 additional credit hours, Master's degree, and Master's degree with 30 additional credit hours. SERB data contain starting-level salary information for all education levels (i.e., all entries corresponding to the null experience level). While data sometimes exist for top-level salaries (i.e., all entries for 28 years of experience), SERB data custodians often instead code top-level salaries as the first experience step in which subsequent experience gains incurs no additional salary premium. The bold values represent these incorrectly-coded top-level salaries for the example contract.

B Full Salary Distribution Imputation

By making use of both my teacher-level micro data as well as information about contract negotiation years, I am able to approximate negotiated salaries for each step of the pay scale. This allows me to estimate the effect of charter competition along the entire negotiated pay scale distribution. Most importantly, these teacher-level data include the college degree, number of years in the district, and annual compensation. This is enough to identify which step on the pay scale that each teacher should in theory be compensated.

Next, I collapse the teacher data so that the unit of observation is the district, year, college degree, experience level and calculate the median payments within each cell.[2] I then merge in contract negotiation dates from my SERB data so that observations are limited to the years in which a new contract is being enforced. In the end I want a dataset that has approximated salary steps for each district, year, education, and experience combination, but teachers are not observed teaching in each of these combinations. To solve this problem, I impute district-specific annual payments for any missing pay scale steps by using predicted values from the regression

$$\text{Median Real Payment}_{idet} = \alpha + \gamma_{it} * \text{Experience}_{idet} + \delta_{it} * \text{Experience}^2_{idet} + \phi_{it} + \theta_d + \epsilon_{iset} \ , \tag{B.1}$$

where $\text{Median Real Payment}_{idet}$ is the 2010-inflation-adjusted median annual payment to teachers in district i, with degree d, years of experience e, during the school year in which the contract for the district is enforced t. I also include a district-year-specific quadratic for a continuous measure of experience (Experience_{idet}) and include the main effects ϕ_{it}. θ_d are degree fixed effects.

Equation (B.1) is simply fitting a district-year-specific quadratic experience term (the γ_{it}'s and δ_{it}'s) to the median payments within each district, during the contract's enforcement year, and allows for level shifts in the pay scale for each education category.

I then create a balanced panel of all possible district-year-education-experience cells and for cells without actual payment information I impute using predicted values from (B.1). This dataset is used for the analysis explained in Section 5 that generates Figure 5.

C Alternative Measures of Charter Competition

In this section, I provide estimates for the main revenue and expenditure outcomes of this study using four alternate measures of charter competition. The first two measures are respectively the number of charter buildings in operation during the given school year that are within 5 and 10 miles of the TPSD's geographic center.[3] It is likely that parents in more rural areas of the state would be willing to have their child travel further distances to attend a school. As a result, I also create a measure of charter competition based on the overall district size. Specifically, for each TPSD,

[2] This helps exclude outlier salaries due to some teachers receiving bonus payments for additional responsibilities such as coaching an athletic team.

[3] TPSD center coordinates are provided in the NCES Common Core of Data.

I have shape files containing coordinates that trace out each enrollment boundary. I identify 20 equidistant coordinates along with the coordinates corresponding to points on the opposite side of the district. I calculate the distance between these 20 points and their accompanying opposite points and take half of this average to calculate my measure of average TPSD radius. Finally, I count the number of charter schools open within 150 percent of this metric. The final measure of charter competition is simply the number of operating charters that are located within district boundaries.

I present the robustness of my main results across these measures of charter competition in Table C.1. For comparison, Column 1 provides estimates using my main competition metric. Overall, my results are extremely robust across competition measures showing that the effects I find are not simply an artifact of my particular competition metric. Estimates measuring competition as the number of operating chartering within 5 miles of the TPSD district center (column 2) most closely mirror my main results. As the radius is extended (columns 3 and 4) estimates attenuate slightly. One possible explanation is that as the boundaries increase, charters are counted that may not actually be viable options for parents in the district. Measuring charter competition as the number of charters operating within TPSD boundaries (column 5) attenuates estimates the most. This could happen if charter competition outside of TPSD boundaries present particularly strong competitive pressures. However, even using this measure, all of the effect signs remain the same making the overall story unchanged. Finally, it is worth noting that each of these alternative measures miss the digital charter competition that is captured by my preferred measure.

Table C.1: Effect of Various Charter Competition Measures on Key IV Estimates

	Original Measure	Alternative Measures			
	Fraction of Students attending Charter × 100	# Charters within 5 miles of TPSD center	# Charters within 10 miles of TPSD center	# Charters within 1.5 × TPSD average radius	# Charters within TPSD boundary
	(1)	(2)	(3)	(4)	(5)
Panel A: *TPSD Revenues*					
IHS of Total	-0.018***	-0.018***	-0.011***	-0.011***	-0.006**
	(0.005)	(0.006)	(0.004)	(0.004)	(0.003)
IHS of Federal	-0.041***	-0.039***	-0.022***	-0.021***	-0.011**
	(0.007)	(0.009)	(0.007)	(0.006)	(0.005)
IHS of Local	-0.034***	-0.034***	-0.020***	-0.019***	-0.010***
	(0.006)	(0.008)	(0.005)	(0.006)	(0.004)
IHS of Residential Values	-0.026***	-0.028***	-0.016***	-0.017***	-0.010***
	(0.005)	(0.006)	(0.004)	(0.005)	(0.004)
Panel B: *Union Salary*					
Log of Entry	-0.002	-0.001	-0.001	-0.000	-0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Log of Imputed Top	-0.010**	-0.007	-0.005	-0.004	-0.002
	(0.004)	(0.005)	(0.003)	(0.003)	(0.001)
Panel C: *TPSD Expenditures*					
IHS of Total (Excl. Charter Transfers)	-0.017***	-0.020	-0.013	-0.014	-0.005
	(0.006)	(0.012)	(0.008)	(0.009)	(0.003)
IHS of Instructional	-0.023***	-0.013**	-0.008**	-0.009**	-0.003
	(0.004)	(0.006)	(0.004)	(0.005)	(0.002)
IHS of Capital Outlays	0.073**	0.103	0.066	0.069	0.022
	(0.034)	(0.080)	(0.052)	(0.056)	(0.022)
IHS of New Construction Capital Outlays	0.113	0.142	0.090	0.091	0.027
	(0.114)	(0.272)	(0.181)	(0.195)	(0.079)

Notes: Standard Errors in parentheses are clustered by district. See footnote 27 on page 19 for details on the inverse hyperbolic sine transformation (IHS). Refer to Tables 4, 5, and 6 for specification details for panels A, B, and C respectively. This table reports 2SLS estimates of the effect of various measures of charter competition on key outcomes. In Column 1, competition is measured as the fraction of the district's membership attending charter schools times 100. Columns 2 and 3 present estimates of competition as measured by the number of charters open within 5 and 10 miles of the TPSD geographic center. In Column 4, competition is measured as the number of charters open within 1.5 times the district's average radius. In Column 5, competition is measured as the number of charters open within the TPSD's boundaries.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

D Ohio School Rating Designation System

Ohio uses four measures to evaluate the performance of schools and districts: (1) State Indicators, (2) Performance Index, (3) Adequate Yearly Progress (AYP), and (4) Value-Added data.

D.1 State Indicators

Schools and districts are evaluated based on 26 measures against state determined goals, as seen in Table D.1.

D.2 Performance Index Scores

The Performance Index score is a continuous measure that summarizes student achievement (for all students, not just those testing proficient or higher) at the school or district level into a single index. These scores are calculated using a weighted average of individual student performance levels on proficiency and achievement tests. The weights for different score levels can be found in Table D.2. You can see that there are large penalties to testing below proficiency, but only small bonuses for testing above the "Proficient level". Thus, it takes several high scores to balance a single low score.

Each weighted score is multiplied by the percentage of students scoring at that level. In order to generate these percentages, schools count the number of students present during the October count and 120 consecutive school days of enrollment, including the March testing period. Other rules apply to counting students that have a small impact on student enrollment counts.[4] Specifically, the Performance Index rating is calculated for school/district i in academic year t using the previous year's $(t-1)$ academic scores as follows:

$$\begin{aligned} PI_{it} = {} & 1.2\ (\%\ \text{Advanced}_{i,t-1}) + 1.1\ (\%\ \text{Accelerated}_{i,t-1}) \\ & + 1.0\ (\%\ \text{Proficient}_{i,t-1}) + 0.6\ (\%\ \text{Basic}_{it}) + 0.3\ (\%\ \text{Limited}_{i,t-1}). \end{aligned} \tag{D.1}$$

D.3 School and District Rating Calculations

Once Performance index scores are calculated, school and districts are then categorized into five levels as seen in Table D.3.

In addition to these raw PI scores, schools and districts can also experience a boost in their rating based on certain growth calculations. Specifically a school/district can move from "Emergency" to "Watch" or from "Watch" to "Improvement" if: (1) the PI score improved in each of the last two years *and* (2) the total two-year gain was at least 10 points *and* (3) a gain of a least 3 points took place in the current year.

D.4 Value Added

Value-Added (VA) measures try to account for how much progress and growth has been made since the previous year. These VA measures are calculated for grades 4-8 in reading and math.

[4] e.g., 1 percent limitation on counting alternately assessed students as proficient. The total count of all student scores includes up to five tests per student.

A composite is made of these scores and schools are delineated as performing above, at, or below expectations. Schools performing above expectation may increase its designation by one rating.

D.5 Ratings Determined by Number of AYP Indicators met

The building/district designation will always be the higher category determined by the PI score or the number of AYP indicators met. Ohio schools that meet AYP must be designated as Continuous Improvement or higher. Conversely, schools not meeting AYP for three years in a row and not meeting it for more than one student group in the most recent year can be rated no higher than Continuous Improvement. AYP indicators are based on 3-8th grade reading and math assessments as well as 10th grade Ohio graduation testing in reading and math.

Schools meet AYP when: (1) The proficiency level weighted across all tested grades is at or above the AYP goal, (2) If the above proficiency level is met when combined with the previous year, (3) a student group must make a 10 percent or greater reduction in its percentage of non-proficient students from the previous year, and they must meet the AYP goal in the secondary indicator (graduation rate and/or attendance rate), or (4) through the growth model, i.e., a non-proficient student projected to be on a path to proficiency within two years will be treated as proficient in the current year.[5] The growth model uses data from the Ohio Achievement tests in grades 3-8 so traditional high school buildings (those with grades 9-12) cannot use the growth model to meet AYP (ODE, 2011). Figure D.1 provides a graphical summary of this information.

[5]Student groups include: All students, Black, American Indian, Asian, Hispanic, Multi-Racial, White, Economically Disadvantaged, Limited English Proficiency, and Students with Disabilities.

Table D.1: State Indicators and 2010-11 Goals

State Indicator	**'10-'11 Goal**	**# of indicators**
3rd-grade achievement tests: reading and math	75%	2
4th-grade achievement tests: reading and math	75%	2
5th-grade achievement tests: reading, math, and science	75%	3
6th-grade achievement tests: reading and math	75%	2
7th-grade achievement tests: reading and math	75%	2
8th-grade achievement tests: reading, math, and science	75%	3
Ohio Graduation Test- 10th-grade: reading, math, writing, science, social studies	75%	5
Ohio Graduation Test- 11th-grade: reading, math, writing, science, social studies	85%	5
Graduation Rate	90%	1
Attendance Rate	93%	1
Total		26

Source: Ohio Department of Education Report Card Guide 2010-11 – (Link)

Table D.2: Performance Index Scores and Report Card Designation

Performance Level	**Weight**
Untested Student	0
Below Basic	0.3
Basic	0.6
Proficient	1.0
Accelerated	1.1
Advanced	1.2

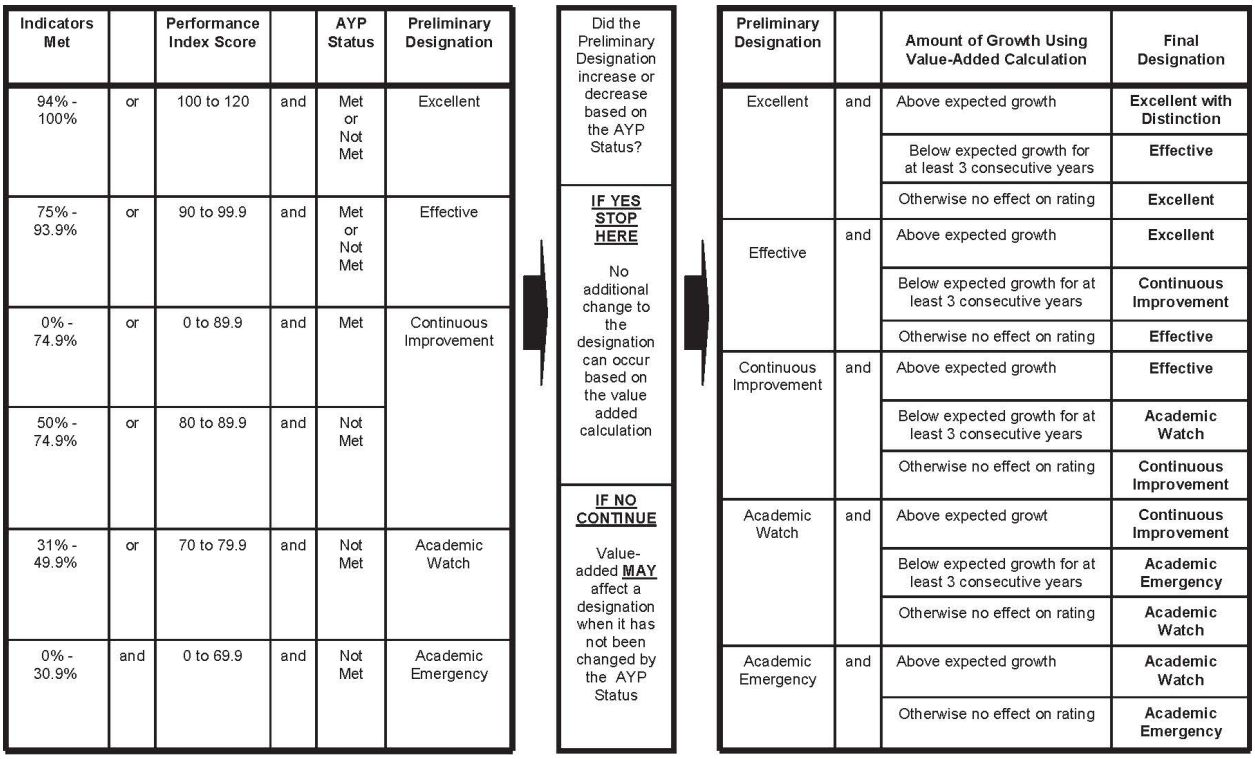
Source: Ohio Department of Education Performance Index Calculator – (Link)

Table D.3: Performance Index Scores and Report Card Designation

PI Score	Report Card Designation
0-69	Academic Emergency
70-79	Academic Watch
80-89	Continuous Improvement
90-99	Effective
100-120	Excellent

Source: Ohio Department of Education Performance Index Calculator – (Link)

Figure D.1: Summary of Rating Designation



Source: Ohio Department of Education Report Card Guide 2010-11 (ODE, 2011) – (Link)

E Robustness: No Child Left Behind

First, I attempt to account for NCLB contamination by adding additional controls to equation (2). Specifically, I add indicator variables for whether the district has had an AYP failure spell for 1-2 and 3+ consecutive years, respectively. Because AYP measures were created by the ODE even for years prior to the NCLB introduction, I also interact these binaries with the same $t-2$ post-2002 school year binaries as I do for the main instruments. This attempts to control for the differential change in response to consecutive AYP failure that occurs at 2002, precisely the year of the introduction of one of the policies determining charter entry. Tables E.1 to E.2 display the main sets of results for this specification. I find that results are almost identical to the specifications omitting these NCLB controls.

Second, many of the NCLB sanctions only could take effect once a school/district failed AYP for two consecutive years. As a result, outcomes from 2004 and earlier are plausibly unaffected by NCLB policies. Tables E.3 to E.4 present estimates of the main regressions from equations (1) and (2), but limit the regression samples to school years 2004 and earlier. Again, while the estimates are often less precise due to the loss of seven years of data, the main story still remains in tact. The robustness of my main estimates to these tests suggests that I am able to adequately control for any outside influence of NCLB on district resource acquisition and allocation.

Table E.1: Effect of Charter Transfers on District Revenues (AYP Interaction Controls)

Panel A: *IHS of Total Revenues*	Total	Federal	Local
	(1)	(2)	(3)
Fraction Charter Transfers ×100 – OLS	-0.006***	-0.025***	-0.018***
	(0.002)	(0.005)	(0.003)
Fraction Charter Transfers ×100 – IV	-0.017***	-0.036***	-0.029***
	(0.006)	(0.008)	(0.006)
Panel B: *IHS of Federal Revenues*	Child Nutrition Act	Disabilities Act	Other
	(5)	(6)	(7)
Fraction Charter Transfers ×100 – OLS	-0.035***	-0.058***	-0.009*
	(0.012)	(0.021)	(0.005)
Fraction Charter Transfers ×100 – IV	-0.050**	-0.053	-0.001
	(0.020)	(0.084)	(0.011)
Panel C: *IHS of Local Revenues*	Property Tax	School Lunch	Other
	(8)	(9)	(10)
Fraction Charter Transfers ×100 – OLS	-0.018***	-0.056***	-0.006
	(0.003)	(0.008)	(0.007)
Fraction Charter Transfers ×100 – IV	-0.024***	-0.052***	-0.035**
	(0.005)	(0.017)	(0.017)
Panel D: *Property Tax Decomposition*	IHS of Property Value		
	Total	Residential	Millage
	(11)	(12)	(13)
Fraction Charter Transfers ×100 – OLS	-0.022***	-0.016***	0.014
	(0.003)	(0.003)	(0.085)
Fraction Charter Transfers ×100 – IV	-0.023***	-0.024***	-0.194
	(0.005)	(0.005)	(0.132)

Notes: N= 11,449 district-year observations. Standard Errors in parentheses are clustered by district. First-stage estimates (and standard errors) for excluded instruments are: Post $1999_{\tau-2} * \mathbb{1}(\text{Acad. E.})_{\tau-2}$ =2.158*** (0.659); Post $2002_{\tau-2} * \mathbb{1}(\text{Acad. W.})_{\tau-2}$ =3.124*** (0.624); and $t-1$ Char. Elig. (Urban 8/21)=2.468*** (0.906). See footnote 27 on page 19 for details on the inverse hyperbolic sine transformation (IHS). The F statistic for excluded instruments is 8.909***. This table reports OLS (see equation (1)) and 2SLS (see equation (2)) estimates for the effect of charter competition on district revenues. The endogenous variable is the fraction of the district's membership attending charter schools times 100. Each regression also includes two binaries one for whether during school-year $t-2$, the district had missed AYP for 1-2 and 3+ consecutive years, respectively. These binares are also interacted with an indicator equal to one if the given $t-2$ school-year was after 2002. Each cell provides the result of a separate regression. See Table G.2 for the mean of each dependent variable and Table G.1 for tests of overidentification. ***, **, and * represent significance at the 1, 5, and 10 percent levels, respectively.

Table E.2: Effect of Charter Transfers on District Expenditures (AYP Interaction Controls)

		IHS of Expenditure				IHS of Capital Outlays	
	Charter Payments (100,000s)	Total (Net of Charter Payment)	Instruction	Capital Outlays	Other	New Construction	Other
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fraction Charter Transfers ×100 – OLS	1.148***	-0.007***	-0.020***	0.069***	-0.020***	0.137***	0.002
	(0.260)	(0.002)	(0.004)	(0.016)	(0.003)	(0.048)	(0.009)
Fraction Charter Transfers ×100 – IV	2.180***	-0.016**	-0.020***	0.071*	-0.027***	0.100	0.001
	(0.461)	(0.007)	(0.004)	(0.037)	(0.004)	(0.124)	(0.021)

Notes: N= 11,449 district-year observations. Standard Errors in parentheses are clustered by district. See footnote 27 on page 19 for details on the inverse hyperbolic sine transformation (IHS). First-stage estimates (and standard errors) for excluded instruments are: Post $1999_{\tau-2} * \mathbb{1}(\text{Acad. E.})_{\tau-2}$ =2.158*** (0.659); Post $2002_{\tau-2} * \mathbb{1}(\text{Acad. W.})_{\tau-2}$ =3.124*** (0.624); and $t-1$ Char. Elig. (Urban 8/21)=2.468*** (0.906). The F statistic for excluded instruments is 8.909***. This table reports OLS and 2SLS estimates of the effect of charter competition on different forms of teacher mobility. The endogenous variable is the fraction of the district's membership attending charter schools times 100. Each regression includes district and commute-zone-by-contract-start-year fixed effects. Each Panel and column provide the results of a separate regression. Each regression also includes two binaries one for whether during school-year $t-2$, the district had missed AYP for 1-2 and 3+ consecutive years, respectively. These binares are also interacted with an indicator equal to one if the given $t-2$ school-year was after 2002. See Table G.2 for the mean of each dependent variable and Table G.1 for tests of overidentification. ***, **, and * represent significance at the 1, 5, and 10 percent levels, respectively.

Table E.3: Effect of Charter Transfers on District Revenues (Pre-2005 Sample)

Panel A: *IHS of Total Revenues*	Total	Federal	Local
	(1)	(2)	(3)
Fraction Charter Transfers ×100 – OLS	-0.002	-0.013***	-0.009***
	(0.002)	(0.005)	(0.003)
Fraction Charter Transfers ×100 – IV	-0.022**	-0.038***	-0.032***
	(0.009)	(0.012)	(0.010)
Panel B: *IHS of Federal Revenues*	Child Nutrition Act	Disabilities Act	Other
	(5)	(6)	(7)
Fraction Charter Transfers ×100 – OLS	-0.009	-0.024	-0.001
	(0.009)	(0.018)	(0.004)
Fraction Charter Transfers ×100 – IV	-0.030	-0.053	-0.005
	(0.023)	(0.102)	(0.012)
Panel C: *IHS of Local Revenues*	Property Tax	School Lunch	Other
	(8)	(9)	(10)
Fraction Charter Transfers ×100 – OLS	-0.010***	-0.036***	0.002
	(0.003)	(0.005)	(0.008)
Fraction Charter Transfers ×100 – IV	-0.021***	-0.042**	-0.067**
	(0.007)	(0.018)	(0.026)
Panel D: *Property Tax Decomposition*	IHS of Property Value		
	Total	Residential	Millage
	(11)	(12)	(13)
Fraction Charter Transfers ×100 – OLS	-0.024***	-0.011***	0.098
	(0.004)	(0.004)	(0.163)
Fraction Charter Transfers ×100 – IV	-0.027***	-0.028***	-0.158
	(0.006)	(0.007)	(0.198)

Notes: N= 7,213 district-year observations. Standard Errors in parentheses are clustered by district. First-stage estimates (and standard errors) for excluded instruments are: Post $1999_{\tau-2} * \mathbb{1}(\text{Acad. E.})_{\tau-2}$ =2.475*** (0.543); Post $2002_{\tau-2} * \mathbb{1}(\text{Acad. W.})_{\tau-2}$ =2.207** (1.125); and $t-1$ Char. Elig. (Urban 8/21)=1.626*** (0.588). See footnote 27 on page 19 for details on the inverse hyperbolic sine transformation (IHS). The F statistic for excluded instruments is 9.551***. This table reports OLS (see equation (1)) and 2SLS (see equation (2)) estimates for the effect of charter competition on district revenues. The endogenous variable is the fraction of the district's membership attending charter schools times 100. The sample is additionally restricted to school-years prior to 2005, the first year when AYP discipline could be enforced. Each cell provides the result of a separate regression. See Table G.2 for the mean of each dependent variable and Table G.1 for tests of overidentification. ***, **, and * represent significance at the 1, 5, and 10 percent levels, respectively.

Table E.4: Effect of Charter Transfers on District Expenditures (Pre-2005 Sample)

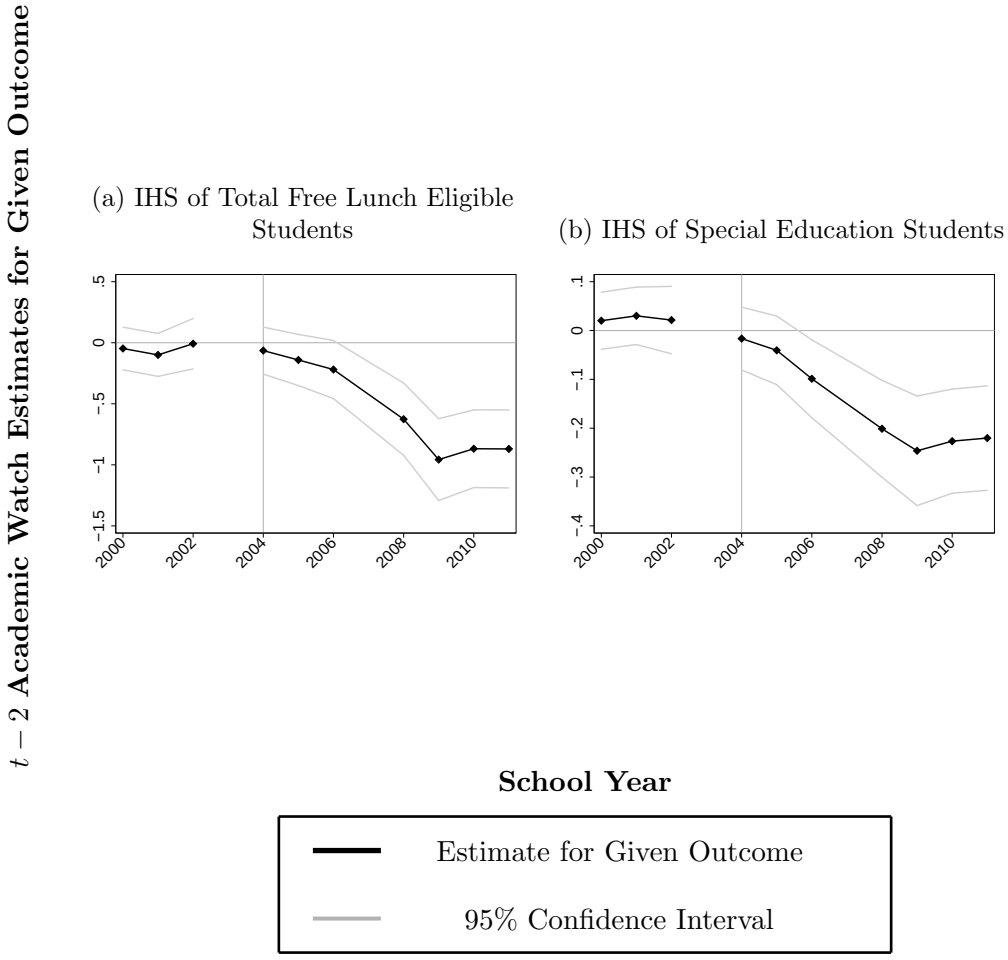
		IHS of Expenditure				IHS of Capital Outlays	
	Charter Payments (100,000s)	Total (Net of Charter Payment)	Instruction	Capital Outlays	Other	New Construction	Other
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fraction Charter Transfers ×100 – OLS	0.715*	-0.004	-0.008**	0.058***	-0.019**	0.073*	0.009
	(0.407)	(0.003)	(0.003)	(0.019)	(0.008)	(0.039)	(0.010)
Fraction Charter Transfers ×100 – IV	1.431***	-0.014	-0.010**	0.084	-0.032***	0.144	0.017
	(0.469)	(0.010)	(0.005)	(0.059)	(0.008)	(0.198)	(0.028)

Notes: N= 7,213 district-year observations. Standard Errors in parentheses are clustered by district. See footnote 27 on page 19 for details on the inverse hyperbolic sine transformation (IHS). First-stage estimates (and standard errors) for excluded instruments are: Post $1999_{\tau-2} * \mathbb{1}(\text{Acad. E.})_{\tau-2}$ =2.475*** (0.543); Post $2002_{\tau-2} * \mathbb{1}(\text{Acad. W.})_{\tau-2}$ =2.207** (1.125); and $t-1$ Char. Elig. (Urban 8/21)=1.626*** (0.588). The F statistic for excluded instruments is 9.551***. This table reports OLS and 2SLS estimates of the effect of charter competition on different forms of teacher mobility. The endogenous variable is the fraction of the district's membership attending charter schools times 100. Each regression includes district and commute-zone-by-contract-start-year fixed effects. Each Panel and column provide the results of a separate regression. The sample is additionally restricted to school-years prior to 2005, the first year when AYP discipline could be enforced. See Table G.2 for the mean of each dependent variable and Table G.1 for tests of overidentification. ***, **, and * represent significance at the 1, 5, and 10 percent levels, respectively.

F Unobservable Trend IV Check: All Outcomes

Figure F.1

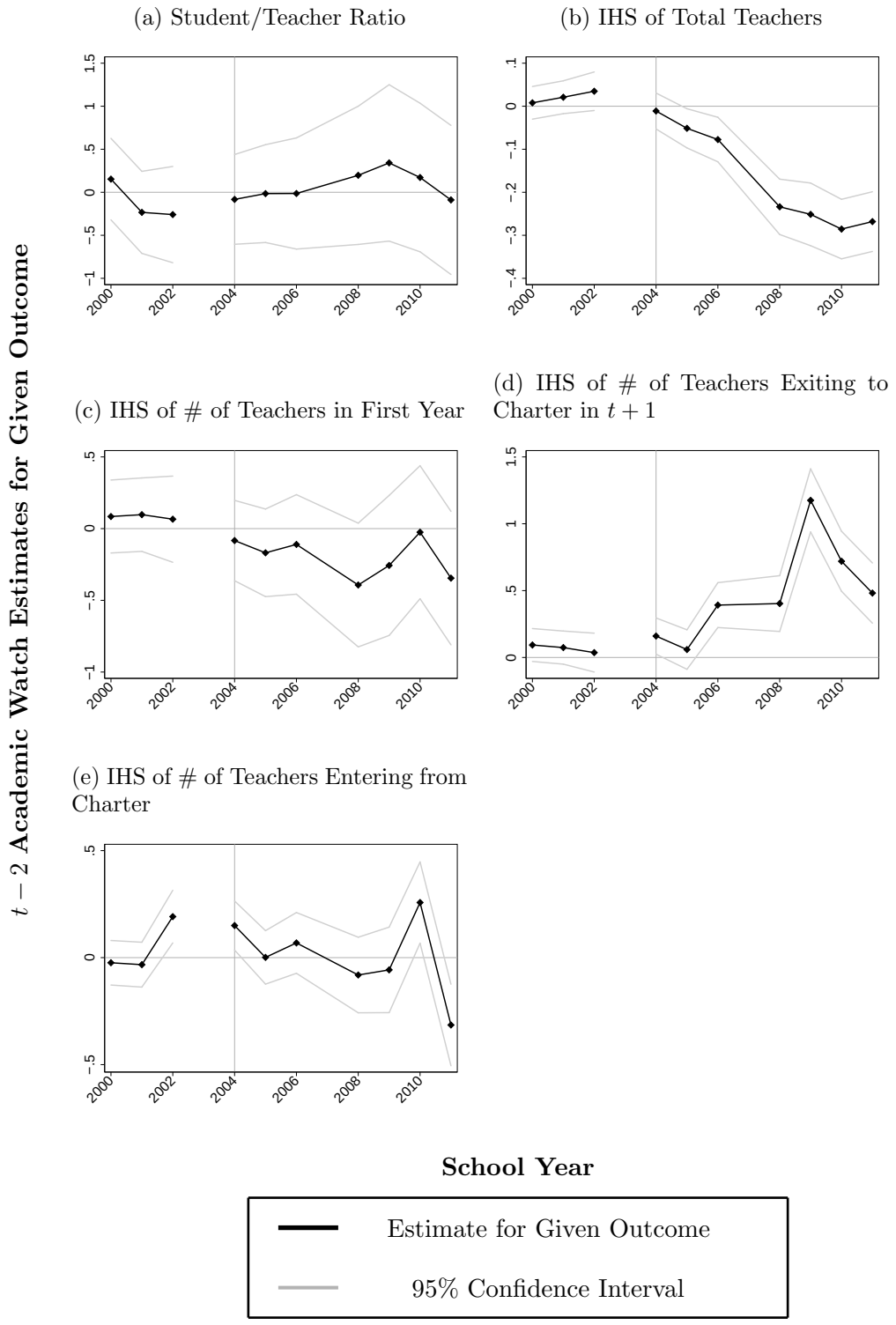
Unobservable Trends Robustness Check: Student Mobility, Table 3



Notes: Each figure presents the effect of receiving an "Academic Watch" rating two years earlier on the given current outcome, estimated from (8) as explained in Section 3.4. Each regression is respectively run on the sample restrictions for the given outcome in Sections 4 through 6.

Figure F.2

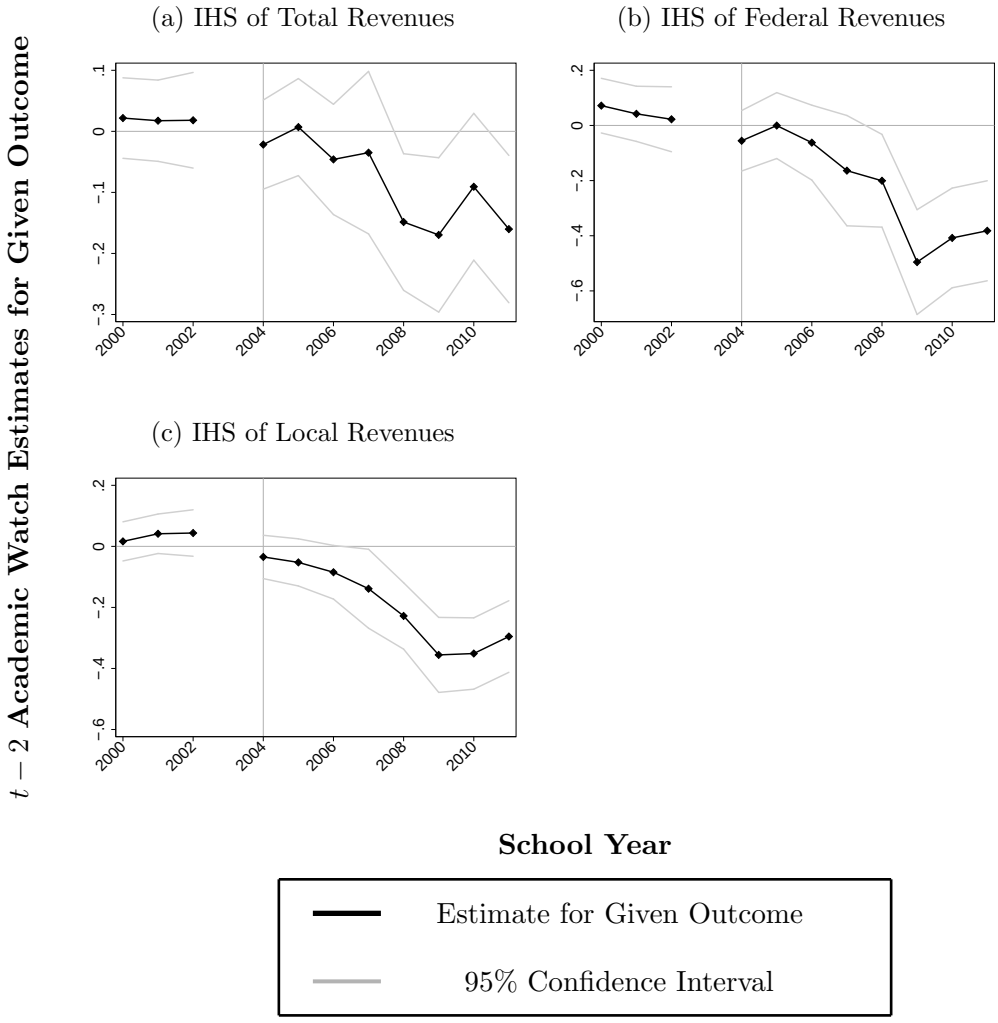
Unobservable Trends Robustness Check: Teacher Mobility, Table 3



Notes: Each figure presents the effect of receiving an "Academic Watch" rating two years earlier on the given current outcome, estimated from (8) as explained in Section 3.4. Each regression is respectively run on the sample restrictions for the given outcome in Sections 4 through 6.

Figure F.3

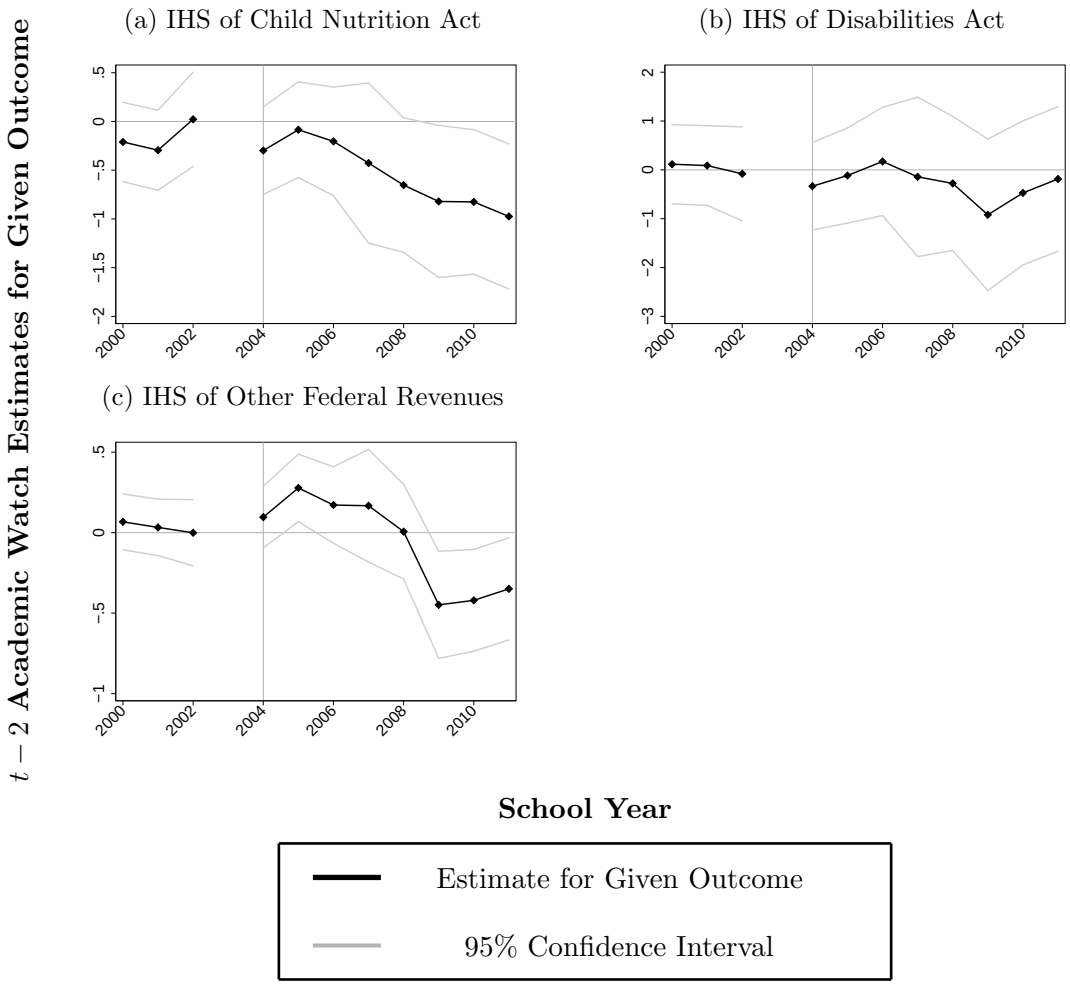
Unobservable Trends Robustness Check: District Revenues, Table 4 Panel A



Notes: Each figure presents the effect of receiving an "Academic Watch" rating two years earlier on the given current outcome, estimated from (8) as explained in Section 3.4. Each regression is respectively run on the sample restrictions for the given outcome in Sections 4 through 6.

Figure F.4

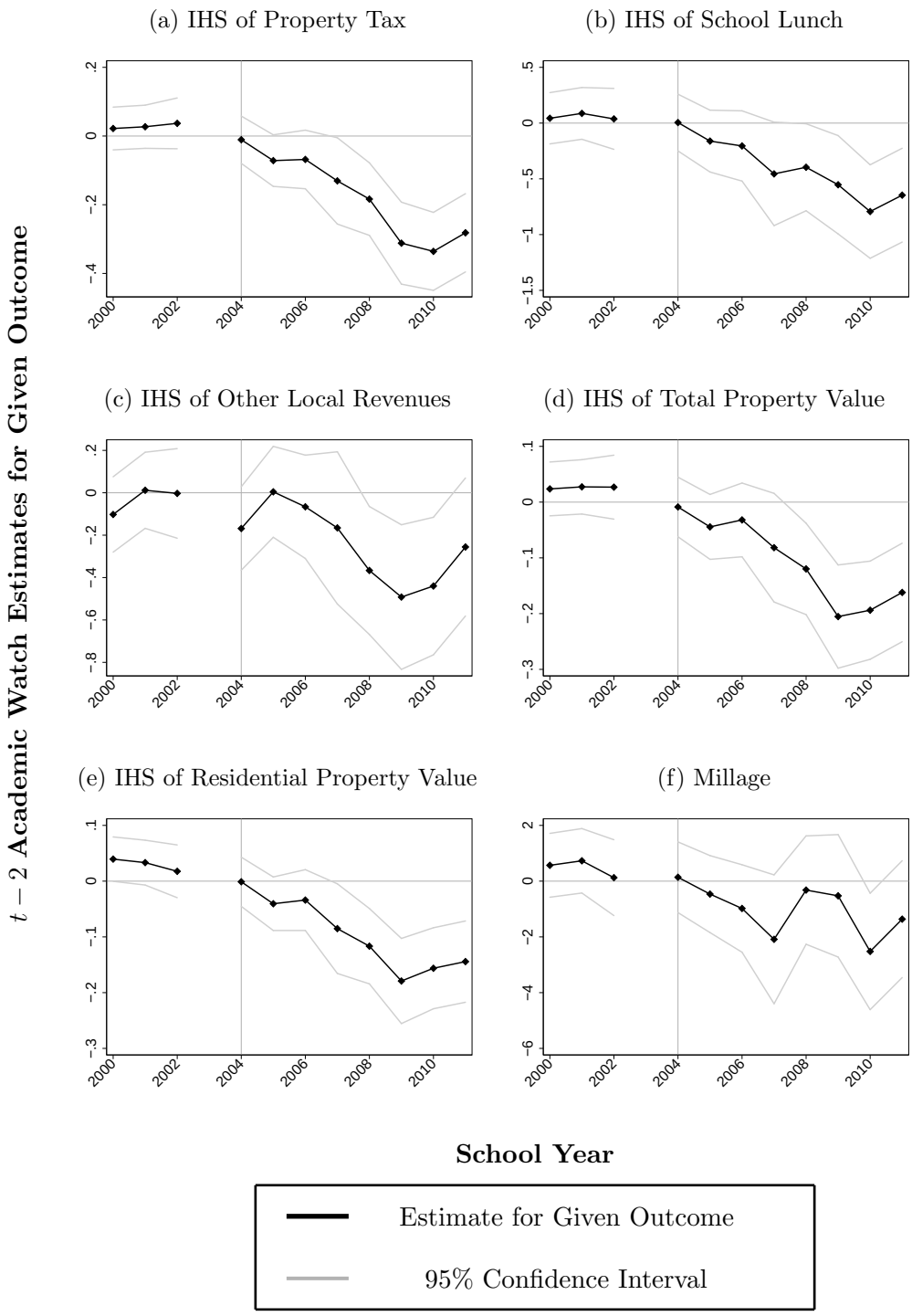
Unobservable Trends Robustness Check: Federal Revenues, Table 4 Panel B



Notes: Each figure presents the effect of receiving an "Academic Watch" rating two years earlier on the given current outcome, estimated from (8) as explained in Section 3.4. Each regression is respectively run on the sample restrictions for the given outcome in Sections 4 through 6.

Figure F.5

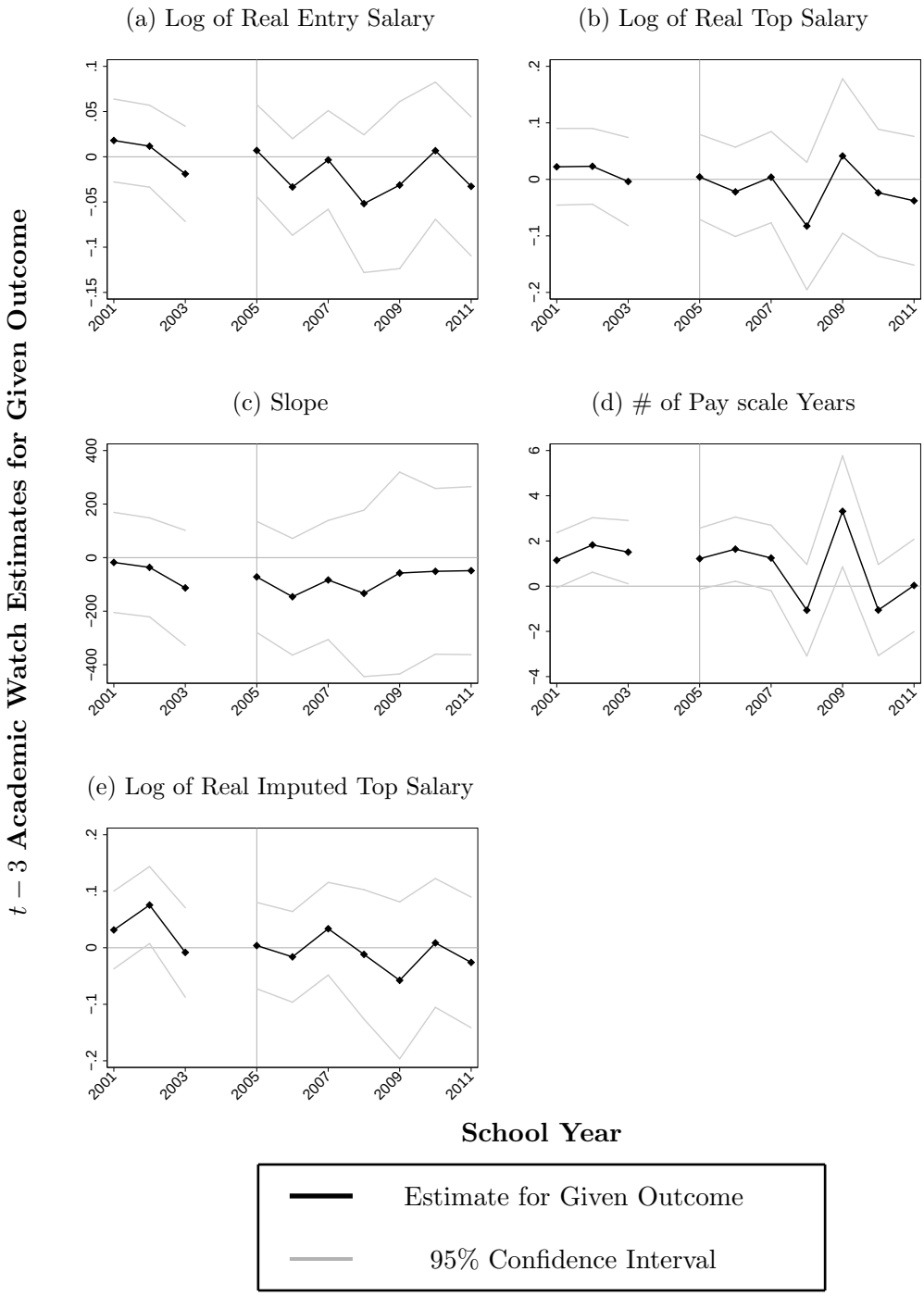
Unobservable Trends Robustness Check: Local Revenues, Table 4 Panels C & D



Notes: Each figure presents the effect of receiving an "Academic Watch" rating two years earlier on the given current outcome, estimated from (8) as explained in Section 3.4. Each regression is respectively run on the sample restrictions for the given outcome in Sections 4 through 6.

Figure F.6

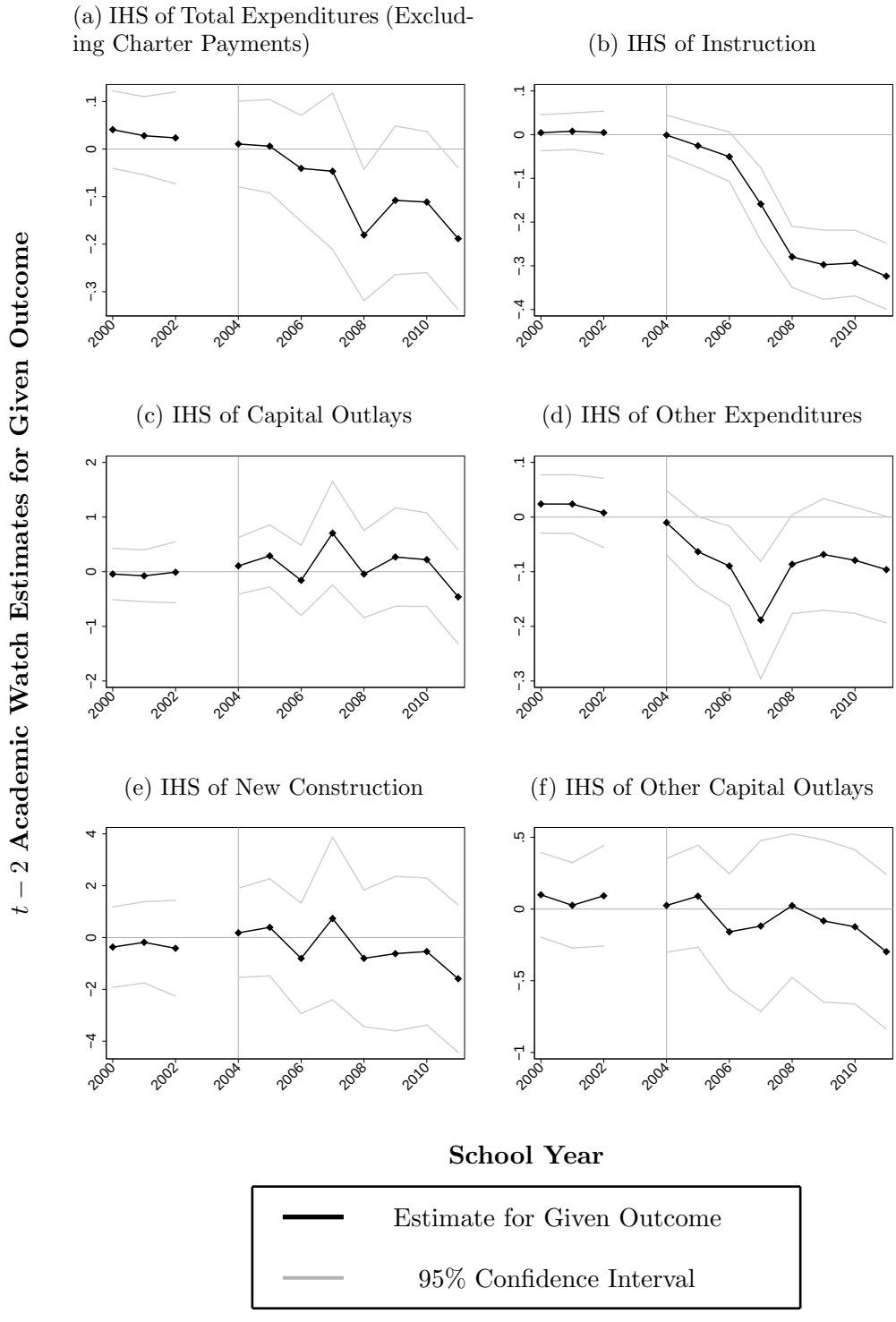
Unobservable Trends Robustness Check: Contract Outcomes, Table 5



Notes: Each figure presents the effect of receiving an "Academic Watch" rating three years earlier on the given current outcome, estimated from (8) as explained in Section 3.4. Each regression is respectively run on the sample restrictions for the given outcome in Sections 4 through 6.

Figure F.7

Unobservable Trends Robustness Check: District Expenditures, Table 6



Notes: Each figure presents the effect of receiving an "Academic Watch" rating two years earlier on the given current outcome, estimated from (8) as explained in Section 3.4. Each regression is respectively run on the sample restrictions for the given outcome in Sections 4 through 6.

G Regression Overidentification Tests and Outcome Means

Table G.1: Overidentification Tests: Hansen J Statistic

Panel A: *Student and Teacher Mobility*

Potential Student Enrollment	Total FRL Eligible Students	Special Education Students	Stu/Tch Ratio	Total Teachers	# Tch. in First Year	# Tch. Exiting to CS	# Tch. Entering from CS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
8.995**	0.373	0.914	0.185	0.543	5.504*	0.986	4.728*

Panel B: *Federal District Revenues*

Total	Child Nutrition Act	Disabilities Act	Other
(1)	(2)	(3)	(4)
3.479	0.861	0.105	1.997

Panel C: *Local District Revenues*

Total	Property Tax	School Lunch	Other	IHS of Total Property Value	IHS of Residential Property Value	Millage
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2.173	3.613	1.268	0.240	0.233	0.360	3.480

Panel D: *Collectively Bargained Outcomes*

Entry Salary	Top Salary	Imputed Top Salary	Slope	# Payscale Years
(1)	(2)	(3)	(4)	(5)
3.923	9.925***	1.932	1.625	6.163**

Panel E: *District Expenditures*

Real Charter Payments (in 100,000s)	Total (Excluding CS Payment)	Instruction	Capital Outlays	Other	New Construction	Other
(1)	(2)	(3)	(4)	(5)	(6)	(7)
9.974***	0.545	7.566**	0.522	4.869*	0.438	2.151

Notes: Each Panel and column provides the Hansen J overidentification test statistic for the respective regression samples found in Tables 3 through 6. ***, **, and * represent significance at the 1, 5, and 10 percent levels, respectively.

Table G.2: Table of Means: Dependent Variables

Panel A: *Student and Teacher Mobility*

Potential Student Enrollment	Total FRL Eligible Students	Special Education Students	Stu/Tch Ratio	Total Teachers	# Tch. in First Year	# Tch. Exiting to CS	# Tch. Entering from CS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2,897	763	396	17	176	13	0.136	0.100

Panel B: *Federal District Revenues*

Total	Child Nutrition Act	Disabilities Act	Other
(1)	(2)	(3)	(4)
2,152,932	417,772	446,004	1,289,156

Panel C: *Local District Revenues*

Total	Property Tax	School Lunch	Other	IHS of Total Property Value	IHS of Residential Property Value	Millage
(1)	(2)	(3)	(4)	(5)	(6)	(7)
16,142,809	13,161,744	518,759	2,462,307	407,999,512	250,736,793	29

Panel D: *Collectively Bargained Outcomes*

Entry Salary	Top Salary	Imputed Top Salary	Slope	# Payscale Years
(1)	(2)	(3)	(4)	(5)
35,144	58,306	59,910	1,530	15

Panel E: *District Expenditures*

Real Charter Payments (in 100,000s)	Total (Excluding CS Payment)	Instruction	Capital Outlays	Other	New Construction	Other
(1)	(2)	(3)	(4)	(5)	(6)	(7)
0.462	31,027,948	15,649,987	3,289,005	12,088,956	2,499,978	789,028

Panel F: *Charter Competition*

Fraction of Students Transferring to Charter
(1)
0.010
(0.021)

Notes: Each Panel and column provides the untransformed mean of the dependent variable for the respective regression samples found in Tables 3 through 6. Mean and standard deviation (in parentheses) for charter competition is provided in Panel F.

ODE (2011). Guide To Understanding Ohio's Accountability System: 2010-2011. Technical report, Ohio Department of Education.