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Educational Spillover Effects of New English Learners in a New Destination State

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Abstract: The number of English learners enrolled in public schools has grown substantially in the United States over the past two decades. The growth is especially large in states in the South and Midwest that have not been traditional destinations for recent immigrants. In this study, we examine the effects of an influx of new English learners on students in receiving schools in Delaware, which is one of the so-called "new destination" states. We find significant positive spillover effects in the short term of new English learners on the test scores of the other students in the receiving schools. The positive effects are mainly concentrated among current and former English learners.

Keywords: English learners; educational spillovers; immigration; human capital

Educational Spillover Effects of New English Learners in a New Destination State

1. Introduction

English learner (EL) students—who are from homes where a language other than English is mainly spoken and who need additional support to participate in English-language instruction—represent the fastest growing student group in the United States over the past two decades. Between the school years of 2000-2001 and 2019-2020, EL student enrollment in public schools increased by nearly 1.4 million students, corresponding to a 35 percent increase in EL student population nationwide (NCES, 2021).

Yet, this influx of EL students was not uniform across the U.S. The size of the EL student population remained relatively constant, or even declined, in some "traditional destination" states such as California and New York over this time period, while it soared in "new destination" states across the South and Midwest. In fact, the increase in the EL student population in states that had EL student shares below the national average at the turn of the century accounts for 90 percent of the increase in EL student population in the United States since then (NCES, 2021). Despite this significant uptick, very little is known about the effects of such a large change in the share of new EL students on their peers in the receiving schools.

In this study, we address this question in Delaware: a new destination state where the number of EL students in grades K-12 increased seven-fold over the past 20 years. Using the within school-year, across-grade variation in incoming EL share, we find significant positive spillover effects of new EL students on the test scores of existing students in receiving schools in the first year, especially in reading. In particular, we find that a five percentage-point increase in the share of new EL students increases English language arts (ELA) scores among existing students by 5 percent of the standard deviation (0.05σ) in the first year. This is a sizable effect,

roughly twice as large as the effect of moving from the 10th percentile to the 90th percentile of cumulative immigrant exposure reported in Figlio et al. (2023). We also show that these spillover effects are mainly concentrated among former (i.e. students who were identified as EL and were reclassified out of EL status in the past) or current EL students in receiving schools: for example, for receiving students designated as EL students in the school, a similar-sized influx of new EL students increases ELA scores by 0.15σ and math scores by 0.07σ in the first year. We also show that this benefit is particular to new EL students: while we find no significant effects of new non-EL students on the educational outcomes of their peers in receiving schools, we find significant positive externalities of new EL students. These results are robust to alternative specifications including student fixed-effects models that leverage within-student over-time variation in incoming EL share.

There is emerging literature examining the effects of school-aged migrants (cross-border or internal) on the educational outcomes of existing students in the United States, yielding mixed results.[1] For example, Schwartz and Stiefel (2011) find a negative effect of immigrant share on the performance of U.S.-born students in New York City public schools. Similarly, Ozek (forthcoming) examines the effects of the large influx of Puerto Rican migrants (U.S. citizens who were mostly identified as ELs when they first entered Florida public schools) in the aftermath of Hurricane Maria, and finds significant adverse effects on the test scores of students already enrolled in the receiving school in the first year of the influx of the newly arriving students. In contrast, Figlio and Ozek (2019) and Van der Werf (2021) explore the educational

[1] There is also extensive research on the educational spillover effects of immigrants outside of the United States. For example, Gould, Lavy, and Paserman (2009) use the large influx of Russian Jews into Israel to study the effects of immigrants and find a large adverse on native Israeli students. Others have also found zero of negative effects (Jensen and Rasmussen 2011; Brunello and Rocco 2013; Ballatore et al. 2018; Tornello, 2016; Ohinata and van Ours 2013; Geay et al. 2013; and Schneeweis 2015; Bossavie 2020; Hassan et al. 2022; Contreras & Gallardo 2022).

spillover effects of refugees and Neymotin (2009) examines the effects of immigrants and find no adverse effect on the educational outcomes of native students. Other studies have found positive spillover effects of immigrants/refugees on native-born students beyond a transitional period after these migrants enter the U.S. (McHenry 2015; Hunt 2016; Morales 2022; Figlio et al. 2023), and after accounting for the negative bias introduced by the differential attrition of native students from public schools in the wake of an immigrant influx (Figlio et al. forthcoming).[2]

To the best of our knowledge, this is the first study that examines the spillover effects of the large EL student influx new destination states have experienced over the past two decades. This distinction is important because the extent to which the current empirical evidence on immigrant effects in education applies to this context is questionable for two reasons. First, there are clear disparities between the public school systems in traditional destination states, which have been the focus of many prior studies in this context (e.g., Figlio et al., forthcoming; Ozek, forthcoming; Figlio and Ozek, 2019; Schwartz and Stiefel, 2011), and new destination states especially in terms of the size of existing EL (or recent immigrant) student populations. As such, traditional destination states benefit from pre-existing infrastructure, funded through the federal Title III program among other sources, to accommodate newly arriving EL students that are unavailable or newly-built in new destination states.

Second, the composition of immigrants/refugees examined in prior literature is likely different than the newly-arriving EL students in new destination states. For example, a sizable

[2] Several studies in the U.S. context have shown that native students, especially those from more affluent families, leave their schools when a large share of immigrant students enter their schools/school districts (Betts and Fairlie, 2003; Cascio and Lewis, 2012; Fairlie and Resch, 2002; Li, 2009; Tumen, 2019).

portion of EL students in the U.S. are not foreign-born.[3] This is also the case in the EL student influx we examine in this study – a quarter of new EL students who entered Delaware public schools were born in the U.S. Further, many foreign-born students in U.S. public schools are not EL students (even though many of them are identified as EL students initially when they enter the school system).[4] As such, it is plausible to expect significant differences between the educational and socioeconomic needs of new EL students in new destination states and immigrants/refugees examined in other studies[5], which casts doubt about the external validity of these studies in the current context.

In contrast to several of the prior studies about the effects of recent immigrant students on their peers' academic achievement, our analysis reveals no deleterious effect. Instead, similar to Figlio et al. (2023), we find significant benefits of the newly arriving EL students for some student groups. We hypothesize that three mechanisms might explain our findings. First, the increase in the number of EL students might increase funding for a school, which could be particularly beneficial for the receiving EL students if these resources improve EL instruction. For example, reaching a critical mass of EL students might allow a school to employ more EL instructors. Second, the addition of newly arriving EL students could lead teachers to adopt instructional strategies that are more effective for EL students, such as teaching more explicit language acquisition lessons than they might otherwise do with fewer EL students. Third, EL

[3] While it is difficult to calculate the share of EL students who are foreign-born nationally (as some states do not collect country of birth information for public school students), our calculations based on 2016-2020 Census data from IPUMS reveal that roughly 30 percent of English Learners in public schools in grades K-12 (as proxied by public school students aged 5 and over who report speaking English less than very well) are foreign born in the United States. Conversely, only 29 percent of foreign-born public school students in the U.S. are EL students. In Florida (one of the states that collect student nativity information), more than 50 percent of EL students were born in the U.S. (Figlio and Ozek, 2020).

[4] For example, see Figlio and Ozek (2020).

[5] For example, close to 90 percent of the refugees/migrants examined in Figlio and Ozek (2019) and Ozek (forthcoming) were eligible for subsidized meals when they entered Florida public schools. In contrast, 26 percent of new EL students in Delaware were identified as low income in the first year.

students in receiving schools might benefit from the presence of recent immigrants in the classroom, who tend to be more academically motivated (e.g., Kao and Tienda, 1995) or could decrease receiving EL students' social isolation in school.[6] While we are unable to test these hypotheses directly in this study due to data limitations, the finding that former EL students also benefit from the arrival of new EL students provide suggestive evidence that peer effects channel that we set out in our third hypothesis could be an important driver of the positive spillover effects.

2. Data and Descriptive Statistics

According to the U.S. Census, Delaware's share of immigrants increased by 65 percent between 2000 and 2010 and by 53 percent between 2010 and 2019. This ranks Delaware fourth nationally in the percentage increase of its immigrant population for 2000-2010 and second nationally for 2010-2019. This growth of course had implications for the public school system: the number of EL students in Delaware public schools increased seven-fold over the past two decades (NCES, 2021). As a result, the share of EL students in the public school system soared from 2 percent in 2000 (ranked 38th among states) to 11 percent in 2019 (ranked 9th). This rate of increase was behind only South Carolina nationwide, and the increase in the number of EL students accounted for about half of the overall enrollment growth in Delaware public schools from 2000 through 2019.

To estimate the effects of new EL students on the rest of their peers in receiving schools, we use student-level administrative data from Delaware covering all students enrolled in grades K-12 between the 2015-16 and 2018-19 school years. These data include students' English Language Arts (ELA) and math scores on the state's Smarter Balanced assessment (SBAC),

[6] Social isolation in school has been shown to be an important challenge recent immigrants face after they enter the host community (e.g., Plenty and Jonsson, 2017).

composite scores on the ACCESS test, which is used to assess English proficiency among EL students annually in Delaware, and student absences along with other information on students such as race, gender, low-income status, exceptional/special education status, country of birth, language spoken at home, and schools attended. These data also include detailed information about the EL status of students including: the student's current EL status, whether the student was ever identified as an EL student, years in the EL program, and years since the student was reclassified out of EL status. Our main outcome of interest is the receiving students' test scores. As such, we focus on receiving students in tested grades who also had prior year test scores (i.e., receiving students in Delaware who were enrolled in grades 4 through 8 with current and prior year test scores).

Using these data, we first examine the extent of EL student growth in Delaware and the characteristics of new EL students, who we define as students who entered Delaware public schools for the first time, and who were identified as EL students in their first year. Between 2015-2016 and 2018-2019 school years, 1,474 EL students entered grades 4 through 8 in Delaware, representing roughly 1 percent of the rest of the student body in enrolled in these grades. Panel A in Figure 1 presents the cumulative distribution function (CDF) of the share of new EL students in the entire student body (in grades 4 through 8) in a given school, and Panel B displays the CDF of the share of new EL students among the receiving EL students in that school and grade 4 through 8. Panel A shows that the annual EL student influx exceeds 2 percent of the student body in roughly 15 percent of Delaware public schools (71 schools), and 1 percent in about 35 percent of Delaware schools (183 schools) that serve any grade between 4 and 8. Panel B suggests that the EL student influx significantly increased the numbers of EL students overall within Delaware schools, with new EL students representing more than 10 percent of the pre-

existing EL students in roughly half of Delaware schools (224 schools) and more than 25 percent in 20 percent of schools (95 schools) serving any grade between 4 and 8. As such, the EL student influx during this time frame was larger (on an annual basis) than the influx of Haitian refugees into Florida public schools in the wake of the Haitian earthquake in 2010 and comparable to the influx of Puerto Rican migrants after Hurricane Maria (Figlio and Ozek, 2019; Ozek, 2023).

Table 1 presents the characteristics of new EL students and of the receiving students in Delaware. There are several findings worth highlighting. First, as shown in column (I) of Table 1, 27 percent of new EL students in Delaware are U.S.-born, and hence are likely eligible for social assistance programs unlike many cross-border migrants. Second, comparing new EL students with receiving students (overall and EL) in columns (II) and (III), we find that new EL students are significantly less likely to be identified as low income (25 percent for new EL students versus 36 percent for existing students) and to be identified as having special education needs (7 percent versus 18 percent) when they enter the public school system. Differences between new EL students and existing students are even more pronounced when we look at foreign-born new EL students: only 19 percent (5 percent) of foreign-born new EL students are identified as low income (special education) compared to 40 percent (13 percent) among U.S.-born new EL students.

These discrepancies could be driven by several factors: (1) foreign-born new EL students may not be eligible for some of the assistance programs provided by the Delaware Department of Health and Social Services (e.g., Temporary Assistance for Needy Families), which are used by the public school system to identify low-income students and typically require U.S. citizenship; (2) it may take some time for new EL students to be identified for these programs[7]; and (3) these

[7] That said, we also examine the low-income and special education statuses of new EL students in the following year and find similar discrepancies, providing evidence against this hypothesis.

discrepancies indeed reflect the differences in family affluence between new EL students and existing students.[8] Nevertheless, Table 1 also reveals that new EL students have significantly worse educational outcomes compared to existing students in the year they arrive, pointing to the fact that they have high educational needs initially.

3. Empirical Framework

There are two important empirical challenges when examining the causal effect of new EL students on existing students in receiving schools. First, new EL students in Delaware are not randomly assigned to schools, and similar to migrants in other contexts, enroll in schools serving higher shares of students from disadvantaged backgrounds (Card, 2001). Appendix Table 1 compares the characteristics of existing students in schools where the new-EL share is below and above 1 percent of the student body in grades 4 through 8, showing that this was also the case among new EL students in Delaware. As such, simple comparisons between the educational outcomes of existing students in schools with higher shares of new EL students versus existing students in other schools will likely yield downward-biased estimates of the causal effects of new EL students. To deal with this selection issue, similar to several studies on peer effects in education[9], we leverage the within-school, across-grade variation in new EL concentration to study the effects of the student influx on host students. We also present findings using student and school fixed-effects, illustrating the robustness of findings to alternative specifications.

Another empirical challenge in this context is the differential attrition of existing students from their schools following a large influx of migrant students. There is substantial evidence in

[8] This could arise if foreign-born EL students in Delaware come from economic migrant families who are typically positively selected from their countries of origin, have higher levels of education, resources, and language skills when they arrive in the U.S. compared to other migrants (Cortes, 2004; Connor, 2010; Potocky-Tripodi, 2004).
[9] Some examples include Carrell and Hoekstra (2010, 2012), Carrell, Hoekstra, and Kuka (2018), Figlio and Özek (2019), Ozek (forthcoming).

the U.S. suggesting that affluent, especially White, students leave their schools or school districts in the wake of an influx of traditionally marginalized students (Betts and Fairlie, 2003; Cascio and Lewis, 2012; Fairlie and Resch, 2002; Li, 2009; Figlio et al., 2023). Once again, failure to account for this selection issue will yield downward-biased estimates of the causal effect of new EL students. While our empirical approach is susceptible to this type of bias (especially when examining long-term effects), we try to minimize it by focusing on the effects in just the first school year when differential attrition is likely not a major issue. That said, we still check to make sure that the results are not driven by differential attrition in the first year.

We estimate the following equation using OLS:

$$Y_{itsg} = \alpha + \beta EL_{sgt} + \delta_{st} + \theta_g + \varepsilon_{itsg} \quad (1)$$

where Y_{itsg} is the year *t* educational outcome (test scores standardized to zero mean and unit variance at the year-grade level) of student *i* who attended school *s* and grade *g* at the beginning of year *t*, EL_{sgt} is the percentage of new EL students in grade *g* and school *s* in year *t*, and δ_{st} and θ_g are school-by-year and grade fixed-effects of the school and the grade that student *i* attended in year *t* respectively. We cluster standard errors at the school-by-grade-by-year level.

There are two important assumptions behind this identification strategy. First, it requires sufficient cross-grade variation in new EL student share within schools. Appendix Figure 1 presents the CDF of the cross-grade range in EL_{sgt} by school-year and shows that the range exceeds 1 percentage points in more than half, 2.5 percentage points in 15 percent, and 5 percentage points in 5 percent of all new EL-receiving schools. Second, EL_{sgt} should be uncorrelated with the baseline attributes of existing students controlling for school-by-year fixed effects. Appendix Table 2 provides the estimated associations between EL_{sgt} and observed characteristics of existing students, with and without school-by-year fixed-effects. Without

school-by-year fixed effects, we find significant correlations between new EL student share and existing student characteristics, reflecting the selection issue illustrated in Appendix Table 1. However, once we introduce school-by-year fixed effects, these associations vanish in almost all cases (only 2 out of 11 estimates are statistically different than zero at 5 percent level or higher). Nevertheless, we include these student attributes and their averages at the cohort-level (school-year-grade level) to check the robustness of our findings and to improve the precision of our estimates.[10]

4. Results

The first panel in Table 2 presents the estimated effects of new EL student share (β) on the ELA and math scores of existing students in the first year where the first column only controls for grade fixed effects, the second column introduces school-by-year fixed effects and prior year test scores, and the last column introduces other student attributes listed in Appendix Table 2 along with cohort-level characteristics. The results in the first column reveal negative associations between new EL student share and existing student outcomes reflecting the downward bias driven by the non-random sorting of new EL students across schools. These estimates turn positive and statistically significant (in the case of ELA scores) when we account for this issue in the second column. These results remain virtually unchanged once we introduce additional student- and cohort-level covariates, providing further evidence that the within-school, across-grade variation in new EL student share is uncorrelated with existing student and cohort characteristics. In terms of effect sizes, the estimates obtained using the full set of controls in column (III) reveal that a 5 percentage-point increase in new EL student share improves existing

[10] In particular, these covariates include prior year test scores, absence rate, race/ethnicity, low-income status, special education status, gender, English learner status, and the school-year-grade level averages of these covariates.

student ELA scores by 0.04σ and math scores by 0.02σ although the latter estimate is statistically insignificant at conventional levels.

We also break down this analysis by the current and former EL status of existing students because existing EL students are more likely to be affected by an influx of new EL students if it leads to improved EL-instruction (e.g., through additional resources or implementation of more effective instructional practices) or because they are more likely to share classrooms with new EL students. We repeat the analysis in the top panel using existing students who are former EL students in the second panel; using existing students who are current EL students in the third panel; and using existing students who have never been identified as EL students in the fourth panel.

The findings reveal that the positive spillover effects of new EL students are mainly concentrated among existing current and former EL students. For example, a 5 percentage-point increase in new EL share increases ELA and math scores among former EL students by 0.08σ and 0.12σ respectively. These benefits are larger for current EL students in ELA with an estimated increase of 0.15σ as a result of a similar-sized increase in EL share. In contrast, we find positive yet imprecisely estimated effects on existing students who were never identified as EL students.

Figure 2 graphically illustrates the main findings for existing EL students and provides further evidence on the validity of the research design. Similar to Carrell et al. (2018) and Ozek (2023), we first regress test scores (averaged ELA and math scores) on all student- and cohort-level characteristics included in the main regressions other than EL_{sgt} along with δ_{st} and θ_g and obtain the predicted test scores. We then plot these predicted scores and actual test scores against the percentage-point difference between EL_{sgt} and new EL student share at the school-by-year

level, with positive values indicating that the cohort received a larger share of new EL students compared to the school. We conduct this analysis separately for former EL students (top panel) and current EL students (bottom panel). Consistent with the baseline equivalency results presented in Appendix Table 2, we find no significant correlation between within-school variation in new EL share and predicted test scores for existing students. That said, actual test scores increase significantly as the relative EL share in the cohort increases.

Is it really the influx of EL students that is driving the positive spillover effects or would an influx of non-EL students have the same effect on existing students through allocation of resources? In Table 3 we examine this question by including the new student share (i.e., the share of all new students who entered grade *g* in school *s* in year *t*) along with new EL share EL_{sgt} in the model with full set of controls presented in column (III) of Table 2. The findings suggest that it is indeed the new EL students that are driving the positive spillover effects. In particular, we observe no significant spillover effects on existing student test scores if none of the entering students were EL students; however, if 5 percent of the entering students were EL students, ELA scores improve by 0.07σ among former EL students and by 0.22σ among current EL students, and math scores improve by 0.12σ among former EL students and by 0.08σ among current EL students.

5. Robustness Checks

Appendix Table 3 presents results from two alternative specifications and examines the robustness of our main findings in Table 2. In particular, in column (I), we present the estimated coefficient on the new EL share variable in models controlling for student fixed-effects whereas column (II) introduces school fixed-effects instead of school-by-year fixed effects. In the first specification, we leverage the within-student, over-time variation in exposure to new ELs while

the second specification makes use of new EL variation within schools (both across grades and across years). Both specifications reach the same conclusion as the findings in Table 2: new ELs significantly improve the test scores of former or current ELs in receiving schools.

Appendix Table 4 examines the extent of differential attrition among existing ELs (for whom we observe the largest positive spillover effects) in the first year and whether this attrition is correlated with the new EL share. In the first column, we examine the effect of new EL share on the likelihood that the existing EL students take the SBACs in the first year while the second column looks at the likelihood that the existing EL students leave their school at the end of the first year (although attrition after the test in the first year should not affect our main findings). We find no significant effect on test-taking in the first year for current and former ELs. The findings in the second column suggest that new ELs do not increase the likelihood that existing (former or current) ELs leave their schools at the end of the first year. In fact, we find significant negative effects of new ELs on attrition among former ELs, suggesting that differential attrition is unlikely to be a driver behind the observed positive effects on existing student outcomes.

6. Concluding Remarks

The number of EL students in public schools has grown significantly over the past two decades in the U.S., and this growth has mostly occurred in states that have not been traditional destinations for recent immigrants in the past. As such, it is important to examine the effects of these new EL students in new destination states on their classmates. On one hand, an influx of new EL students could be detrimental if the educational needs of new EL students require additional resources that detract from the resources devoted to their peers. On the other hand, there might be academic benefits of more new EL students, if their increase provides more financial resources to schools, if it leads to implementation of more effective instructional

practices (especially for existing EL students) due to economies of scale, if new immigrants bring greater work ethic and academic motivation that positively influence their peers, or if new immigrants create other social benefits such as a critical mass of EL students that make EL students feel more included in their school community.

In this study, we address this question in Delaware, a state that experienced one of the largest increases in EL population nationwide in this time frame. We find positive spillover effects of new EL students on existing students who are currently or formerly identified as EL students. Further, we find no detrimental effects of new EL students on the test scores of existing students who have never been identified as EL students, with some evidence pointing to moderate positive effects on the reading achievement of these students. While we cannot identify the pathways through which these positive effects accrued, the large benefits for former EL students, who no longer receive EL supports and services, suggest that peer effects could be an important driver of these externalities.

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Table 1. Differences in Student Characteristics between New English Learners and Other New and Existing Students

	New English learners	Other new students	Existing students	Existing English learners
First year outcomes -				
ACCESS composite score	-1.009			0.088
	(1.581)			(0.874)
ELA scores	-0.713	-0.143	-0.047	-0.731
	(0.988)	(0.976)	(0.989)	(0.875)
Math scores	-0.872	-0.154	-0.039	-0.578
	(1.049)	(0.956)	(0.984)	(0.873)
% absent days	6.675	8.558	6.282	5.662
	(9.039)	(13.72)	(9.994)	(10.69)
Student characteristics -				
Hispanic	0.576	0.106	0.189	0.777
	(0.494)	(0.308)	(0.391)	(0.417)
Black	0.157	0.419	0.310	0.091
	(0.364)	(0.493)	(0.462)	(0.288)
White	0.096	0.391	0.424	0.059
	(0.295)	(0.488)	(0.494)	(0.235)
Low income	0.245	0.292	0.386	0.475
	(0.430)	(0.455)	(0.487)	(0.499)
Special education	0.071	0.141	0.181	0.249
	(0.257)	(0.348)	(0.385)	(0.433)
English learner			0.082	
			(0.274)	
Ever English learner			0.173	
			(0.378)	
Foreign born	0.731	0.013	0.075	0.385
	(0.444)	(0.113)	(0.263)	(0.487)
N	1,474	6,079	124,053	10,856

Notes: Standard deviations in parentheses. Column (I) presents the average outcomes of new English learner (EL) students in the first year after they entered Delaware public schools (top panel) and other characteristics (bottom panel); column (II) presents the statistics for other new students; and columns (III) and (IV) present the statistics for all existing students and existing EL students.

Table 2 – Effects of New English Learner Share on Existing Student Test Scores in the First Year, by Existing Student English Learner Status

	(I)	(II)	(III)
School-year fixed effects	No	Yes	Yes
Student and cohort characteristics	No	No	Yes
All students (*N=119,165)*			
ELA scores	-0.057***	0.007*	0.008**
	(0.011)	(0.004)	(0.004)
Math scores	-0.049***	0.002	0.003
	(0.011)	(0.003)	(0.004)
Former English learners (*N=11,668)*			
ELA scores	-0.027*	0.018**	0.016**
	(0.017)	(0.008)	(0.007)
Math scores	-0.019	0.021**	0.024**
	(0.019)	(0.010)	(0.009)
Current English learners (*N=10,215)*			
ELA scores	-0.007	0.026***	0.029***
	(0.010)	(0.007)	(0.006)
Math scores	0.000	0.007	0.013**
	(0.012)	(0.005)	(0.005)
Never English learners (*N=97,282)*			
ELA scores	-0.051***	0.004	0.005
	(0.011)	(0.003)	(0.003)
Math scores	-0.049***	-0.001	-0.000
	(0.012)	(0.003)	(0.003)

Notes: Standard errors, clustered at the school-by-grade-by-year level, are given in parentheses. The first column presents the coefficient on the new English learner share without school-by-year fixed effects, the second column introduces school-by-year fixed effects and prior year test scores, and the third column adds the other student covariates given in the bottom panel of Table 1, along with their averages at the school-by-grade-by-year level. *, **, *** represent statistical significance at 10, 5, and 1 percent levels.

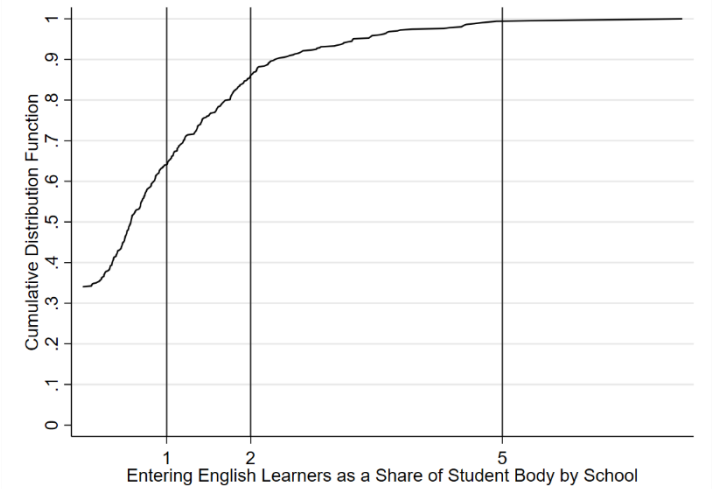
Table 3. Effects of New English Learner Share on Existing Student Test Scores in the First Year Holding New Student Share Constant, by Existing Student English Learner Status

	All students	Former English learner	Current English learner	Never English learner
ELA scores -				
New student share	0.001	0.002	-0.006	0.002
	(0.002)	(0.004)	(0.004)	(0.002)
New EL share	0.012***	0.014*	0.044***	0.008
	(0.005)	(0.008)	(0.007)	(0.005)
Math scores -				
New student share	0.001	-0.001	0.001	0.002
	(0.002)	(0.004)	(0.005)	(0.003)
New EL share	0.007	0.024**	0.016*	0.002
	(0.005)	(0.011)	(0.008)	(0.005)
N	119,165	11,668	10,215	97,282

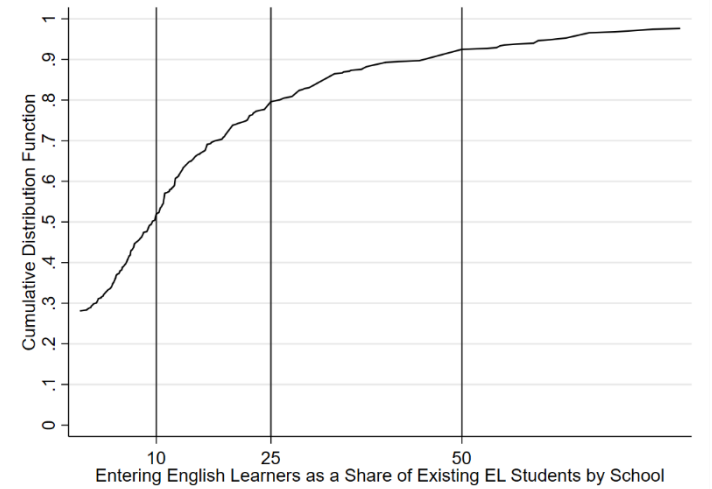
Notes: Standard errors, clustered at the school-by-grade-by-year level, are given in parentheses. All regressions include the covariances listed in column (III) of Table 2. *, **, *** represent statistical significance at 10, 5, and 1 percent levels.

Figure 1 - Distribution of New English Learners Across Schools

(A) New English learners as a share of existing student body



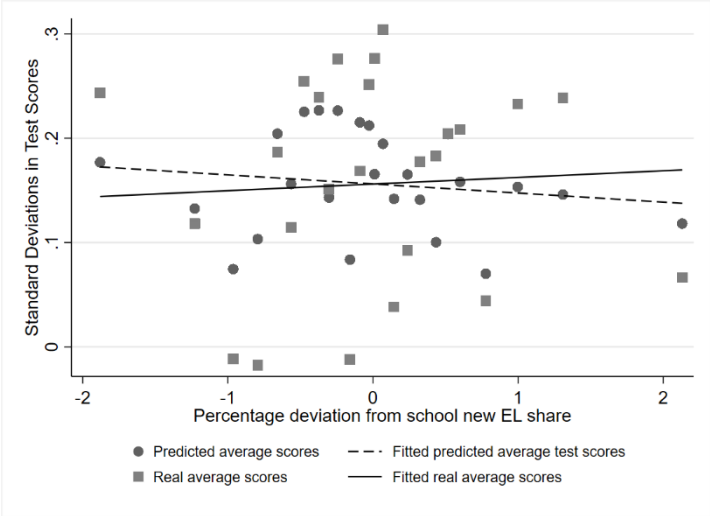
(B) New English learners as a share of existing EL students



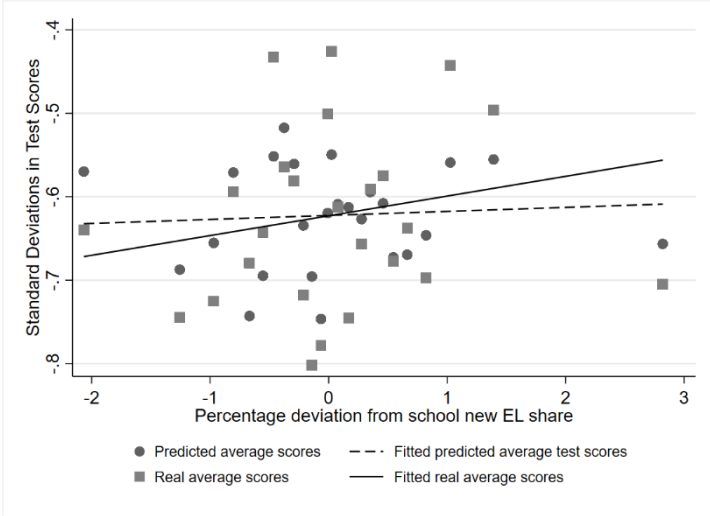
Notes: Figures present the cumulative distribution of the share of new English learners by school in Panel A and the share of new English learners among existing English learners by school in Panel B. New English learner shares are multiplied by 100.

Figure 2 - Effects of New English Learner Share on Existing Student Test Scores in the First Year, Former and Current English Learners

(A) Former English learners



(B) Current English learners



Notes: Predicted test scores are created by first running a regression that includes the student attributes given in column (III) of Table 2, grade fixed-effects, school-by-year fixed-effects, and existing student attributes averaged at the school-by-year-by-grade level. We then predict test scores using the estimated coefficients.

Appendix Table 1 – Differences Between Existing Student Characteristics in Schools with High- versus Low New EL Share

		New EL share less than 1 percent	New EL share greater than 1 percent
Prior year outcomes			
	ELA score	0.055	-0.165
		(0.983)	(0.975)
	Math score	0.054	-0.159
		(0.985)	(0.973)
Other student characteristics			
	Hispanic	0.142	0.253
		(0.349)	(0.435)
	Black	0.304	0.305
		(0.460)	(0.460)
	White	0.475	0.367
		(0.499)	(0.482)
	Other race	0.080	0.075
		(0.271)	(0.263)
	Low income	0.348	0.440
		(0.476)	(0.496)
	Special education	0.175	0.192
		(0.380)	(0.394)
	Ever English learner	0.125	0.245
		(0.331)	(0.430)
	Current English learner	0.056	0.121
		(0.229)	(0.326)
	Foreign born	0.059	0.100
		(0.235)	(0.300)
	N	68,155	58,378

Notes: Standard deviations in parentheses. The first column presents the prior year test scores and other student characteristics of existing students in schools where the new English learner share is smaller than 1 percent of the student body but greater than zero, the second column presents the characteristics of existing students in schools where the new English learner share is larger than 1 percent.

Appendix Table 2 – Estimated Associations between Existing Student Characteristics and New English Learner Share

	(I)	(II)
School-year fixed-effects	No	Yes
Prior year outcomes		
ELA score	-0.064***	-0.005
	(0.012)	(0.003)
Math score	-0.057***	0.001
	(0.012)	(0.004)
% absent days (0-100)	0.209***	0.181***
	(0.050)	(0.069)
Other student characteristics		
Hispanic	0.035***	0.001*
	(0.008)	(0.001)
Black	-0.004	0.000
	(0.003)	(0.001)
White	-0.029***	-0.000
	(0.007)	(0.001)
Low income	0.022***	0.004***
	(0.005)	(0.001)
Special education	0.003*	-0.000
	(0.001)	(0.001)
Male	0.001	-0.000
	(0.001)	(0.001)
English learner	0.020***	0.000
	(0.005)	(0.001)
Foreign born	0.012***	-0.000
	(0.003)	(0.001)
Joint test for balance of observed attributes		
F-stat	12.55	1.40
p-value	0.000	0.170

Notes: Standard errors, clustered at the school-by-grade-by-year level, are given in parentheses. The estimated coefficients represent the coefficient on the new EL share variable (in percentage points) in regressions where the dependent variable is the corresponding student characteristic with and without school-by-year fixed-effects. *, **, *** statistical significance at 10, 5, and 1 percent levels.

Appendix Table 3 – Effects of New English Learner Share on Existing Student Test Scores in the First Year, by Existing Student English Learner Status, Student and School Fixed-Effects Models

	(I)	(II)
Student fixed effects	Yes	No
School fixed effects	No	Yes
All students (*N=119,165)*		
ELA scores	0.007***	0.006
	(0.002)	(0.004)
Math scores	0.005*	0.003
	(0.002)	(0.004)
Ever English learners (*N=20,941)*		
ELA scores	0.013***	0.013***
	(0.005)	(0.004)
Math scores	0.017***	0.015***
	(0.006)	(0.005)
Never English learners (*N=97,282)*		
ELA scores	0.005*	0.005
	(0.003)	(0.004)
Math scores	0.001	-0.001
	(0.003)	(0.004)

Notes: Standard errors, clustered at the student level in column (1) and school level in column (2), are given in parentheses. The first column presents the coefficient on the new English learner share with student fixed-effects and the second column presents the coefficient on the new English learner share with school fixed-effects. Both columns include prior year test scores and other student covariates given in the bottom panel of Table 1, along with their averages at the school-by-grade-by-year level. *, **, *** represent statistical significance at 10, 5, and 1 percent levels.

Appendix Table 4 – Effects of New English Learner Share on Existing Student Test Participation and Mobility in the First Year and Across Schools at the End of the Year, by Existing Student English Learner Status

	Took the test in the first year	Changed schools at the end of the first year
Former English learners (*N=11,668)*	0.002	-0.014**
	(0.002)	(0.007)
Current English learners (*N=10,215)*	-0.003	-0.007
	(0.002)	(0.005)

Notes: Standard errors, clustered at the school-by-grade-by-year are given in parentheses. The first column presents the effect of new English learner share on the likelihood that the student takes the standardized test in the first year and the second column presents the effect on the likelihood that the student left the school at the end of the first year. Both columns include school-by-year fixed-effects, prior year test scores and other student covariates given in the bottom panel of Table 1, along with their averages at the school-by-grade-by-year level. *, **, *** represent statistical significance at 10, 5, and 1 percent levels.