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Which Students are Left Behind?

The Racial Impacts of the No Child Left Behind Act

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Which Students are Left Behind? The Racial Impacts of the No Child Left Behind Act

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Abstract

The No Child Left Behind Act imposes sanctions on schools if the fraction of each of five racial group of students demonstrating proficiency on a high stakes exam falls below a statewide pass rate. This system places pressure on school administrators to redirect educational resources from groups of students most likely to demonstrate proficiency towards those who are marginally below proficient. Using statewide observations of 3rd and 4th grade math tests, this paper demonstrates that students of successful racial groups at schools likely to be sanctioned gain less academically over their subsequent test year than comparable peers at passing schools. This effect is stronger at schools more likely to suffer from NCLB sanctions and is robust to nonrandom sample selection.

Demands for school accountability and concerns about racial performance disparities culminated in the No Child Left Behind Act (NCLB), the 2002 reauthorization and expansion of the Elementary and Secondary School Act. The NCLB holds districts and buildings accountable for student performance on state administered high-stakes tests, sanctions failing schools, and provides expanded educational opportunities for students attending these schools. Proponents of the NCLB hope it will increase educational quality and reduce the racial and income academic achievement gaps. However, the implementation of the NCLB also provides incentives to reduce academic achievement for some groups of students. This article describes these incentives and documents a reduction in scholastic performance among these groups.

The NCLB institutes a system of performance goals that, if not met, trigger sanctions of increasing severity on schools and districts. Yet, as Ladd (2001) suggests, any performance-based system suffers from a number of potential pitfalls. For instance, important societal standards not covered by performance measures are likely to receive less instructional attention. When performance goals are translated into empirical measures, there may be a weak connection between the goals and measures. For example, the presence of high-stakes exams encourages teaching to the content of the exams thereby improving measured achievement without improving educational performance.[1]

In addition to these concerns, the NCLB creates incentives for school administrators to focus resources on specific racial groups in the hopes of making Adequate Yearly Progress (AYP). As mandated by the NCLB, each school must test five distinct racial groups: Black, Hispanic, White, American Indian and Asian/Pacific Islander. For a school to make AYP, the percentage of students in each racial group within that school who demonstrate proficiency on a

[1] Jacob (2005) finds that gains made on high-stakes tests are not mirrored in low-stakes tests and the gains that are made on high-stakes exams appear to be due to improvements in test-specific skills. Klein, et. al. (2000) find similar results when comparing the Texas high-stakes test with the National Assessment of Educational Progress.

high-stakes test must exceed a state determined pass rate. Schools with too low a percent of students demonstrating proficiency in any racial group do not make AYP and are subject to school-wide sanctions under the NCLB. By focusing on a binary pass/no pass outcome for each racial group, the NCLB provides incentives for administrators to direct resources away from racial groups projected to make AYP and target those resources towards members of groups thought to be in danger of not making AYP. For instance, an administrator may choose to abandon a curriculum that has broad appeal for one that focuses on skills that a lower performing group of students lack. Administrators may assign students of weaker racial groups to stronger teachers in hopes of raising their high-stakes academic performance leaving students of other racial groups in the care of less able teachers. Administrators may choose to fund co-curricular activities that appeal to one particular racial group in hopes of raising their academic performance. Rouse, et. al. (2007) document Florida schools who failed that state's accountability standards were more likely to reorganize students within classrooms into smaller learning "units", were more likely to mandate a minimum class time spent on high stakes subjects, and were more likely to reward high teacher performance. Whatever the specific avenue, responding to the possibility of failure under the NCLB in this way is referred to as "strategic instruction" in this paper. This paper documents evidence consistent with the presence of strategic instruction and the extent to which it alters academic achievement for students in racial groups not targeted by school administrators.

To test for the presence of strategic instruction, consider two similar students. The first is a member of a racial group which made AYP but attends a school that contains another racial group that failed to make AYP. The second is a member of the same racial group as the first but attends a school that had no groups fail to make AYP. If strategic instruction exists, then the first student should gain less academically over the course of the subsequent year than the second because resources are directed away from the first student in favor of the failing racial group at her school. Measuring academic differences between these students suggests one method of identifying strategic instruction. The data employed in this paper allows for a second method. The data examined span the period before and after enactment of the NCLB presenting the ability to measure the change in the differences between these two students that occurred before and after the NCLB.

The following econometric estimates are consistent with the strategic instruction hypothesis. Using a statewide sample of 4th graders, it is found that students of successful racial groups who attend schools where another racial group fails to make AYP score lower on a subsequent high-stakes test than comparable students at schools without failing racial groups. Estimates of this impact are of similar magnitude to the test score decrease that occurs when students switch schools midyear and occur after controlling for general differences arising between failing and successful schools. Consistent with the strategic instruction hypothesis, this difference increases as failing schools face more severe NCLB sanctions and in schools that *ex ante* are more likely to fail to make AYP. These impacts occur despite controlling for student-level past standardized test performance, a host of other observable student characteristics, and for the racial and socio-economic makeup of schools. These findings are also robust to controlling for non-random sample attrition and do not appear to be the result of administrators targeting students by their *a priori* beliefs of student ability.

A handful of researchers have investigated a form of strategic instruction based not on race but on student ability. Chakrabarti (2007) uses disaggregated school-level data to analyze the behavior response of schools threatened under Florida's "opportunity scholarship" program.

This program predates the NCLB but offers similar incentives to school administrators. Under this program, schools failing for two out of four years must provide students with vouchers. Chakrabarti argues that the incentive this program creates is for administrators to focus on students who are marginally below the threshold required to pass Florida's high-stakes test. When compared to students at similar but non-threatened schools, Chakrabarti finds that marginal students at threatened schools improve performance. Further, Chakrabarti argues that the entire test distribution moves to the right, with larger moves for marginal students.

Burgess, Propper, Slater, and Wilson (2005) examine school accountability for secondary students in the United Kingdom. If strategic instruction occurs, schools with a higher proportion of marginal students will have a greater incentive to divert resources from students at the tails of the ability distribution. Indeed, these authors find that as the proportion of marginal pupils increases, all students lose relative to the most able, but the lowest ability group loses the most. One possible explanation for the relative stability of the most able students is that UK schools have overlapping catchment zones, leading to school competition for the best students.

Using pre-NCLB Texas data on individual students, Reback (2007) finds that schools respond to the Texas accountability system with measures helping low-performing students and specific, targeted measures towards students that are critical to the school's accountability ratings. Reback compares students within buildings and finds that those gaining most academically are also those who have the highest probability of increasing their school's rankings. In contrast, relatively high achieving students perform worse than expected if their performance is unlikely to impact their school's ratings.

Before proceeding, two caveats are necessary. First, all prior research on strategic instruction in public education has focused on administrator's *a priori* beliefs or observations of student ability. However, arriving at these beliefs involves significantly more uncertainty and hence a weaker motivation to strategically instruct than is the case if administrators choose to target resources based upon observables as obvious as student race. As a result, if one finds strategic instruction based upon ability, it is likely that one will also find strategic instruction based upon race. However, the converse may not be true. If administrators target resources based upon racial characteristics, then strategic instruction may alter the relative performance of races rather than the relative performance of students of differing abilities. Secondly, the presence of strategic instruction may not result in an inefficient outcome. If, prior to the NCLB, schools over-expended resources on students of would-be successful racial groups, then the NCLB incentives discussed here may improve overall resource allocation. Further, as suggested by Chakrabarti (2007), if building administrators respond to the NCLB by introducing more effective teaching techniques, better curriculum, or a more efficient use of resources, then the NCLB may improve overall student learning.

Section 2: The NCLB and Student Testing in Washington

As part of a move towards educational accountability, the state of Washington introduced the Washington Assessment of Student Learning (WASL), a statewide test of reading, writing, listening, and mathematics in 1997.[2] The WASL is the state of Washington's high-stakes test used to identify AYP under the NCLB. In the 4th grade the WASL tests mathematics, reading and writing. In order to avoid complications that arise when combining scores from tests of

[2] Much of this section describes the Washington testing system as it was in place during the time which this paper addresses. Since that time, Washington has made some changes to its high-stakes testing system including replacing the listening test with a science test in 2004. The method of determining AYP based upon individual racial group performance has not changed and, indeed, is mandated by the NCLBA.

different subjects, this paper analyzes only the WASL math results which have been normalized to mean zero and variance equal to one within each year.[3]

The NCLB requires school districts to bring all students to the "proficient" level in reading and mathematics by the 2013-2014 school year. In the meantime, individual schools must meet state AYP targets toward this goal for both their overall student population as well as for eight socio-demographic subgroups: American Indian, Asian/Pacific Islanders, Black, Hispanic, White, special education, limited English, and economically disadvantaged students. To make AYP, the state of Washington measures the percentage of a school's students in each of these nine groups who demonstrate proficiency on the WASL and compares this to the state-imposed pass rate. For a school to make AYP, the percentage of the total student body, as well as the percentage of each subgroup, must be above the required pass rate. As designed, a single student can be a member of many groups and therefore impact a school's ability to make AYP multiple times. For instance, an Asian, limited English student from an economically disadvantaged family would be represented in the overall student body as well as three of the eight demographic subgroups. If this student fails to demonstrate proficiency on the high stakes test, then this failure is represented in the overall calculation of percent proficient as well as the calculation of the three subgroups.

Required pass rates in Washington are calculated by first determining the cumulative twelve-year improvement needed between 2001-02, when the NCLB was implemented, and 2013-14, in order to have 100% of all students demonstrate proficiency at the end of this period. This total improvement is then evenly divided over the twelve year period. For example, in 2001-2002, 29.7% of 4th grade students were rated as math proficient by Washington. If this

[3] Indeed, the vast majority of schools failing to make AYP in 2004-2005 did so because of a failure to achieve the required pass rate in mathematics. In 2005, of the 207 Washington buildings failing to make AYP, 161 were due to poor math scores.

figure rises by 5.86 percentage points in each of the subsequent 12 school years, the goal of 100% proficiency would be attained by 2013-2014. Thus, the mathematics required pass rate required to make AYP in the 2002-03 school year was 29.7%+5.86% = 35.56%. A school with fewer than 35.56% of their overall student body (or of any subgroup) demonstrating math proficiency in the 2002-2003 would be classified as not meeting AYP.[4] Finally, AYP is granted only if 95% of all continuously enrolled students at each grade level take the WASL. In 2008, 43.4% of 4th graders demonstrated proficiency in all three phases of the WASL (reading, writing, and math) and 53.6% demonstrated proficiency on the math portion. In that year, 50.9% of schools offering 4th grade had insufficient students demonstrating proficiency to be above the required pass rate and hence did not make AYP.

The NCLB prescribes specific penalties for schools receiving Title I funds failing to meet AYP, but it allows states to determine the structure of penalties for non-Title I schools. For example, in the case of Title I schools that fail to make AYP for two years in a row, students in the school must be allowed to transfer to a school in the same district that makes AYP. In this case, the NCLB requires up to 5 percent of the district's Title I funds be used to pay for transfer students' transportation. Schools failing to show improvement over three years are required to provide supplemental educational services including private tutoring. Those failing over a longer time period are required to replace teachers or administrators, and in extreme cases, incur the loss of local governance. This increased scope of sanctions for schools failing to make AYP in consecutive years is later used to test the presence of strategic instruction. However, as Figlio and Lucas (2004) point out, schools performing poorly on state assessments impact not only

[4] In order to not penalize schools that begin far from the state mandated pass rate, the NCLBA created the "safe harbor" provision which grants AYP to schools failing to make AYP as described above but who reduce the number of students failing to show proficiency on the WASL by 10%. The safe harbor provision maintains the incentive for administrators to target the students on the margin of passing in order to show 10% gains. In the data this paper uses, 7 schools offering 4th grade achieved AYP through the safe harbor provision. This represents .57% the state's elementary schools and .56% of 4th graders.

themselves but also their communities through diminished property values. Thus, schools face considerable pressure to improve measured performance on high stakes tests.

In addition to the WASL, Washington students take the Iowa Test of Basic Skills (ITBS). The Iowa tests are standardized exams identifying a student's academic level. The ITBS is given in Washington near the end of the student's 3rd grade year, the year immediately prior to the WASL. Using the ITBS math results presents a number of advantages. First, since the ITBS is not employed as a tool to determine AYP, it is unlikely to be the direct focus of strategic instruction. Instead it may be a tool used by administrators who decide how to allocate resources across students. Secondly, since the ITBS is given the year previous to the WASL, it can be used as a proxy for student ability. As such, this paper compares the academic progress of students from the time of taking the ITBS to their completion of the WASL. Another advantage conveyed with the ITBS data is the large number of demographic, social-economic, and academic variables observed. These variables are used as explanatory variables in later regressions. Unlike the WASL scores, a student's ITBS is measured as a percentile relative to all nationwide 3rd graders taking the ITBS.

Optimally, a researcher would compare schools under the NCLB with those that were not impacted by the NCLB to test if strategic instruction took place. But, since all public schools in Washington are subject either to the NCLB, state-level sanctions tied to NCLB, or both, there is no direct control group with which to compare strategic instruction practices. However, as suggested by Rouse, *et. al.* (2007), schools having failed to make AYP in prior years are more likely to change instruction strategies in future years in order to avoid the increasing sanctions for failing AYP. Further, both the ITBS and WASL have been given in Washington since the mid-1990s, which creates the possibility of a before-and-after identification strategy. If the

NCLB creates strategic instructional behavior, then differential WASL outcomes should be found among schools under the threat of sanctions and should be present only after the NCLB was enacted.

Section 3: Data and Descriptive Statistics

The data used in this article consist of four cohorts of paired observations of ITBS/WASL scores for third/fourth graders. The first observed cohorts of third graders took the ITBS in the spring of 2001 and the WASL in the spring of 2002. The final observed cohort took the ITBS in 2004 and the WASL in 2005. The state of Washington did not define AYP until late in the spring of 2002 and only notified schools of their AYP status after the subsequent school year commenced. Hence the first two cohorts began the school year in which they took the WASL before their building administrator knew their building's AYP status. Administrators had little opportunity to pursue strategic instruction for these cohorts. Students in the final two cohorts began their WASL the year after schools knew their AYP status so administrators had the ability to pursue strategic instruction for these students. The heterogeneity between these two sets of cohorts offers one opportunity for identifying the impact of the NCLB.

As a first attempt to investigate strategic instruction, the final two cohorts are examined—the cohorts who took the WASL in buildings where the principal knew their AYP status from the preceding year. After excluding special education students and those with missing observations, the pooled number of student observations in the last two cohorts is 112,485. This represents 74.8 percent of all Washington public 4th grade students and 85.7 percent of all non-special education students. Panel A of Table 1 divides this cohort into two groups: students at schools who made AYP in the previous year and students who are members of a race that made AYP in the previous year but who attend buildings which did not make AYP because another racial group failed. For example, this second group includes Hispanic students if Hispanics at their building made AYP but Whites did not. In this example, Panel A of Table 1 would not include those White students.

Panel A of Table 1 demonstrates a number of important features. First, a significant difference in WASL and ITBS performance occurs between passing students at AYP schools and passing students at failing schools. On average, students at AYP schools score .085 standard deviations above the state WASL mean and average just above the 62nd percentile on the ITBS. Members of a successful racial group at a failing school score .27 standard deviations below the average on the WASL and at the 56th ITBS percentile. Since Table 1 includes only those students in racial groups that made AYP, this difference is not caused by inclusion of failing groups of students. Rather, the difference likely arise from any number of factors .[5] For instance, AYP schools have roughly half the free/reduced lunch population relative to non-AYP schools and students of successful racial groups at non-AYP schools are much more likely to be minorities than those at AYP schools.

If strategic instruction occurs, passing students at failing schools will make smaller gains between their ITBS test year and their WASL year than do observationally equivalent students at AYP schools. Panel A of Table 1 suggests that this may be the case. Students at failing schools averaged at the 56th percentile on the 3rd grade ITBS. Those at passing schools averaged at the 62nd percentile, a statistically significant but relatively small difference in performance. In their fourth grade year, students at failing schools averaged .27 standard deviations below the WASL average (the 34th WASL percentile), those at passing schools averaged almost .1 standard deviation above average (the 49th WASL percentile). This large difference in WASL performance relative to ITBS performance suggests significant academic improvement of

[5] See Krieg and Storer (2006).

students at passing schools relative to passing students at schools that failed. Of course these differences could be explained by a number of competing hypotheses other than strategic instruction. For instance, the difference between a 56th and 62nd ITBS percentile student may be large in terms of academic competency making it difficult for schools to transform low ITBS students into high WASL scorers. Schools that pass all their students may use better teaching techniques which account for the increased performance of all their students. Or, passing schools may have a different composition of students that makes the school successful. To help distinguish between these possibilities, consider Panel B of Table 1. Panel B presents descriptive statistics for the two cohorts that were observed prior to Washington schools knowing their AYP status. These two cohorts are separated into two groups: students at buildings that will make AYP in the future and students of a racial group that will make AYP in the future who attend schools who will not make AYP. Thus, Panel B simply presents the same schools and racial groups as does Panel A but does so for the two years prior to NCLB.

Contrasting students at AYP schools before and after the imposition of NCLB (the first columns of Panels A and B) demonstrates little difference between passing schools before and after the NCLB. Before and after differences in WASL and ITBS scores are small as are student and building demographic measures. Of course, little difference is to be expected in school performance if those schools expect to make AYP and do not alter their instructional practices. However, the relative performance of students of a passing race at a failing schools appears higher prior to the NCLB. These students averaged at the 54th percentile on the ITBS, a small difference from their post-NCLB average of the 56th percentile. However, these students scored .21 standard deviations below the WASL average (the 44th WASL percentile); a rather large improvement over the -.27 standard deviation (the 34th percentile) performance expected of similar students after the NCLB. This decrease of relative performance is explored more systematically in the next section.

Section 4: Econometric Evidence

The preceding descriptive statistics suggest that the gains made for students in a passing racial group at a failing school were larger prior to the NCLB than after it. These statistics also suggest the following econometric approach to exploring this further. Consider the regression:

$$(1) \qquad WASL_{itb} = \beta_0 + \sum_{j=1}^{L} \phi_i ITBS_{itb}^{j} + \alpha AYPFAIL_{tb} + \gamma AYPFAILRACE_{itb} + \lambda NCLBA_t + \boldsymbol{\psi} \mathbf{B}_{tb} + \boldsymbol{\lambda} \mathbf{X}_{itb} + \varepsilon_{itb}$$

where $WASL_{itb}$ is student i's test score during time period t in building b. $\mathbf{X}_{itb}$ is a matrix of student-specific control variables and $\mathbf{B}_{bt}$ represent a matrix of time-varying building control variables.[6] AYPFAIL is a binary variable equaling one if one of the five racial groups at the building failed to make AYP in the previous year. Since no buildings failed to make AYP during the first two observed years, AYP is equal to zero for all of these observations. NCLB is a binary variable equaling one for the last two observed cohorts (those cohorts who took the WASL after full NCLB implementation). Because of the non-linear relationship between tests measured on a percentile basis and those measured in standard deviations around the mean, WASL test scores are assumed to be a polynomial function of ITBS scores where the degree of polynomial, L, whose value is determined by minimizing the AIC.

[6] The student control variables include nine binaries representing ethnicity, five binaries representing the duration of student enrollment in the school, four binaries indicating their frequency of reading for fun, six binaries indicating their amount of daily television watched, three binaries indicating the frequency of speaking English at home, gender, the amount of computer usage at school, the presence of a computer at home, and if they skipped or were held back a grade. The building control variables include the percentage of student body in each of the five NCLBA racial groups, the percent of students receiving free or reduced lunches, the average building enrollment and its square, and five binary variables indicating the building type (traditional elementary, comprehensive, parent partnership program, internet/computer school, or alternative school).

The variable of interest in equation (1) is AYPFAILRACE which equals one for students of a racial group which made AYP in the previous year and who attend a school that failed to make AYP because of the failure of another racial group. If strategic instruction occurs, then γ, the coefficient on this variable, would be less than zero indicating that WASL performance was lower for students of a successful racial group who attend schools that failed because of the prior performance of another racial group.

Panel A of Table 2 presents estimates of equation (1). Students of races that did not cause the previous AYP failure expect to score .050 standard deviations lower on the WASL than similarly situated students at passing schools. To put this into context, the (unreported) coefficient on black (relative to white) is -.146, the impact of changing schools midyear is -.048, of having been held back at least one grade is -.092, and of having a computer at home .060. Thus, a student of a passing racial group who attends a school that had another racial group fail is expected to have their WASL performance diminish by about the same amount as would occur as if he or she changed schools midyear or about the same as the difference that occurs between students with and without a computer at home.

Of interest in Panel A of Table 2 is the negative coefficient associated with failing to make AYP. All students at schools who failed to make AYP in the prior year can be expected to score .044 WASL standard deviations lower than schools making AYP in the prior year. Among other things, this may be the result of unobserved differences in student composition, teacher recruitment and retention, and financial differences between passing and failing buildings. It is important to note that the strategic instruction finding occurs in the presence of this AYP status variable suggesting that there is an additional racial component to AYP failure.

Panel A of Table 2 also presents an estimated coefficient associated with the variable NCLB. Conditional expected WASL tests scores are .03 standard deviations higher after enactment of the NCLB—about 60% of what students of successful racial groups at failing schools expect to lose. Potential explanations for this improvement are many: the NCLB better focused resources on academics, teachers may teach to the test, or the resources associated with NCLB were used efficiently by school administrators. Regardless of the cause, Table 2 presents a picture of a change in relative racial performance among students at failing schools and a simultaneous small, but statistically significant, increase in overall test performance.

If the estimate of γ = -.050 is the result of administrators focusing attention on racial groups who previously failed to make AYP, then this difference should grow in magnitude at schools that have failed to make AYP in consecutive years resulting in more severe NCLB sanctions. In this data, it is possible to identify schools and races who have failed AYP for two consecutive years. Consider the regression:

$$(2) \quad WASL_{itb} = \beta_0 + \sum_{j=1}^{L} \phi_i ITBS_{itb}^{j} + \alpha AYPFAIL_{tb} + \nu AYPFAILTWICE_{tb}$$
$$+ \gamma AYPFAILRACE_{itb} + \zeta AYPFAILRACETWICE_{itb} + \lambda NCLBA_t + \boldsymbol{\psi} \mathbf{B}_{bt} + \boldsymbol{\lambda} \mathbf{X}_{itb} + \varepsilon_{ibt}$$

where AYPFAILTWICE equals one if racial groups at the building failed for two consecutive years. AYPFAILRACETWICE equals one if a student is a member of a racial group who successfully made AYP for two consecutive years and attends a school where another racial group failed to make AYP for two consecutive years.[7] If strategic instruction occurs, one would expect ζ to be negative suggesting a further decrease in academic performance.

[7] In the case of consecutive failure, students are assigned the value of one to each of AYPFAILURERACE and AYPFAILURERACETWICE. Buildings are assigned the value of one to each of AYPFAIL and AYPFAILTWICE.

Panel B of Table 2 presents estimates of selected coefficients from equation 2. These results support the strategic instruction hypothesis. Students of a passing racial group at a school failing in the previous year expect to score .055 standard deviations lower on the WASL than similar students at passing schools. However, students of a passing racial group at a school that failed for two consecutive years can be expected to lose an additional .035 standard deviations. This larger decline would be expected if school administrators focused increased attention to needy groups of students at the expense of those that have traditionally performed adequately on the WASL.

Section 5: Robustness Checks

Tables 1 and 2 suggest that students of a successful racial group at schools that fail to make AYP perform worse than similarly situated students at passing schools. While this may be due to strategic instruction, alternative hypotheses are possible and explored in this section.

While strategically targeting students based upon their race may be plausible, school administrators are privy to information that may result in a more efficient form of strategic instruction that the prior empirical strategy mistakenly identifies as being based upon race. As suggested by Reback (2008), student test history presents administrators with rough estimates of each student's propensity to show proficiency on the WASL. Rather than targeting students based upon race, an administrator could target instructional resources using ITBS test history and their subsequent perceptions of individual student ability. For instance, based upon their 3rd grade ITBS score, an administrator could place students on the perceived margin of passing the WASL in a strong 4th grade teacher's classroom and place very strong and very weak students with less able teachers.[8] This would result in increased learning for middle-ability students and lower gains for students on the tails of the ability distribution. As long as high ability students continue to pass the WASL, this strategy would maximize the percent of students passing the WASL and therefore the school's probability of making AYP. If administrators behave this way and if test scores are correlated with race, then the results from Table 1 and 2 would occur not because of strategic instruction focusing on student race, but rather because students receiving decreased attention are those whose previous tests scores are perceived by administrators as being those requiring the least academic attention.

One way of testing for this possibility is to interact AYPFAIL with each students' 3rd grade ITBS score. If administrators at schools that failed to make AYP in the previous year direct resources away from students who scored well on the 3rd grade test, then this interacted variable (AYPFAIL×ITBS) will be negative and its presence should cause the significant coefficients associated with AYPFAILRACE to become insignificant. To control for non-linearities in this potential relationship, polynomials of ITBS interacted with AYPFAIL and are included in:

$$\text{(3)} \qquad \text{WASL}_{itb} = \beta_0 + \sum_{j=1}^{L} \phi_i \text{ITBS}_{itb}^{j} + \sum_{j=1}^{M} \xi_i \text{AYPFAIL} \times \text{ITBS}_{itb}^{j} + \alpha \text{AYPFAIL}_{tb}$$
$$+ \gamma \text{AYPFAILRACE}_{itb} + \lambda \text{NCLBA}_{t} + \boldsymbol{\psi} \mathbf{B}_{bt} + \boldsymbol{\lambda} \mathbf{X}_{itb} + \varepsilon_{ibt}$$

where L and M and determined by minimizing the AIC.

Table 3 presents estimates of ξ which are individually insignificantly different from zero (though they do jointly explain WASL results). γ, the coefficient on AYPFAILRACE, remains negative, statistically significant, and of slightly larger magnitude than the OLS estimates of

[8] This form of strategic instruction was explored by Krieg (2008), Reback (2008), and Chakrabarti (2007)

equation (1). This suggests that strategic instruction is racially based and not based upon prior observation of student test scores.

A second robustness check involves sorting the sample to control for school outliers. The possibility exists that, based upon the composition of their student bodies, some schools are so certain of making AYP (or so certain of failing to make AYP) that administrators face no incentive to perform strategic instruction. If this is the case, then the prior results may understate the impact of strategic instruction in those schools that perform it. On the other hand, there is high variance across schools in measures like free and reduced price lunch participation, academic achievement of teachers, student demographics and resources per pupil. If the decision to participate in strategic instruction is correlated with these measures, it is possible that a few schools acting as outliers lead to the prior findings.

To sort the sample, consider the building-level logit regression:

$$(4) \qquad PR(Y_b = 1) = f(\boldsymbol{\psi}\mathbf{B}_b + \varepsilon_b)$$

where Y is equal to zero if a building failed to make AYP in either of 2004 or 2005 (the last two observed cohorts), and **B** represents the building control variables used in equations (1) through (3) measured in 2001. This logit can be thought of as a forecast of which schools will make AYP based upon their characteristics observed at the time of NCLB enactment. From this logit regression, predicted probabilities of a building making AYP are generated, sorted, and divided into the lowest, middle, and highest thirds. Using the entire sample of students, equation (1) is then re-estimated for each third and results are presented in Table 4.

Table 4 presents evidence that all schools act strategically with respect to student race, but the predominant effects occur at schools in the lower third of the predicted probability of making AYP. Students of a passing race at schools in this group who failed to make AYP can expect to score .062 WASL standard deviations lower than similar students at passing schools in this group. Schools in the middle and top thirds of the probability of making AYP have less evidence of strategic instruction. In both cases, passing races expect to score .021 standard deviations worse than comparable students however, neither of these measures are statistically different than zero. This pattern of findings is consistent with administrators at schools perceived to be in danger of failing to make AYP acting aggressively by redirecting resources towards racial groups that may cause the failure. Schools less likely to fail have much less urgency in following this course of action and a much smaller racial impact results.

A final explanation for these findings is that the composition of students taking the WASL differs between AYP and non-AYP schools and this difference is not accounted for by the independent variables in the regressions. This concern has been addressed by a number of studies, especially with regard to strategic placement of students in special education programs[9] and through strategic administrative exclusion of students most likely to fail their high stakes test.[10] If non-random selection of students omitted from this analysis occurs, then the results of the prior regressions may be biased in favor of finding strategic instruction.

Table 5 presents counts of included and missing observations of general education students by year. Over the time period examined, the percentage of valid general education students with complete WASL and ITBS observations has remained stable suggesting that the NCLB did little to change the trend of missing exams. Secondly, the numbers of missing observations are relatively small; over the four cohorts observed less than 15% of all Washington general education students are missing. Unless there is a high correlation between being unobserved and WASL performance, this small number of missing observations is unlikely to

[9] See Figlio and Getzler (2002), Deere and Strayer (2001), Cullen and Reback (2006), and Jacob (2005).
[10] Figlio (2006) finds that during test weeks in Florida, the duration and frequence of disciplinary suspensions for low-performing students in grades that face high-stakes tests increases.

overturn the prior results. However, one can imagine failing schools encouraging some students to take the WASL while simultaneously discouraging others in hopes of making AYP. This non-random attrition needs exploration before making the conclusion that strategic instruction exists.

To test for the possibility of sample selection bias, a two-stage Heckit procedure is employed.[11] In the first stage, a probit augments the regressors from equation (1) with the contemporaneous percentage change of a county's population to estimate if a student missed the WASL. Because a primary reason for missing the WASL is that students move from their local school district, including the percentage change in the local population may help explain sample attrition. The second stage of the Heckit procedure adds the inverse Mills ratio from this probit to equation (1). Results from these two regressions are presented in Panel A of Table 6.

Analysis of the first stage probit in Panel A of Table 6 reveals that students do miss the WASL systematically. Schools in counties with high population growth are more likely to enroll students who later miss the WASL. After the passage of the NCLB, the conditional probability of individuals missing the WASL declined. Further, students at schools which failed to make AYP in the previous year, are also less likely to miss the WASL. This may be an artifact of failing schools more aggressively recruiting additional test takers in hopes of improving past performance. Finally, students of a passing racial group at a school that failed to make AYP are more likely to miss the WASL. Possibly, these students do not receive the encouragement to take the WASL from their administrators to the same extent as those in failing racial groups. Whatever the reason, if these students are stronger than average test takers, the prior regression results would actually understate the impacts of strategic instruction.

The second stage Heckit results in Panel A of Table 6 explore the possible biases that occur because of WASL attrition. Relative to the estimates of equation (1), the Heckit results

[11] See Wooldridge (2002), chapter 17 for details.

suggest that the impacts of racial strategic instruction are actually larger after correcting for non-random WASL attrition. Those students of a successful racial group are expected to score .087 standard deviations worse than comparable students, a large, but statistically insignificant difference when compared to the OLS estimates.[12]

A related non-random attrition concern exists. If high ability students are more likely to leave a school that recently failed to make AYP, then estimates of student performance of remaining students may appear lower leading to the strategic instruction conclusion. To check for this possibility, the interactions of AYPFAIL and cubics of student ITBS scores were interacted and included in the first stage probit of Panel A, Table 6. If higher ability students leave failing schools with higher probability than lower ability students, coefficients on these variables will be positive. It turns out, these coefficients are individually and jointly insignificant ($F = .1923$, $p = .901$) suggesting that non-random attrition by ability does not lead to the strategic instruction conclusion.

A second possible selection bias is suggested by Table 5. A significant number of 3rd graders miss the ITBS test. Since this test is an explanatory variable of all prior regressions, its omission may bias estimates of the WASL results if students miss the ITBS in an non-random fashion. However, since the ITBS is an explanatory variable, the Heckit procedure cannot be used to explore if omitting those who failed to take the ITBS biases the regression coefficients. To check for the importance of missing the ITBS, a second two-stage procedure is followed. The first stage employs the subsample with complete observations of ITBS scores and estimates the regression:

[12] If more able students are more likely to leave lower performing schools, then one may conclude strategic instruction exists when it does not. However, the first stage probit model includes ITBS scores as independent variables. The unreported coefficients on ITBS scores are jointly significant and negative indicating that higher scoring ITBS students are less likely

(5) $$ITBS_{ibt} = \boldsymbol{\lambda}\mathbf{X}_{ibt} + \boldsymbol{\psi}\mathbf{B}_{bt} + \sum_{j=1}^{m} \theta WASL^{j}_{ibt} + \varepsilon_{ibt}$$

where X and B are defined as in equation (1). Using the estimated coefficients from (5), predicted ITBS scores are generated only for those students with missing ITBS scores. The students with generated ITBS scores are then integrated into the sample and equation (1) is re-estimated with results presented in Panel B of Table 5. Results from this procedure are broadly consistent with those in Table 2; WASL scores are .060 standard deviations lower for students of passing racial groups at failing schools and the impact of NCLB and school AYP failure are similar as the prior OLS estimates.

As a final check for sample selection bias, the preceding two analyses were merged. Using equation (5), ITBS scores were created for those individuals missing the ITBS and then integrated into the complete data set. Using these data, a second Heckit procured accounting for missing the WASL was estimated and results presented in Panel C of Table 5. The results of this were broadly similar with those of the prior Heckit model. Students of a passing race at a failing school are expected to score .071 standard deviations lower on the WASL than comparable students. Taken as a whole, it does not appear that non-random WASL nor ITBS attrition accounts for the racial impacts of the NCLB.

Section 6: Discussion and Conclusions

This article demonstrates a differential impact of the NCLB on racial groups depending upon their and other racial groups' prior success on a high stakes test. Students of a successful racial group at a school where another racial group failed to make AYP are expected to score .050 standard deviations lower on Washington's high stakes test than are similar students who attend a school where no racial group failed. This test difference is of similar magnitude to the conditional impact of switching schools midyear and the conditional differences occurring between students having and not having computers at home. This finding occurs in the presence of individual controls for prior standardized test scores, demographic features, and individual student characteristics. It also occurs in the presence of building level controls for prior AYP passage, racial make-up, enrolment, building type, and the level of student financial need. The estimated impact of this disparity grows in magnitude as the building fails to make AYP in consecutive years and faces more significant NCLB sanctions. This finding is also stronger at schools that are *a priori* more likely to fail to make AYP. Further, this finding remains even after controlling for a second type of strategic instruction that may occur when building administrators target resources towards students based upon their prior test scores. Finally, these findings are robust to non-random sample attrition from the WASL and ITBS tests. Taken as a whole, this evidence suggests that building administrators participate in strategic instruction; that is, administrators focus their efforts on racial groups that have trouble making AYP. Given the limits on school resources, this redirection of resources towards one racial group causes a diminution in academic performance of students in successful racial groups.

Two arguments may be made that these findings underestimate the true impact of the NCLB. First, consider a school where each racial group made AYP in the prior year but one group was close to failure. Because the required pass rate rises each year, should this school fail to increase the performance of the group that barely passed, it will fail in future years. A school in this position has incentives to perform strategic instruction prior to failure but, under the empirical strategy used in this paper, would not be identified as doing so. Thus, the estimated impacts of strategic instruction may understate the actual impacts of inter-race resource shifting. The second issue has to do with the minimum size of the racial group required to determine AYP failure. Under the NCLB, schools with fewer than 30 students in a demographic group automatically receive AYP for that group. This requirement reduces the incentive to perform strategic instruction at small schools however, schools that are close to this limit may participate in strategic instruction because an unforeseen addition of one or two students may make that school accountable under the NCLB. Since these schools were automatically classified as AYP schools, this research may again understate the actual impacts of strategic instruction.[13]

At the time of its passage, one of the stated goals of the NCLB was to eliminate the achievement gap between students of different races and backgrounds. The NCLB may accomplish this in an unintended manner by reducing the performance of children in successful racial groups. However, shifting of resources from students of successful racial groups to less successful ones is not necessarily an inefficient use of resources. If prior to the NCLB schools over-allocated resources towards a particular racial group (perhaps as a result of successful parental lobbying), then strategic instruction may result in a more efficient allocation of resources. Further, while this research presents evidence that the relative positions of racial groups has been impacted by the NCLB, it also documents higher WASL test scores after the enactment of the NCLB. Thus, the NCLB may have changed relative racial performance while simultaneously increasing overall performance.

The implications of the current structure of the NCLB can be significant for the futures of schools and society. Schools which focus their attention on poorly performing racial groups run the risk of reducing performance in their high performing racial groups. Over a period of time, it is possible that these schools will find that they have inadequately prepared students in these groups for success on the high stakes test at later grades. In short, these schools may trade AYP today for their district's middle and high schools future failure when the fourth graders

[13] Incidentally, the requirement of 30 students per demographic group introduces another potential basis of strategic instruction. It is possible that district administrators shift school boundaries or busing routes to purposefully keep individual schools from reaching the 30 student level in weaker demographic groups.

advance. This becomes especially important as the required pass rate increases and the performance of all students, even those in passing racial groups, becomes more critical in determining a building's AYP. For society, it is not clear that transferring resources from one racial group to another is a costless endeavor. If, for instance, schools change curricula to better engage students in an at-risk racial group, members of that group may improve but perhaps by less than members of the other groups deteriorate. The gains made by one group may or may not compensate for the losses suffered by others.

Simple alterations to the NCLB could prevent this type of strategic instruction and maintain its focus on reducing racial disparities. For instance, rather than measuring the percent of each racial group that passes the WASL, the NCLB could measure year-to-year average test gains by racial group and then require each racial group to demonstrate some appropriate amount of gains. Such a system would eliminate the incentive to focus on poorly performing racial groups at the expense of highly performing ones.

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Table 1: Descriptive Statistics					
		Panel A: Cohorts Where AYP is Known		Panel B: Cohorts Where AYP is Unknown	
	Variable	Students at non-failing schools	Students of race other than that which failed	Students at future non-failing schools	Students of race other than that which will fail
Student Variables	WASL	.085 (.977)	-.270 (.958)	.096 (.963)	-.209 (.956)
	ITBS	62.70 (28.40)	56.06 (28.76)	61.63 (28.49)	54.11 (28.75)
	Indian	.024 (.153)	.026 (.159)	.023 (.151)	.094 (.292)
	Asian	.080 (.271)	.080 (.271)	.075 (.264)	.079 (.270)
	Black	.052 (.221)	.057 (.232)	.052 (.222)	.049 (.216)
	Hispanic	.130 (.336)	.114 (.318)	.108 (.311)	.092 (.289)
	White	.707 (.455)	.717 (.450)	.730 (.444)	.685 (.464)
	English Never	.123 (.328)	.128 (.334)	.110 (.313)	.122 (.327)
Building Variables	% Indian	2.55 (5.78)	4.66 (12.76)	2.47 (5.00)	8.96 (18.96)
	% Asian	8.15 (8.74)	4.31 (7.14)	7.69 (8.21)	4.20 (6.96)
	% Black	5.57 (8.25)	7.15 (14.31)	5.69 (8.60)	7.12 (14.00)
	% Hispanic	13.76 (18.05)	51.51 (24.83)	11.85 (16.45)	45.24 (26.71)
	% Free/Reduced	39.35 (22.97)	74.17 (15.65)	37.47 (22.70)	72.01 (14.81)
	Enrollment per grade	76.40 (26.87)	86.41 (23.15)	76.97 (27.59)	82.74 (19.84)
	Number of obs.	110,755	1,730	113,933	1,820
	Number of schools	287	25	283	25

Table 2: OLS Estimates of WASL Scores		
	Panel A	
λ	NCLB	.030*** (.003)
α	AYPFAIL	-.044*** (.008)
γ	AYPFAILRACE	-.050** (.021)
	R^2	.577
	N	228,238
	L	10
	Panel B	
λ	NCLB	.031*** (.003)
α	AYPFAIL	-.031*** (.008)
υ	AYPFAILTWICE	-.090*** (.021)
γ	AYPFAILRACE	-.054** (.022)
ψ	AYPFAILRACETWICE	-.035* (.019)
	R^2	.577
	N	228,238
	L	10
	F-test of $\gamma = \psi = 0$	4.27**

Notes: *** {**} (*) represent statistical significance at the 1% {5%} and (10%) levels. Standard errors corrected for clustering within buildings are in parenthesis. All regressions contain the independent variables listed in note 6.

Table 3: OLS Estimates of WASL Scores Using Interacted Student ITBS Scores		
λ	NCLB	.030*** (.003)
α	AYPFAIL	-.114*** (.032)
γ	AYPFAILRACE	-.058*** (.021)
ξ_1	AYPFAIL×ITBS	.0007 (.002)
ξ_2	AYPFAIL×ITBS^2	.00004 (.00005)
ξ_3	AYPFAIL×ITBS^3	-.0000005 (.0000004)
	R^2	.577
	N	228,238
	L	10
	M	3
	F-test of $\xi_1 = \xi_2 = \xi_3 = 0$	8.64 (.000)

Notes: *** {**} (*) represent statistical significance at the 1% {5%} and (10%) levels. Standard errors corrected for clustering within buildings are in parenthesis. All regressions contain the independent variables listed in note 6.

Table 4: OLS Estimates of WASL Scores by Building Likelihood of Making AYP				
		Lowest Third	Middle Third	Highest Third
λ	NCLB	.030*** (.006)	.031*** (.005)	.037*** (.005)
α	AYPFAIL	-.052*** (.010)	-.034 (.023)	-.065*** (.023)
γ	AYPFAILRACE	-.062*** (.021)	-.021 (.061)	-.021 (.073)
	R^2	.563	.562	.552
	N	68,930	73,880	85,428

Notes: *** {**} (*) represent statistical significance at the 1% {5%} and (10%) levels. Standard errors corrected for clustering within buildings are in parenthesis. All regressions contain the independent variables listed in note 6.

Table 5: Numbers of Included and Excluded Students					
Academic Year	General Education	Missing ITBS Score	Missing WASL Score	Missing both ITBS & WASL	Valid Observations
2001-2002	67,346	4,922 (7.3%)	3,808 (5.6%)	829 (1.2%)	57,787 (85.8%)
2002-2003	67,878	5,323 (7.8%)	3,944 (5.8%)	645 (1.0%)	57,966 (85.4%)
2003-2004	65,583	4,756 (7.3%)	3,500 (5.3%)	667 (1.0%)	56,660 (86.4%)
2004-2005	65,669	5,124 (7.8%)	3,855 (5.9%)	865 (1.3%)	55,825 (85.0%)
Total	266,476	20,125 (7.5%)	15,107 (5.7%)	3,006 (1.1%)	228,238 (85.6%)

Table 6: Estimates of WASL Scores Controlling for Non-Random Attrition of Students						
		Panel A		Panel B	Panel C	
		1st Stage Probit	2nd Stage Heckit	OLS with Estimated ITBS	1st Stage Probit	2nd Stage Heckit
λ	NCLB	.012** (.006)	.028*** (.003)	.031*** (.003)	.010* (.006)	.026*** (.003)
α	AYPFAIL	-.209*** (.019)	.003 (.012)	-.040*** (.006)	-.202*** (.018)	.077*** (.007)
γ	AYPFAILRACE	.900*** (.037)	-.087** (.041)	-.060*** (.017)	.883*** (.037)	-.071*** (.027)
	Population Growth Rate	.037*** (.004)	--	--	.014*** (.004)	
	Inverse Mills Ratio	--	.911*** (.178)	--	--	3.28*** (.094)
	R^2		.575	.628		.632
	N	243,345	243,345	248,363	263,470	263,470

Notes: *** {**} (*) represent statistical significance at the 1% {5%} and (10%) levels. The dependent variable for the 1st stage probit equals one if the observation did not take the WASL and equals zero otherwise. Standard errors corrected for clustering within buildings are in parenthesis. All regressions contain the independent variables listed in note 6.

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