Papers and Presentations Employing Data from the North Carolina Education Research Data Center

*Presentations and publications since 2009 are in bold text. Presentations and publications since 2010 are in bold text and marked with an *:

**Minority Achievement Gap**


Southworth, Stephanie. 2010. “Examining the Effects of School Composition on North Carolina Student Achievement Over Time”. EPAA (Forthcoming)


**Teacher Quality and Student Outcomes**

* Ahn, Thomas. 2011. “Optimal Matching of Teachers and Schools under Accountability Pressure.” (University of Kentucky, working paper)


Goldhaber, Dan. 2006. “National Board Teachers are More Effective, but are they in the Classrooms Where They’re Needed the Most?” *Education Finance and Policy* 1(3): 372-383.


**School Accountability and Choice**


Jones-Sanpei, Hinckley A. 2006. “Racial and Socioeconomic Segregation in a District with Controlled School Choice.” Paper presented at the Association for Public Policy Analysis and Management Fall Research Conference, Madison, WI.

Ladd, Helen F. 2003. “School Vouchers and Student Achievement: What We Know So Far.” Center for Child and Family Policy, Policy Brief, 3(1).


The Academic Performance of At-Risk Children


**Problem Behavior in Schools**


**Linking Data and Policy**


**Impact of Specific Policies on Student Outcomes**

Alfeld, Corinne, Yan Li, Rebecca Prince, and Martha Putallaz. 2008. “Effects of Summer Academic Programs in Middle School on High School Test Scores, Coursetaking, and College Major.” Submitted to the *Journal of Advanced Academics*.


Other Studies


Abstracts of Most Recent Papers and Publications

*Ahn, Thomas. 2011. “Optimal Matching of Teachers and Schools under Accountability Pressure.” (University of Kentucky, working paper)

Accountability systems are designed to introduce market pressures to increase efficiency in education. One potential channel by which schools may increase efficiency is to recruit effective teachers in the transfer market. I use a maximum score estimator model, North Carolina public school data, and the state’s unique accountability system to analyze how schools respond to accountability pressure in the teacher transfer market. Results show that schools under a high degree of accountability pressure will match with teachers who are proven to be effective in raising test scores, while ignoring teachers with observable measures of ‘expertise,’ such as certification. Accountability pressure seems to motivate schools to compete against high achieving schools for effective teachers (and succeed).


We use the public school administrative dataset from North Carolina and a regression-discontinuity framework to examine the effect of No Child Left Behind sanctions on raising the academic performance of students. In particular, we focus on whether schools that barely miss AYP in a given year exhibit improvements relative to those schools that barely make AYP, due to the threat or implementation of sanctions. We also distinguish schools around the discontinuity by the type of sanction for which they are at risk, and analyze the distributional impact across specific groups of students. If schools operate efficiently, improvement for one sub-group in the wake of a sanction must come at the expense of other sub-groups. If schools were inefficient, it is possible for all sub-groups to improve academically. Results show that the threat of sanctions are mostly ineffective.


Charter schools, particularly new ones, are staffed by high rates of new teachers, and this may help to explain why their students struggle to meet expectations. Inexperienced charter faculties are widely acknowledged, but to date, no study has linked teacher experience to student performance in charter schools. I examine whether inexperienced faculties affected student achievement in North Carolina charters, using a twelve-year panel of student test data. The share of new teachers in the state’s charter faculties was quite high in new schools, but fell sharply as the schools aged. Consistent with earlier research, I find significant returns to charter school age, but this maturation cannot be attributed to declining rates of new teachers. Rather, charter students benefited from having relatively fresh faculties in recently-new schools, more so in math than reading. This counterintuitive relationship held until the schools were in their sixth or
seventh year of operation, after which, relatively inexperienced faculties yielded lower student achievement.


Do charter schools draw good teachers from traditional, mainstream public schools? I use a 1997-2007 panel of all North Carolina public school teachers to examine the qualifications and classroom performance of mainstream teachers moving to the charter sector. High rates of inexperienced and uncertified teachers moved to charter schools, but among certified teachers changing schools, the on-paper qualifications of charter movers were better or not statistically different from the qualifications of teachers moving between comparable mainstream schools. Grade 3-5 teachers moving to charter schools had lower estimated fixed effects on end-of-grade math exams, but I find statistically weak evidence that charter movers had relatively high fixed effects within the schools they were leaving. Taken together, these findings reveal nuanced patterns of teacher quality flowing into charter schools. Charters drew certified, highly qualified, and perhaps locally effective teachers from mainstream schools, but they also attracted uncertified and less qualified teachers. The distribution of persistent teacher quality among charter participants was significantly lower than, but largely overlapped with, the quality distribution of exclusively mainstream teachers.


We use data on statewide end-of-course tests in North Carolina to examine the relationship between teacher credentials and student achievement at the high school level. The availability of test scores in multiple subjects for each student permits us to estimate a model with student fixed effects, which helps minimize any bias associated with the non-random distribution of teachers and students among classrooms within schools. We find compelling evidence that teacher credentials affect student achievement in systematic ways and that the magnitudes are large enough to be policy relevant. As a result, the uneven distribution of teacher credentials by race and socio-economic status of high school students--a pattern we also document--contributes to achievement gaps in high school.


Using detailed data from North Carolina, this paper examines the frequency, incidence, and consequences of teacher absences in public schools, as well as the impact of a policy designed to reduce absences. The incidence of teacher absences is regressive: when schools are ranked by the fraction of students receiving free or reduced-price lunch, schools in the poorest quartile averaged almost one extra sick day per teacher than schools in the highest income quartile, and schools with persistently high rates of teacher absence were much more likely to serve low-income than high-income students. In regression models incorporating teacher fixed effects, absences are associated with lower student achievement in elementary grades. There is evidence
that the demand for discretionary absences is price-elastic. Our estimates suggest that a policy intervention that simultaneously raised teacher base salaries and broadened financial penalties for absences could both raise teachers' expected income and lower districts' expected costs.


Since 1990, Latin American immigrants to the United States have dispersed beyond traditional gateway regions to a number of “new destinations.” Both theory and past empirical evidence provide mixed guidance as to whether the children of these immigrants are adversely affected by residing in a non-traditional destination. We use administrative public school data to study Hispanic youth in one new destination, North Carolina. Conditional on third grade socioeconomic indicators, we find that Hispanic youth who arrive by age 9 and remain enrolled in North Carolina public schools close achievement gaps with socioeconomically similar white students by sixth grade and exhibit a significantly lower high school dropout rate. Their performance closely resembles that of first-generation youth in more established immigration gateways.


As implemented in North Carolina, Early College High Schools are small, autonomous schools designed to increase the number of students who graduate from high school and are prepared for postsecondary education. Targeted at students who are underrepresented in college, these schools are most frequently located on college campuses and are intended to provide students with 2 years of college credit upon graduation from high school. This article reports on preliminary 9th-grade results from 285 students in 2 sites participating in a longitudinal experimental study of the impact of the model. These early results show that significantly more Early College High School students are enrolling and progressing in a college preparatory course of study. This expanded access, however, is associated with somewhat lower pass rates for some courses, suggesting the need for strong academic support to accompany increased enrollment in more rigorous courses. Implementation data collected on one school indicate that it is successfully implementing the model's components.


This paper examines the potential spillover effects of inclusion of classmates with emotional-behavioral disorders (EBD) on own-test score performance. Current research suggests non-trivial reduction in achievement on the order of 5% of a standard deviation, which summed over 20 students in each classroom becomes substantial in the aggregate. However, no studies have examined these potential effects after 1st grade. This paper uses administrative data from North Carolina that includes the census of public school children in grades 3-5 during the years 2000-2007 in order to fully characterize classroom exposure to students with EBD. Using a variety of empirical specifications, including school-level, teacher-level, and student-level fixed effects, the results suggest small or no effects of inclusion in these grades for students in North Carolina public schools. Initial discussion of reconciling these findings with previous research is also provided.


The notion that some high stakes need to be attached to direct measures of teachers’ classroom performance as a control for quality in the workforce is an idea gaining traction in public education. One such proposal prescribes lowering the barriers to entry into teaching while simultaneously being more selective about which teachers are retained when they become eligible for tenure (Robert Gordon, Thomas J. Kane, and Douglas O. Staiger 2006; Eric A. Hanushek 2009). The focus on teacher performance in general, and tenure in particular, is supported by three important findings from teacher quality research. First, teacher quality (measured by estimated teacher impacts on student test score achievement) is the most important schooling factor when it comes to improving student achievement.2 Second, teacher quality is a highly variable commodity (Kane, Rockoff, and Staiger 2008). Third, a strikingly small percentage of tenured teachers are ever dismissed for poor performance (Daniel Weisberg et al. 2009). In this paper we explore the potential for using value-added model (VAM) estimates as the primary criteria for rewarding teachers with tenure; a policy reform currently under consideration.3 Specifically, we describe selected findings from a larger study examining the stability of VAM estimates and their value in predicting student achievement (Goldhaber and Michael Hansen 2009). This line of research has important implications for many policies relying on VAM estimates to control teacher quality in the workforce, since a degree of stability of teacher performance over time is implicitly assumed.


Virtually all states require teachers to undergo licensure testing before participation in the public school labor market. This article analyzes the information these tests provide about teacher effectiveness. The authors find that licensure tests have different predictive validity for student achievement by teacher race. They also find that student achievement is impacted by the race/ethnicity match between teachers and their students, with Black students significantly benefitting from being matched with a Black teacher. As a consequence of these matching effects, the uniform application of licensure standards is likely to have differential impacts on the achievement of White and minority students.

Whether early-career estimates of teacher effectiveness accurately predict later performance is of interest to those who advocate allowing more individuals to initially enter the teaching profession, and then being more selective about who is allowed to remain. This paper explores the potential for using value-added measures (VAM) to estimate teacher performance. There is little evidence that variation of teacher effects change over teacher careers, but good evidence that prior year VAM estimates of teacher job performance predict student achievement, even when there is a multi-year lag between the estimated teacher performance and the estimate of student achievement. VAM teacher effect estimates provide valuable information to consider as a factor in making substantive personnel decisions.


Investment in the certification of teachers by the National Board of Professional Teaching Standards (NBPTS) represents a significant policy initiative for the nation’s public school teachers. This article investigates the potential impact of NBPTS certification on teachers’ career paths. Using a competing risks model on data from North Carolina public schools, we find evidence that those teachers who apply to NBPTS are more likely to be mobile than are nonapplicants, particularly after they have gone through the certification process. Regression discontinuity estimates suggest that National Board–certified teachers are more likely than unsuccessful applicants to leave the North Carolina public school system and that this appears to result from certified teachers exiting high-minority schools, particularly Charlotte-Mecklenburg schools.


Most studies that have fueled alarm over the attrition and mobility rates of teachers have relied on proxy indicators of teacher quality, even though these proxies correlate only weakly with student performance. This paper examines the attrition and mobility of early-career teachers of varying quality using value-added measures of teacher performance. Unlike previous studies, this paper focuses on the variation in these effects across the effectiveness distribution. On average, more effective teachers tend to stay in their initial schools and in teaching. But the lowest performing teachers, who are generally the most likely to transfer between schools, appear to “churn” within the system, and teacher mobility appears significantly affected by student demographics and achievement levels.

This study presents a generalization to the standard career concerns model and applies it to the public teacher labor market. The model predicts optimal teacher effort levels decline with both tenure at a school and experience, all things being equal. Using administrative data from North Carolina spanning 14 school years through 2008, the author finds significant changes in teacher sick leave consistent with the generalized career concerns model. By exploiting exogenous variation in career concerns in the form of principal turnover, the author shows the observed behaviors cannot be due to the endogeneity of teacher mobility decisions alone. Also examined are the effects of career concerns incentives breaking down. There is evidence suggestive of teacher shirking, and evidence on an unobservable measure of effort taken from the Schools and Staffing Survey that corroborates findings from observable teacher absence behavior. In sum, teachers exert considerable discretion over their own effort levels in response to these incentives. This has important policy implications.


The reshuffling of students due to the end of student busing in Charlotte- Mecklenburg provides a unique opportunity to investigate the relationship between changes in student attributes and changes in teacher quality that are not confounded with changes in school or neighborhood characteristics. Comparisons of OLS and IV results suggest that spatial correlation between teachers’ residences, students’ residences, and schools could lead to spurious correlation between student attributes and teacher characteristics. Schools that experienced a repatriation of black students experienced a decrease in various measures of teacher quality. I provide evidence that this was primarily due to changes in labor supply.


Using longitudinal elementary school teacher and student data, we document that students have larger test score gains when their teachers experience improvements in the observable characteristics of their colleagues. Using within-school and within-teacher variation, we further show that a teacher’s students have larger achievement gains in math and reading when she has more effective colleagues (based on estimated value-added from an out-of-sample preperiod). Spillovers are strongest for less-experienced teachers and persist over time, and historical peer quality explains away about twenty percent of the own-teacher effect, results that suggest peer learning.


This study uses data from North Carolina to examine the extent to which survey based perceptions of working conditions are predictive of policy-relevant outcomes, independent of
other school characteristics such as the demographic mix of the school’s students. Working conditions emerge as highly predictive of teachers’ stated intentions to remain in or leave their schools, with leadership emerging as the most salient dimension. Teachers’ perceptions of their working conditions are also predictive of one-year actual departure rates and student achievement, but the predictive power is far lower. These weaker findings for actual outcome measures help to highlight both the strengths and weaknesses of using teacher survey data for understanding outcomes of policy interest.


Research has consistently shown that teacher quality is distributed very unevenly among schools, to the clear disadvantage of minority students and those from low-income families. Using North Carolina data on the length of time individual teachers remain in their schools, we examine the potential for using salary differentials to overcome this pattern. We conclude that salary differentials are a far less effective tool for retaining teachers with strong preservice qualifications than for retaining other teachers in schools with high proportions of minority students. Consequently large salary differences would be needed to level the playing field when schools are segregated. This conclusion reflects our finding that teachers with stronger qualifications are both more responsive to the racial and socioeconomic mix of a school's students and less responsive to salary than are their less-qualified counterparts when making decisions about remaining in their current school, moving to another school or district, or leaving the teaching profession.

Although the federal No Child Left Behind program judges the effectiveness of schools based on their students’ achievement status, many policy analysts argue that schools should be measured, instead, by their students’ achievement growth. Using a ten-year student-level panel dataset from North Carolina, we examine how school-specific pressure associated with the two approaches to school accountability affects student achievement at different points in the prior-year achievement distribution. Achievement gains for students below the proficiency cut point emerge in response to both types of accountability systems. In contrast to prior research highlighting the possibility of educational triage, we find little or no evidence that schools in North Carolina ignore the students far below proficiency under either approach. Importantly, we find that the status, but not the growth, approach reduces the reading achievement of higher performing students, with the losses in the aggregate exceeding the gains at the bottom. Our analysis suggests that the distributional effects of accountability pressure depend not only on the type of pressure for which schools are held accountable (status or growth), but also the tested subject.


Extensive research shows that blacks, those of low socioeconomic status, and other disadvantaged groups continue to exhibit poorer school performance compared with middle and upper-class whites in the United States’ educational system. Environmental exposures may contribute to the observed achievement gap. In particular, childhood lead exposure has been linked to a number of adverse cognitive outcomes. In previous work, we demonstrated a relationship between early childhood lead exposure and end-of-grade (EOG) test scores on a limited dataset. In this analysis, data from the North Carolina Childhood Lead Poisoning Prevention Program surveillance registry were linked to educational outcomes available through the North Carolina Education Research Data Center for all 100 counties in NC. Our objectives were to confirm the earlier study results in a larger population-level database, determine whether there are differences in the impact of lead across the EOG distribution, and elucidate the impact of cumulative childhood social and environmental stress on educational outcomes. Multivariate and quantile regression techniques were employed. We find that early childhood lead exposure is associated with lower performance on reading EOG test scores in a clear dose-response pattern, with the effects increasingly more pronounced in moving from the high end to the low end of the test score distribution. Parental educational attainment and family poverty status also affect EOG test scores, in a similar dose-response fashion, with the effects again most pronounced at the low end of the EOG test score distribution. The effects of environmental and social stressors (especially as they stretch out the lower tail of the EOG distribution) demonstrate the particular vulnerabilities of socioeconomically and environmentally disadvantaged children. Given the higher average lead exposure experienced by African American children in the United States, lead does in fact explain part of the achievement gap.
The achievement gap continues to be an important educational issue, with disadvantaged groups exhibiting poorer school performance. Recently, literature has shown that even very low levels of early lead exposure affect cognitive and academic performance. As individuals at the lower end of the socioeconomic spectrum are more likely to be exposed to lead, this exposure may be an important contributor to the achievement gap. In this paper, we explore whether early childhood blood lead levels are associated with membership in exceptionality designation groups. In addition, we examine the racial and socioeconomic composition of these exceptional groups. Data from the North Carolina Childhood Lead Poisoning Prevention Program surveillance registry were linked at the individual child level to educational outcomes available through the North Carolina Education Research Data Center. Designation into exceptionality groups was obtained from the end-of-grade (EOG) data. Both standard bivariate and multivariate analyses were employed. Bivariate analyses indicate that blood lead levels and reading EOG scores differ by exceptionality, as well as by race and enrollment in free/reduced lunch. Logistic regression confirmed the relationship between blood lead levels and likelihood of exceptionality. Contextual factors – enrollment in the free/reduced lunch program, race, and parental education – are also significant with regard to exceptionality. This study demonstrates that early childhood lead exposure significantly influences the likelihood of being designated exceptional. These results provide additional evidence that early childhood lead exposure is a significant explanator of the achievement gap.


Researchers, policymakers, and parents share a perception that school composition is a major influence on school quality. An important source of change in school populations is the withdrawal of white and more affluent families, in reaction to perceived reallocation of resources toward limited English speakers, and a general devaluation of social capital in schools. Our study focuses on North Carolina, which experienced an increase of over 66 percent in the school age population of Latino origin between 2000 and 2006, as well as large increases in the proportion of students from poor families, many of whom are Latino. We use longitudinal administrative data to estimate the impact of immigration on racial, ethnic, and socioeconomic composition within and across schools.
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The ninth grade marks a critical juncture in American schooling. Issues surrounding the transition to high school are particularly salient in North Carolina, where school dropout is a topic of growing concern. This research focuses on the effects of participating in a high school transition program on a number of educational outcomes for individual students. The research literature presents mixed findings on the effectiveness of ninth grade academies for student success, measured primarily in terms of test scores and grade promotion. A number of methodological factors may account for these inconsistent research findings. Our study employs some methodological innovations that may elucidate program effects, and can shed light on the processes through which the high school transition program influences student outcomes. These innovations include: use of disaggregated student-level information; an experimental design; analysis of multiple student outcomes; and a longitudinal design that tracks outcomes for individual students over time.


This interactive symposium included several presentations that (1) reviewed key characteristics of state education data systems and the policies and best practices governing their use and evolution, and (2) explored the types of roles SEA-IHE collaborations have played in leveraging accountability and compliance data to inform educational policies and practices at the state and local levels.


One of the most consistent findings in the literature on teacher quality is that teachers improve with experience, especially in the first several years. This study extends this research by separately identifying the effect of general teaching experience and grade-specific experience. Using within-teacher variation, I find that both general experience and grade-specific experience improve teacher performance. For math scores, the magnitude implies that teachers who always repeat grade assignments improve approximately 35% faster than teachers who never repeat grade assignments. In addition to furthering our understanding of how teachers improve with experience, this paper contributes to a literature on task-specific human capital.

Growing concerns over the inadequate achievement of U.S. students have led to proposals to reward good teachers and penalize (or fire) bad ones. The leading method for assessing teacher quality is “value added” modeling (VAM), which decomposes students’ test scores into components attributed to student heterogeneity and to teacher quality. Implicit in the VAM approach are strong assumptions about the nature of the educational production function and the assignment of students to classrooms. In this paper, I develop falsification tests for three widely used VAM specifications, based on the idea that future teachers cannot influence students’ past achievement. In data from North Carolina, each of the VAMs’ exclusion restrictions are dramatically violated. In particular, these models indicate large “effects” of 5th grade teachers on 4th grade test score gains. I also find that conventional measures of individual teachers’ value added fade out very quickly and are at best weakly related to long-run effects. I discuss implications for the use of VAMs as personnel tools.


Nonrandom assignment of students to teachers can bias value-added estimates of teachers’ causal effects. Rothstein (2008) shows that typical value-added models indicate large counterfactual effects of fifth grade teachers on students’ fourth-grade learning, indicating that classroom assignments are far from random. This article quantifies the resulting biases in estimates of fifth-grade teachers’ causal effects from several value added models, under varying assumptions about the assignment process. If assignments are assumed to depend only on observables, the most commonly used specifications are subject to important bias, but other feasible specifications are nearly free of bias. I also consider the case in which assignments depend on unobserved variables. I use the across-classroom variance of observables to calibrate several models of the sorting process. Results indicate that even the best feasible value-added models may be substantially biased, with the magnitude of the bias depending on the amount of information available for use in classroom assignments.

Southworth, Stephanie. 2010. “Examining the Effects of School Composition on North Carolina Student Achievement Over Time.” *EPAA (Forthcoming)*

Educational outcomes are influenced by student, family, and school factors. In this study I focus on the effects of school level inputs on North Carolina students’ reading and math achievement from fourth through eighth grade. Key amongst the school characteristics is the effect of school racial and poverty composition. I examine the composition for each school by creating race by poverty cohorts of schools. Utilizing HLM models on math and reading achievement for the same students in fourth, sixth and eighth grade, I find that the racial and poverty composition of schools affect student achievement net of student, family and other school influences. I also find that increasing teacher quality and school resources reduces, but does not eliminate, the effects of school racial and poverty composition on student achievement. Based on these findings, I recommend that policies leading to reductions in racial and poverty isolation in schools and
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increases in teacher quality should be pursued to guarantee equality of educational opportunities to all children in North Carolina schools.

Stearns, Elizabeth, and Elizabeth J. Glennie. 2010. “Opportunities to participate: Extracurricular activities’ distribution across and academic correlates in high schools.” Social Science Research. 39:2; 296-309.

Studies suggest that students who participate in extracurricular activities benefit in a number of ways. However, schools provide different opportunities to participate in these activities. Using information from high school yearbooks and administrative data on students and schools in North Carolina, we examine whether school characteristics influence the numbers and types of extracurricular activities available, whether schools providing more and diverse activities have higher participation rates, and whether these schools have better academic outcomes. We find that school size and poverty levels significantly influence the number and types of activities available, with larger schools and those schools with more affluent student bodies offering more activities. Opportunities to participate are associated with positive academic outcomes for the school, even when controlling for school resources. For some—but not all—activities, student participation rates mediate the relationship between activity availability and the school’s academic profile. For benefits to be present, schools must provide these resources, and students must invest in them.


This paper describes the school mobility rates for elementary and middle school students in North Carolina and attempts to estimate the effect of school mobility on the performance of different groups of students using student fixed effects models. School mobility is defined as changing schools at times that are non-promotional (e.g., moving from middle to high school). We used detailed administrative data on North Carolina students and schools from 1997 to 2005 and followed four cohorts of 3rd graders for six years each. School mobility rates were highest for minority and disadvantaged students. School mobility rates for Hispanic students declined across successive cohorts, but increased for Black students. Findings on effects were most pronounced in math. School mobility hurt the math performance of Black and Hispanic students, but not the math performance of white students. School mobility improved the reading performance of white and more advantaged students, but had no effect on the reading performance of minority students. “Strategic” school moves (cross-district) benefitted or had no effect on student performance, but “reactive” moves (within district) hurt all groups of students. White and Hispanic students were more likely to move to a higher quality school while Blacks were more likely to move to a lower quality school. The negative effects of school mobility increased with the number of school moves.