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LESSONS FROM HURRICANE KATRINA: THE EMPLOYMENT EFFECTS OF THE MASS DISMISSAL OF NEW ORLEANS TEACHERS

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In the aftermath of Hurricane Katrina, the Orleans Parish school district fired over 4,000 public school teachers, as the city underwent a transition to a market-based system of charter schools. Using administrative data, we examine whether and how these teachers returned to public school employment. We estimate that school reform and dismissal substantially increased teacher exit from the district and the state, relative to similar teachers in other parishes that suffered hurricane damage. Dismissed teachers who returned were more likely to be Black and locally trained, but new hiring through alternative certification programs led to a substantial demographic shift. A teacher population that had been highly experienced and more than 70% Black shifted through new hiring at charter schools. Implications for other districts considering teacher employment reforms are discussed.

Introduction

The City of New Orleans experienced massive demographic, political, geographic, and policy changes in the wake of Hurricane Katrina in 2005, including the complete restructuring of the city's public school system. From 2006 to 2014, state and local policymakers reformed the underperforming, centralized school district into a model of market-based public education. New Orleans became the nation's first majority-charter district with citywide school choice, high-stakes accountability, and significantly decentralized school management. The effects of this transition on students have been the object of severe criticism (e.g., Buras, 2013; Dixon, 2015) and enthusiastic praise (e.g., Public Impact & New Schools for New Orleans, 2015). Harris and Larsen (2016) report that student achievement increased by up to 0.4 standard deviations as a result of school reform. However, these gains came with significant costs to the city's teachers. Over 4,000 teachers employed by the city's public schools were subject to the nation's first system-wide teacher dismissal, with uncertain opportunities for rehiring in a newly decentralized labor market.

While the dismissal has been debated at length in the courts and media, both education journalism (e.g. Mitchell, 2015) and academic literature (e.g. Cook and Dixon, 2010) have focused on anecdotal evidence of the economic and psychological harm to teachers whose careers ended with the dismissal. However, administrative data reveal that many pre-Katrina teachers continue to play a role

in the city's reformed school system. This is the first study to use state administrative records to provide evidence about the post-Katrina outcomes of the teachers who were subject to dismissal.

Our primary objective is to document how many teachers were dismissed, who they were, and who among them reentered employment in public education in New Orleans' reformed system or in traditional public schools in other parishes. Using regression analysis on administrative data, we attempt to identify factors related to post-Katrina employment for this historic cohort and to provide more generalizable evidence of the effects of mass dismissal and market-based school reform on teachers.

In New Orleans, reformers holistically altered the landscape for teacher re-hiring through a combination of policy changes: the expiration of the teachers' CBA, relaxation of state-level teacher protections, and the shift of most teacher employment to independent charter operators. Although the circumstances that triggered the mass dismissal in New Orleans are unique, the theory of action underpinning these reforms is not. School turnaround strategies often include the dismissal and selective rehiring of teachers at chronically underperforming schools (e.g., Herman et al., 2008). Cities such as Washington, DC and Detroit are similarly expanding their charter sectors, a reform that implicitly requires that a large number of teachers be dismissed from district employment contracts followed by selective rehiring by charter operators as at-will employees.

Diminished collective bargaining rights for teachers have been implemented in Michigan and Wisconsin and proposed in other states.

While these policies are intended, in part, to remove obstacles to the equitable distribution of teacher quality, there are risks that effective teachers will exit for friendlier suburban districts or be chased from the profession entirely by the negative policy environment (Felton, 2016). Strategies that involve the mass firing of teachers are particularly controversial, since this introduces instability for students and families, and a loss of experience and institutional knowledge for schools (Center on Education Policy, 2012; de la Torre et al., 2013; Malen & Rice, 2004; Strunk et al., 2016). Although there is a growing body of research on the outcomes of teacher firing through school turnaround, little research has examined broader systemic change, including the particularly risky move of mass teacher dismissal.

In this study, we ask what are the employment outcomes of New Orleans' pre-Katrina teachers – the only existing cohort of U.S. teachers to have faced the type of mass dismissal and dramatic restructuring of local teacher employment policy that is now proposed in other cities? Within this broad question we explore issues related to race, experience, retirement eligibility, and community attachment. With the caveat that it is not empirically possible to isolate causal effects of mass dismissal and school reform through observation of a single district, we provide insight into the magnitude of effects that might be

experienced in other contexts by attempting to separate the effects of dismissal and reform from what might have occurred due to hurricane-related damage. In addition, we look both at short-term re-employment when many students and teachers were still displaced, and longer-term outcomes when the population had stabilized and almost all schools had transitioned to charter management. Finally, we provide descriptive statistics on teachers who entered the system after the reform and the subsequent shift in teacher demographics in a majority-black school system.

Background

Hurricane Katrina made landfall in Louisiana on August 29, 2005, causing the city's levee system to fail in over 50 places and flooding almost 80% of the city. Public schools were among the thousands of buildings damaged by flooding, and citywide evacuation continued for weeks. The Orleans Parish School Board (OPSB), which operated most of the city's schools, had no students to teach and consequently received no state per-pupil revenue. On September 15, 2005, the school district placed all teachers and other personnel on disaster leave without pay, enabling employees to collect unemployment benefits. On March 24, 2006, OPSB terminated all employment contracts, initiating the largest mass firing of public school teachers in the nation's history. That spring, the district allowed its CBA with United Teachers of New Orleans (UTNO) to expire with no efforts at renegotiation.[1]

Behind this mass firing was a larger plan for school reform (Perry, Harris, Buerger, & Mack, 2015). Prior to 2005, Louisiana had already established a state Recovery School District (RSD) empowered to take over chronically low-performing schools. OPSB had long been one of the worst performers in the state, and there were concerns about corruption and financial mismanagement (Cowen Institute, 2010). In November 2005, with the city evacuated and teachers temporarily laid-off, the legislature empowered RSD to take over more than 100 New Orleans public schools, with the intent of contracting most out as charter schools. Only the 12 highest-performing schools remained under the direct control of OPSB with the option to continue as either traditional district-run schools or district-authorized charter schools.[2] As part of these reforms, RSD and OPSB also eliminated most school attendance zones in New Orleans. In the short-run, open-enrollment facilitated school access for families returning to unstable housing. In the long-run, it provided the mechanism for reformers to establish competition between schools for student enrollment.

Like all New Orleans residents who experienced Hurricane Katrina, teachers suffered material, financial, and emotional loss. There is pervasive evidence of trauma and anxiety suffered by the survivors of Katrina (DeSalvo et al. 2007; Elliott & Pais 2006; Weems et al., 2010). Some would choose never to return to the city or to teaching. For those who wanted to return, opportunities for re-employment were crucial, as poor labor market outcomes for Katrina survivors

have been linked to negative psychological and economic effects (Groen & Polivka, 2008). For teachers in particular, the employment context in New Orleans had dramatically changed.

First, the number of teaching positions was reduced by the sudden drop in the student population.[3] Second, only OPSB followed established personnel policy to rehire dismissed teachers based on seniority. RSD offered only a vague and unenforced promise of "priority consideration" at the schools it was operating. Schools that transitioned to charter management had no obligation to hire pre-Katrina teachers. Third, post-Katrina, no New Orleans teaching positions were protected by a CBA. Charter school teachers were at-will employees of their CMOs, and charter schools were also exempt from most state teacher employment policies and from participation in the state teacher pension system.[4] Finally, RSD implemented high-stakes teacher accountability systems in all previously failing schools, placing greater pressure on schools to hire and fire based on indicators of student test performance. In short, the relative job security of the pre-Katrina CBA was replaced by a decentralized system with multiple employers, few employment protections, uncertain compensation, and greater test-based accountability.

This context provides the only existing case in which to study the consequences of a sudden removal of employment protections for an entire urban teacher labor market, coupled with mass firing and selective rehiring. Despite the

media attention paid to the New Orleans teacher dismissal, little is known about the employment outcomes of teachers who were fired. In this study, we measure the impact of the events in New Orleans on the teachers who were first physically displaced from their homes and schools, and then formally dismissed from public school employment. We attempt to provide more generalizable findings for other settings by estimating the impact of dismissal and reform on teacher employment, with efforts to control for the simultaneous effects of hurricane damage. In the discussion section, we highlight potential implications for districts considering similar reforms.

Data and Methods

Our analysis is based on de-identified personnel files provided by the Louisiana Department of Education (LDOE). Hurricane Katrina hit New Orleans prior to the state's fall data collection, and no reliable records exist for New Orleans in that year. Instead, we focus on teachers who were full-time, full-year employees of New Orleans public schools during the prior school year (2004-05).[5] We follow the employment outcomes of these teachers through the 2013-14 school year. We compare the New Orleans cohort to 2004-05 teachers from other Louisiana parishes, many of whom experienced shorter hurricane evacuations and severe hurricane-related damage due to Hurricane Katrina or Rita, but none of whom were subject to dismissal and school reform.

Our teacher-level data include positions, salaries, demographics, certificates, and college degrees. Because Louisiana does not record a direct measure of teaching experience, we impute experience by locating each teacher's 2004-05 salary and education level on her district's salary schedule. We gathered data on school performance from publicly available school report cards published by LDOE,[6] and student demographics aggregated from enrollment records for the 2004-05 school year.

Our focus is on the short- and long-term employment outcomes of pre-Katrina teachers. Due to missing records, we cannot calculate employment outcomes for New Orleans teachers post-Katrina until the fall of 2007. We pick up there to report short-term employment outcomes of the dismissed teacher cohort. At that time, the demand for teachers in New Orleans was considerably reduced, as the student population was about half of the pre-Katrina level. Although no CBA was in place, many New Orleans schools were still operated directly by OPSB and RSD, which created an opportunity for teachers to rejoin the workforce on a similar salary schedule to the pre-Katrina teacher CBA and continue participation in the state teacher pension system. Analysis in 2007 shows whether teachers could return to employment stability after the hurricane. However, 2007 does not fully reflect teachers' return to the local labor market, as much of the city's population was still displaced. For this reason, we also analyze long-term employment outcomes in 2013-14 when the city's resident and student

populations had stabilized. By that time almost all schools were operated by CMOs, and at-will teacher employment without CBAs and salary schedules dominated the teacher labor market. Together, these two time periods capture the short-run and equilibrium patterns of teacher returns to New Orleans.

Our first objective is to provide a measure of re-employment rates for the dismissed teacher cohort. We can compare these rates to similar teachers in other Louisiana school districts, but more generalizable estimates of the impact of dismissal and school reform on dismissed teachers require some detangling of the effects of the hurricane and the school reform that occurred in its wake. We use simple regression analysis to estimate the difference in employment outcomes for otherwise similar 2004-05 teachers from New Orleans and other Louisiana school districts that did not experience dismissal or reform. Specifically, we estimate:

$$Y_{itjk} = \beta \cdot Dismissed\ Teacher_i + \boldsymbol{\alpha} \cdot \boldsymbol{Teacher}_{i2005} + \boldsymbol{\gamma} \cdot \boldsymbol{School}_{j2005} + \boldsymbol{\delta} \cdot \boldsymbol{Parish}_{k2005} + \varepsilon_{ijk} \quad (1)$$

where *Y* is equal to one for a positive employment outcome in time t (2007 or 2013) for teacher i from pre-Katrina school *j* located in parish *k*. β estimates the difference in the probability of post-Katrina employment for New Orleans dismissed teachers relative to comparison teachers, holding constant pre-dismissal teacher, school, and parish characteristics. We include teacher variables from 2005, measuring demographics (race, gender), years of teaching experience, education level, and whether the teacher was initially trained in New Orleans,

other Louisiana school districts, or outside Louisiana. We include school variables for 2005, measuring students' race (percent black), economic status (percent eligible for subsidized lunches), and school performance on the state accountability system. We cluster the random error term ε_{ijk} at the school-level.

Because dismissal, school reform, and Hurricane Katrina occurred in the same timeframe, the ideal empirical model would separate the effects of evacuation, flooding, and school reform from the effects of the dismissal. It is not possible to separate the effects of school reform from the effects of dismissal, because both occurred concurrently in a single parish, affecting all teachers in the parish, and neither occurred elsewhere in the state. However, it is feasible to control, at the parish level, for observable hurricane-related damage, because many parishes in the state were simultaneously affected by evacuations and infrastructure damage from either Hurricane Katrina or Hurricane Rita in September 2005.

We compiled measures of hurricane-related damage from several sources.[7] A salient hurricane effect on school districts was the sudden decrease in school enrollment due to household displacements, which could directly impact the number of teachers a district could employ. We measure this through the percent change in total student enrollment from initial 2005 levels. Second, we measure the impact on the local labor market with the percent change in unemployment from initial July 2005 levels. We also include several measures of infrastructure

damage: the percent of occupied housing units that suffered minor, major, and severe damage; the cost per capita of hurricane-related road repairs; and, most salient for teacher employment, the cost per capita of hurricane-related school repairs. Because of high correlations across these measures, we constructed principal components of hurricane-related damage and use the significant components as parish-level control variables in equation (1).[8] Finally, we restrict the comparison group of non-New Orleans teachers by omitting teachers in parishes that were not affected by either Katrina or Rita to create a subset of comparison teachers in hurricane-affected districts only.[9] Even with these controls, we acknowledge that comparing New Orleans teachers to teachers in other parishes is not an adequate control for unobservable or unmeasurable damage the city suffered, and our results should not be interpreted as causal.

Our second set of analyses focuses on the dismissed teacher cohort and further examines who returned to teaching and in what types of schools. We measure several employment outcomes for pre-Katrina teachers in the newly deregulated labor market. First, we estimate teacher and school characteristics that are related to teachers' propensities to return to public school employment overall. Second, we examine who returned to employment in New Orleans versus moving to more traditional employment contracts in other Louisiana districts. Finally, we examine the sector to which New Orleans teachers returned, comparing re-employment probabilities in district, state takeover, and charter schools. We

cannot observe if teachers returned to private schools, public schools in other states, or educator positions in other organizations.[10] Thus our measures of teacher employment likely underestimate return to employment overall.

To examine factors that contributed to the employment outcomes of pre-Katrina New Orleans teachers, we estimate the following equation for the dismissed teacher cohort:

$$Y_{ijt} = \boldsymbol{\alpha T}_i + \boldsymbol{\gamma S}_j + \varepsilon_{ij} \quad (2)$$

where *Y* is the employment outcome for teacher *i* at time *t* (2007 or 2013) who taught in school *j* in the year prior to Hurricane Katrina. $\boldsymbol{T}$ is a vector of teacher characteristics, and $\boldsymbol{S}$ is a vector of school characteristics, both measured in the year prior to the dismissal. ε is a random error. Equation (2) provides estimates of $\boldsymbol{\alpha}$ and $\boldsymbol{\gamma}$ to measure associations between specific teacher and school characteristics and the likelihood that a New Orleans teacher will be re-employed and, in other specifications, the location and school type of employment.

In estimating equations (1) and (2), we include in $\boldsymbol{T}$ measures of teacher demographics (gender, race, and ethnicity). We also include the location of the teacher's undergraduate university (New Orleans, other Louisiana parish, or out-of-state) as an indicator for whether she had local roots and training. Teaching experience is measured in the year prior to the dismissal in bins related to workforce attachment. The first bin includes Louisiana teachers in their first three years of teaching. Under Louisiana law, teachers received significant employment

protections in their fourth year. We control for experience in 5-year bins from year 4 to year 25. Our final bin includes all teachers who had 25 or more years of experience and were thus eligible for Louisiana teacher retirement benefits at the time of Hurricane Katrina. For this group, the dismissal triggered automatic retirement and pension payments rather than unemployment, creating a unique set of financial incentives.[11] At the time, Louisiana law allowed these teachers to continue to receive pension payments while also drawing a teaching salary if they were re-employed in a traditional public or charter school after the dismissal.

Finally, we control for 2004-05 school characteristics including the school's score on the Louisiana school accountability report card, whether the school was designated as failing, the proportion of black students, and the proportion of students eligible for free or reduced-price lunch (FRL). Prior school characteristics might influence both a teacher's motivation to return to teaching and her attractiveness as a candidate for a post-Katrina teaching position.

We estimate equations (1) as a linear probability model where coefficients reflect the marginal change in the probability of employment related to incremental change in independent variables.[12] For equation (2), we estimate a linear probability model for the dichotomous outcome of employment in the post-Katrina years of 2007 and 2013 (vs. not employed). For outcomes with multiple options (employment location and school type), we estimate equation (2) as a multinomial logistic model to estimate the effects of pre-Katrina characteristics on

return to each type. We report statistically significant results based on robust standard errors.

Results

Demographics and Qualifications of Pre-Katrina Teachers

Our first objective is to accurately report the scope of the mass dismissal, including the demographics and qualifications of the affected teachers. Then, we extrapolate implications from the New Orleans experience for other districts. We identified 51,923 teachers in Louisiana public schools in 2004-05, of which 4,332 worked in Orleans Parish and were therefore subject to the dismissal. Table 1, Panel A provides summary statistics for pre-Katrina New Orleans teachers (Column 1) compared to pre-Katrina teachers from other parishes that were affected by hurricanes in September 2005 (Column 2) and those that were not affected (Column 3) in 2004. We also compare New Orleans teachers who returned to public school employment and those who did not through fall 2007 (Panel B) and fall 2013 (Panel C).

The cohort of dismissed New Orleans teachers (Column 1) had, on average, 15.4 years of teaching experience in 2004, with 31% already eligible for retirement. The teachers were 78% female, 71% black, and 60% held bachelors' degrees from local New Orleans colleges. Teachers in other hurricane-affected parishes (Column 2) were, on average, less-experienced, more likely to have advanced degrees, and more likely to be white, female, and, unsurprisingly, to

have attended college outside New Orleans. Teachers in other hurricane-affected parishes are more similar to teachers in unaffected parishes (Column 3) than to New Orleans teachers. Notably, given the high proportion of black teachers in New Orleans relative to other parishes, the mass dismissal affected only 8% of the state's teachers overall, but 24% of the state's black teachers. Overall, New Orleans pre-Katrina teachers brought experience, diversity, and local roots to a high-need district.

All 4,332 teachers from Column 1 were fired in 2006. By fall 2007, 50.3% had been rehired in a Louisiana public school – with 32.8% re-employed in New Orleans and 17.5% employed in other parishes. The remaining 49.7% of dismissed teachers were not working in Louisiana public schools in 2007. Only 7.5% of New Orleans teachers exited public school teaching in 2003, and 8.3% in 2004, so this was a substantial increase. Panel B compares re-employed teachers in New Orleans (Column 4) to those employed in other parishes (Column 5) and those who were not employed in 2007 (Column 6). Although average years of experience is similar, both older teachers who were eligible to retire and younger teachers who had not achieved tenure were less likely to have returned. Those who returned to New Orleans were more likely to be black and to have attended a local college. Those who moved to employment in a new Parish were more likely to be white and educated in Louisiana colleges outside New Orleans.

By fall 2013, only 36.9% of the original New Orleans cohort was still employed – with 21.9% employed in New Orleans and 15.1% in other parishes (Columns 7 and 8). Thus, a substantial number of teachers who were rehired in New Orleans by 2007 had exited the reformed school system by 2013, while most who moved to other parishes were still employed outside New Orleans. Compared to those who were not employed in 2013 (Column 9), those employed had substantially less initial teaching experience. By 2013, employed teachers were more likely to be female, to have a bachelor's degree only, and to have been college-educated in New Orleans.

Discussions of the teacher dismissal often focus on the impact on the careers of the city's black teachers (e.g. Mitchell, 2015). We identify 3,076 black teachers who were subject to dismissal in 2005. By 2007, 1,509 (49%) had exited school employment, growing to 1,912 (62%) in 2013. However, we find that black teachers were more likely than teachers of other races to remain employed through 2013.

Estimated Effects of Dismissal and Reform on Teacher Exit

We next compare employment outcomes of New Orleans teachers to pre-Katrina teachers from other all parishes and hurricane-affected parishes. Results are reported in Table 2 as both raw differences in employment outcomes and estimated differences based on regressions that control for teacher demographics, school characteristics, and parish-level hurricane affects. To examine both overall

exit from teaching and exit from New Orleans, we estimate equation (1) for both the probability of employment in Louisiana public schools overall and the probability of employment in the same parish as 2004-05.

Panel A reports results for 2007 and 2013 employment, comparing New Orleans fired teachers to teachers in all other parishes. In 2007 (Panel A, Column 1), we observe a significant and substantial gap of 30 percentage points between the probability of employment for New Orleans pre-Katrina teachers and the probability of employment for teachers from other parishes. Controlling for teachers and school characteristics, the estimated difference falls by 7 percentage points, and controlling for hurricane effects the estimated differences falls by another 8 percentage points. Thus, at least half of the raw difference in overall employment is explained by factors other than dismissal and school reform, leaving a sizeable difference of 15 percentage points that is likely related to the combined effects of dismissal and reform. In Panel A, Column 2, we observe that the gap in employment narrowed but persisted through 2013. There was a 20-point raw difference in employment in 2013 between New Orleans teachers and teachers from other parishes, of which 8.6 percentage points are not explained with added control variables and are likely due to dismissal and reform.

These results capture overall employment outcomes for teachers, but do not fully capture the loss to New Orleans schools. We next compare rates for teachers return to employment in New Orleans to rates of sustained employment

in the same parish for comparison teachers. From the 2004-05 cohort, only 33% of New Orleans teachers were employed in New Orleans in 2007, while over 73% of teachers in other parishes remained employed in their pre-Katrina parish. This 40-point raw difference falls to 32.6 points with controls for teachers and school characteristics, and to 16.4 points with additional controls for hurricane effects. Thus, substantially fewer pre-Katrina teachers were re-employed in New Orleans, as well as employed overall, relative to the employment patterns of similar teachers in other parishes. By 2013, 26.5% more teachers from other non-Orleans parishes were employed in their original parish than were New Orleans teachers, and we estimate that 7.3 percentage points of this difference is likely attributable to dismissal and school reform.

To further ensure that we are not falsely identifying hurricane effects, in Panel B of Table 2, we replicate these results restricting the comparison group to only teachers in hurricane-affected parishes. The results are quite similar to Panel A, with the exception that the estimated difference in employment in the original parish is not statistically significant in 2013. All other raw and estimated differences are statistically significant and similar in magnitude to the results for the unrestricted sample in Panel A.

In summary, we estimate that at least half of the raw differences in employment and employment mobility between dismissed New Orleans teachers and other teachers are explained by hurricane effects or demographic differences,

but a significant and substantial employment gap still exists that is likely due to dismissal and school reform.

Characteristics that Influenced Reemployment

We next focus on isolating influential characteristics related to the employment outcomes of pre-Katrina New Orleans teachers. We estimate equation 1 for the cohort of New Orleans dismissed teachers only and report regression coefficients in Table 3.[13] We include all 4,332 fired teachers and estimate the probability of return to any type of employment in 2007 (Column 1) and 2013 (Column 2). The results suggest that experience was associated with return. Teachers who had not achieved tenure were 17.2 percentage points less likely to return, and teachers who were eligible for retirement were 13.2 percentage points less likely to return by 2007 (both significant at $p<.05$). Those teachers most likely to return, relative to the reference group, were those with 15-19 years of experience. This experience group had the most to gain by contributing to the state retirement system for a few additional years. By 2013, we also observe that teachers just short of retirement in 2004 are now also less likely to be employed, having reached full retirement eligibility.

We also find that teachers with New Orleans or in-state college degrees were significantly and substantially more likely to return to employment in the state. Other studies find that teachers typically work close to their university-based training programs (see, e.g., Boyd et al., 2005; Reininger, 2012), and our

results suggest these connections persisted. Other demographics and school characteristics are unrelated to employment in 2007, but by 2013 (Column 2), we observe that black pre-Katrina teachers were significantly more likely to be reemployed by approximately 4.3 percentage points.

School Sector Outcomes for Pre-Katrina Teachers

Our next analysis examines the sectors of post-Katrina schools that hired pre-Katrina teachers. First, we predict the probability of return to New Orleans or movement to other parishes, relative to the reference group who did not return to public school employment. The results of this multinomial logit regression are displayed in Table 4, Panel A for 2007 and 2013 employment as odds ratios. We find that teachers who had not achieved tenure were substantially less likely to return to employment in any location, both in the short-term and long-run. Teachers who were retirement eligible were less likely to return by 40-45% in 2007 and by 70-80% in 2013, relative to teachers with 4-9 years of experience. Factors that positively influenced return to New Orleans public schools include being educated in Orleans Parish or other Louisiana colleges and having taught at a school with a higher pre-Katrina performance score. Long-run employment in New Orleans, relative to not being employed, was also significantly higher for black teachers, ceteris paribus. Teachers who moved to employment in other parishes in 2007 were significantly less likely to be black, more likely to have masters degrees, and taught at lower-performing pre-Katrina schools, relative to

those who did not return to public school employment. In the long-run, black and white pre-Katrina teachers were equally likely to be employed in other parishes, ceteris paribus, but black teachers were significantly more likely to be employed in New Orleans than white teachers.

Next, we estimate whether teachers who returned to New Orleans were positioned in the remaining OPSB direct-run schools, schools taken over and operated by RSD, or charter schools. These results are displayed in Panel B of Table 4. The multinomial logit is estimated for the subgroups of 1,420 teachers who were employed in New Orleans in 2007 (Columns 7 and 8) and 948 who were employed in New Orleans in 2013 (Columns 10 and 11). We estimate the probability of employment in RSD-run schools and charter schools relative to the reference outcome of re-employment by OPSB, with results expressed as odds ratios.

In 2007, New Orleans pre-Katrina teachers had been rehired by seven remaining OPSB schools, 31 RSD schools, and 36 charter schools. OPSB was the only post-Katrina employer that applied pre-Katrina seniority rules. Rehired OPSB teachers retained pension participation and some employment protections, but were no longer covered by a CBA. We find that, among teachers re-employed in New Orleans, teachers with 20 or more years of experience were substantially less likely to work in RSD-operated and charter schools than OPSB-operated schools in 2007. Employment in RSD schools was more likely for teachers from

failing pre-Katrina schools, and schools with a high proportion of FRL students, suggesting that re-employment in takeover schools included many who had taught in underperforming schools prior to dismissal. At charter schools, we see a larger probability of employment for teachers educated in Orleans Parish or other in-state colleges. Teachers whose pre-Katrina school had a high FRL rate are also more likely to be re-employed by charters, relative to OPSB, but there is no significant relationship between school quality measures and charter employment. Black teachers were 36% less likely to be employed by charters, relative to OPSB. Thus, there was some selective sorting of teachers to OPSB and RSD that resembled the pre-Katrina status quo. Experienced teachers and those from high-performing OPSB schools returned to those settings. Teachers from lower-performing schools that had been taken over, returned to the takeover schools.

By 2013, RSD had contracted most of its schools to CMOs; only six RSD school persisted while the number of charter schools grew to over 70, with 66 charter schools employing pre-Katrina teachers. At this time, we see that teachers with fewer than four years of experience at dismissal are three times more likely to work at RSD schools and two times more likely to work at charter schools, compared to OPSB schools. Black pre-Katrina teachers who returned to teaching continued to be significantly and substantially less likely to work at charter schools, although the effect is smaller than in 2007.

Entry of New Teachers in New Orleans

The story of the mass dismissal of New Orleans also requires attention to the characteristics of new teachers who entered the city after 2005. Approximately one-third of the pre-Katrina teachers were rehired in New Orleans. An additional 601 new teachers entered New Orleans between time of the dismissal and fall 2007. These teachers substantially changed the teacher workforce in the city. Table 5 reports demographics for these new hires in 2007 (n=601) and 2013 (n=472). In addition to being less experienced, only 16% of new teachers held a masters degree or above, compared with 68% of the pre-Katrina cohort. Over half of the new teachers were educated outside Louisiana, and over 60% were white, while the student population remained at over 90% black students. By 2013, approximately 20% of new teachers had a master degree, 42% were educated out-of-state, and 59% were white.

Barrett and Harris (2015) report that the new hires resulted in substantially lower proportions of black teachers and locally-educated teachers over time, as the highly experienced pre-Katrina teachers who were re-employed retired and were replaced by new hires. While many charter schools continued to employ pre-Katrina teachers through 2013, others hired primarily through Teach for America and TNTP. These programs accounted for approximately 35% of new teacher hires from 2007 through 2013, and were responsible for a substantial demographic shift in the teacher workforce. It is beyond the scope of this study to identify whether positions in charter schools were less-attractive to pre-Katrina

teachers or whether charter actively sought a new type of teacher. However, our results suggests that post-Katrina hiring at charter schools is responsible for this shift, rather than an exit of black teachers. We find that pre-Katrina black teachers are actually more likely to be employed in New Orleans through 2013 than similar white pre-Katrina teachers, with their employment concentrated in non-charter settings.

Summary of Results

While we cannot measure how many pre-Katrina teachers unsuccessfully sought reemployment, our analysis suggests that a substantial number did return to New Orleans. We find pre-Katrina teachers employed in all types of post-Katrina New Orleans schools including district, state takeover, and charter schools. However, a large group of dismissed teachers who returned to employment in the short-term transferred to teaching in another parish. Overall, approximately two-thirds of pre-Katrina teachers exited New Orleans, and approximately half exited public school teaching in the state. Relative to similar teachers in the state, we estimate that the dismissal and school reform influenced a pre-Katrina teacher to be more likely to exit teaching by 15 to 16 percentage points in the short-run and 8 to 9 percentage points in the long-run. These policies influence teachers to be more likely to exit their school district by 16 to 17 percentage points in the short-run and 6 to 7 percentage points in the long-run.

These results contribute important new information to the discussion of the inequities associated with these reforms. A particular concern is the unequal impact of the dismissal on the black middle class (e.g., Mitchell, 2015). Dismissed New Orleans teachers were over 70% black and represented a substantial portion of all black teachers in the state. Post-Katrina, we find statistically similar rates of return to employment for black teachers and white teachers through 2007, and significantly greater continued employment through 2013 for black teachers. However, white teachers, for reasons we cannot discern in this study, were more likely to enter employment outside New Orleans following dismissal than were black teachers, enabling them to escape the potential instability of employment in a district that was transitioning to charter management and at-will teacher employment. At the same time, we see that charter schools were more likely to hire from alternative certification program than local universities, triggering a demographic shift to less-experienced teachers and smaller percentage of black teachers.

We also see clear patterns of return and sorting related to teacher experience. The patterns we observe are consistent with incentives built into the state's teacher retirement system. Teachers who could collect pension benefits immediately upon dismissal in 2006 were less likely to return, while teachers nearing retirement returned only until they reached eligibility. Moreover, consistent with expectations built into the retirement system, we also observe that

late-career teachers are more likely to return to OPSB or RSD schools, which continued to participate in the state retirement system, while many charter schools opted out.

Implications for Other Settings

These results have several important implications for other cities considering such reforms. First, we observe a substantial proportion of displaced teachers being absorbed by other, often non-urban, school districts, with the largest group rehired in nearby suburban parishes. This included many locally-educated teachers whose teacher training occurred in New Orleans. Other states and urban school districts should consider ripple effects of exit to suburban districts as a potential effect of mass teacher dismissals and other teacher policy changes. Controlling for hurricane effects, we estimate that New Orleans teachers exited to other parishes at twice the typical rate of cross-district mobility in the short-run after dismissal.

Second, there are justifiable concerns about the equity effects of teacher dismissals in urban settings. In Louisiana, like many other settings, urban school reform disproportionately affected the black teacher workforce, due to the concentration of black teachers in urban New Orleans. However, black teachers were more likely to be reemployed than white teachers in the long-term. Policymakers should consider the long-run social and economic effects of teacher policy reforms that might unequally cause minority teachers to lose jobs and other

employment protections. Potential concerns arise both from the reduced attractiveness of at-will charter employment for experienced teachers and the recruitment practices of charter schools and the alternative certification programs they depend on for staffing.

A final concern for other cities is the demand for teachers in relation to the supply. New Orleans schools experienced a suddenly diminished need for teachers due to significantly reduced enrollment. This allowed schools to be selective in teacher hiring in a way that would not be feasible in other settings. Absent a source of excess supply, a mass teacher dismissal might require the rehiring of most teachers, many of whom were already teaching in underperforming schools. This has been observed in other turnaround efforts that require districts to fire substantial amounts of currently employed teachers (Strunk et al., 2016). In short, the New Orleans teacher reforms implemented at the time of Hurricane Katrina offer important lessons for both the New Orleans public school system and for other urban school districts and states contemplating large-scale reforms to teacher employment protections.

Notes

1.UTNO is the New Orleans affiliate of the American Federation of Teachers and was the single collective bargaining entity for New Orleans teachers prior to 2006. Louisiana is a "right to work" state where union membership cannot be required.

2.Of the remaining 19 schools, seven were permanently closed, and 12 became district charter schools under OPSB's authority.

3.See Supplemental Appendix A for population and demographics statistics for New Orleans and other parishes in 2004, 2007, and 2013.

4.Schools chartered by RSD are exempt from policies governing teacher certification, teacher tenure, and due process and are not required to participate in the state's teacher pension system.

5. Some teachers would have naturally exited New Orleans between the 2004-05 school year and August 2005 and have been replaced. Without 2005-06 records, we are unable to measure this exactly. However, prior attrition was very low among New Orleans tenured teachers with less than 8% leaving the prior two years.

6.Louisiana school report cards were based largely on student proficiency rates on state standardized tests, but also included attendance, dropout, and graduation indices. School performance scores (SPS) were associated with a star-rating system from no stars to five stars. Schools with scores below 60 received no stars, 60-79 received one stars, 80-99 received two stars, 100-119 received three stars, 120-139 received four stars, and 140 or above received five stars.

9.Hurricane damage statistics were obtained from FEMA reports (fema.gov), and unemployment statistics were obtained from the Bureau of Labor Statistics (bls.gov).

8.Our analysis produces two principal components with eigenvalues greater than 1.0. These two components were added to eq. 2. Alternate specifications that include direct measures of hurricane effects in place of principal components provided similar results.

9.A preferred strategy would be to directly compare New Orleans teachers to a matched-comparison group in a district with a similar workforce and similar Hurricane damage. The closest match based on principal components of hurricane affects is St. Barnard Parish. However, the teacher demographics in this parish are substantially different than New Orleans, particularly in terms of race, and offer too few similar teachers for a rigorous matching analysis.

10.It is unlikely that the private school sector in New Orleans absorbed a substantial number of pre-Katrina public school teachers. Private schools also permanently closed after Katrina. The NCES Private Schools Universe Study (PSS) reports that Orleans Parish had 77 private schools operating in 2004, and only 42 in 2007 and 43 in 2013.

11.Louisiana laws governing teacher tenure and teacher retirement age have changed since 2005. We structure our analysis based on the regulations that existed for pre-Katrina teachers.

12.Predicted probabilities of a LPM are not constrained at the 0, 1 interval as they are in logistic regression. Over the models we estimate, less than 1% of predicted probabilities fall outside of the 0, 1 interval. As suggested by Horrace & Oaxaca (2006), we tested for possible bias by excluding these observations from estimation and the results are similar to what we present below. Results are also similar to estimates with logistic regression, which are provided in Supplemental Appendix B.

13.The reference group for Table 3 is a white, male teacher with a bachelor's degree from an out-of-state college, who had 4-9 years of teachers experience and was teaching at a non-failing New Orleans public school in 2004.

References

Barrett, N., & Harris, D. (2015). Significant Changes in the New Orleans Teacher Workforce. Retrieved from *http://educationresearchalliancenola.org/publications/significant-changes-in-the-neworleans-teacher-workforce*.

Boyd, D., Lankford, H., Loeb, S., & Wyckoff, J. (2005). The draw of home: How teachers' preferences for proximity disadvantage urban schools. *Journal of Policy Analysis and Management*, 24(1), 113-132.

Buras, K. L. (2013). New Orleans Education Reform: A Guide for Cities or a Warning for Communities? (Grassroots Lessons Learned, 2005-2012). *Berkeley Review of Education*, 4(1).

Center on Education Policy. (2012). *Opportunities and obstacles: Implementing stimulus-funded School Improvement Grants in Maryland, Michigan, and Idaho.* Washington, DC.

Cook, D. A., & Dixson, A. D. (2013). Writing critical race theory and method: A composite counterstory on the experiences of Black teachers in New Orleans post-Katrina. *International Journal of Qualitative Studies in Education*, *26*(10), 1238-1258.

Cowen Institute (2010). *The 2010 State of Public Education in New Orleans: Five Years after Hurricane Katrina.* Retrieved from *http://www.coweninstitute.com/wp-content/uploads/2010/07/katrina-book.final_.CIpageSmaller.pdf*

De la Torre, M., Allensworth, E., Jagesic, S., Sebastian, J., Salmonowicz, M., Meyers, C., & Gerdeman, R. D. (2013). *Turning around Low-Performing Schools in Chicago: Research Report*. Consortium on Chicago School Research. 1313 East 60th Street, Chicago, IL 60637.

DeSalvo, K. B., Hyre, A.D., Ompad, D.C., Menke, A., Tynes, L.L., & Muntner, P. (2007). Symptoms of posttraumatic stress disorder in a New Orleans workforce following Hurricane Katrina. *Journal of Urban Health* 84(2): 142-152.

Dixson, A. (2015). Review of "Ten Years in New Orleans: Public School Resurgence and the Path Ahead.". Boulder, CO: National Education Policy

Center. Retrieved from *http://nepc. colorado.edu/thinktank/review-NOLA-public-impact.*

Elliott, J.R. & Pais, J. (2006), Race, class, and Hurricane Katrina: Social differences in human responses to disaster. *Social Science Research* 35: 295–321.

Felton, E. (2016) Calif. Supreme Court Puts an End to Vergara Saga. *Education Week*. Retrieved from *http://blogs.edweek.org/edweek/teacherbeat/2016/08/ca_supreme_court_vergara.html?cmp=soceml-twfdbltz-ewnow*

Groen, J. & Polivka, A. (2008). The effect of Hurricane Katrina on the labor market outcomes of evacuees. *American Economic Review* 98(2): 43–48.

Harris, D., & Larsen, M. (2016). The effects of the New Orleans post-Katrina school reforms on student academic outcomes (Working Paper). Retrieved from *http://educationresearchalliancenola.org/files/publications/The-Effects-of-the-New-Orleans-Post-Katrina-School-Reforms-on-Student-Academic-Outcomes.pdf*

Herman, R., Dawson, P., Dee, T., Greene, J., Maynard, R., Redding, S., & Darwin, M. (2008). Turning Around Chronically Low-Performing Schools. IES Practice Guide. NCEE 2008-4020. *National Center for Education Evaluation and Regional Assistance*.

Horrace, W. C., & Oaxaca, R. L. (2006). Results on the bias and inconsistency of ordinary least squares for the linear probability model. *Economics Letters*, 90(3), 321-327.

Malen, B., & Rice, J. K. (2004). A framework for assessing the impact of education reforms on school capacity: Insights from studies of high-stakes accountability initiatives. *Educational Policy*, *18*(5), 631-660.

Mitchell, C. (2015). Death of my career. *Education Week*. Retrieved from *http://neworleans.edweek.org/veteran-black-female-teachers-fired/*

Perry, A., Harris, D., Buerger, C., & Mack, V. (2015). The Transformation of New Orleans Public Schools: Addressing System-Level Problems Without a System. New Orleans, LA: The Data Center.

Public Impact & New Schools for New Orleans (2015). *Ten Years in New Orleans: Public School Resurgence and the Path Ahead.* Retrieved from

http://www.newschoolsforneworleans.org/wp-content/uploads/2015/06/Public-School-Resurgence-Full-Report-FINAL.pdf

Reininger, M. (2012). Hometown Disadvantage? It Depends on Where You're From Teachers' Location Preferences and the Implications for Staffing Schools. *Educational Evaluation and Policy Analysis,* 34(2), 127-145.

Strunk, K. O., Marsh, J. A., Hashim, A. K., & Bush-Mecenas, S. (2016). Innovation and a Return to the Status Quo: A Mixed-Methods Study of School Reconstitution. *Educational Evaluation and Policy Analysis*, 0162373716642517.

Weems, C. F., Taylor, L. K., Cannon, M. F., Marino, R. C., Romano, D.M., Scott, B. G., & Triplett, V. (2010). Post traumatic stress, context, and the lingering effects of the Hurricane Katrina disaster among ethnic minority youth. *Journal of Abnormal Child Psychology* 38: 49–56.

Table 1: Teachers and School Characteristics

	Panel A: 2004			Panel B: 2007			Panel C: 2013		
	All 2004 Louisiana Teachers			2004 New Orleans Teachers			2004 New Orleans Teachers		
	New Orleans	Other Parishes, Hurricane Damaged	Other Parishes, Not Hurricane Damaged	Employed in New Orleans	Employed in Other Parishes	Not Employed	Employed in New Orleans	Employed in Other Parishes	Not Employed
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Teaching experience									
Years of experience	15.42	14.78*	15.21	15.66	15.55	15.22	13.08	11.90*	17.07*
	(12.38)	(11.30)	(11.42)	(11.52)	(11.28)	(13.27)	(10.46)	(9.83)	(13.22)
Tenured (4+ years)	0.70	0.76*	0.76*	0.75	0.77	0.63*	0.72	0.71	0.68
Eligible for retirement (25+ years)	0.31	0.26*	0.26*	0.29	0.29	0.34*	0.18	0.16	0.40*
Education level									
Bachelors	0.68	0.70	0.66*	0.67	0.67	0.70	0.71	0.72	0.67*
Masters	0.25	0.21*	0.20*	0.26	0.23	0.24	0.24	0.22	0.25
Masters plus 30 hours or more	0.07	0.10*	0.14*	0.07	0.09	0.06	0.05	0.06	0.08*
Undergraduate college location									
New Orleans	0.60	0.11*	0.01*	0.67	0.63*	0.55	0.68	0.65	0.56
Other Louisiana Parish	0.17	0.76*	0.83*	0.15	0.22*	0.17*	0.15	0.19*	0.17*
Out of state	0.20	0.11*	0.15*	0.15	0.13	0.24	0.15	0.14	0.22
Teacher demographics									
Black	0.71	0.19*	0.23*	0.74	0.70*	0.70*	0.75	0.72	0.70
White	0.26	0.80*	0.76*	0.24	0.28*	0.26	0.22	0.25	0.27
Other race	0.03	0.01*	0.01*	0.03	0.02	0.04	0.03	0.03	0.03*
Female	0.78	0.83*	0.82*	0.77	0.82*	0.77	0.78	0.80	0.77*
School characteristics									
Failed state report card (2005)	0.61	0.07*	0.11*	0.58	0.60	0.63*	0.55	0.62*	0.62
School performance score	54.94	84.89*	82.85*	58.96	53.93*	52.64*	60.62	52.63*	53.52
	(36.56)	(28.56)	(30.71)	(39.65)	(32.77)	(35.48)	(38.00)	(31.53)	(36.99)
Percent black students	92.97	42.38*	50.92*	91.75	93.49*	93.58*	91.60	93.73*	93.26
	(14.42)	(29.71)	(31.80)	(16.52)	(13.06)	(13.31)	(16.19)	(13.05)	(14.05)
Percent FRL students	77.51	61.22*	62.9*2	76.13	79.21*	77.80*	76.19	79.66*	77.44*
	(21.90)	(21.44)	(24.38)	(23.63)	(20.46)	(21.15)	(23.34)	(20.13)	(21.76)
Number of teacher observations	4,332	33,505	14,000	1,420	757	2,155	948	652	2,732
Percent of 2004 cohort				32.8%	17.5%	49.7%	21.9%	15.1%	63.1%

Author calculations of means (standard deviations) based on LDOE adminsitrative employment and student enrollment files. Hurricane-damanged parishes suffered major or severe hurricane damage to homes, roads, or schools due to Hurricanes Katrina or Rita. School performance scores were assigned by LDOE in fall 2005, based on proficiency rates on spring 2004 state standardized tests. A score of 100 is roughly equivalent to having all students at or above proficient. For Panel A * indicates that the group mean is statistically different than the New Orleans group (Column 1). For Panels B and C, * indicates that the group mean is statistically different than the mean for the group re-employment in New Orleans (Column 4 or 7). Groups are identified as significantly different based on two-tailed t-tests for continous variables and chi-square tests for dichotomous variables with $p<0.05$.

Table 2: Estimated Effects of Dismissal and Reform on Teacher Employment

Panel A: New Orleans vs. All Other Parishes	Employed Anywhere in Lousiana		Employed in the Same Parish as 2004	
	2007	2013	2007	2013
	(1)	(2)	(3)	(4)
A.New Orleans teachers	50.3%	36.9%	32.8%	21.9%
B. Other teachers	80.2%	57.3%	73.3%	48.4%
C. Raw difference (A-B=C)	-29.9%	-20.3%	-40.5%	-26.5%
D. OLS estimate with teacher and school controls	-22.9%*	-10.7%*	-32.6%*	-16.0%*
E. OLS estimate with teacher, school, and hurricane effects controls	-15.1%*	-8.6%*	-16.4%*	-7.3%*

Panel B: New Orleans vs. Hurricane-Affected Parishes	Employed Anywhere in Lousiana		Employed in the Same Parish as 2004	
	2007	2013	2007	2013
	(5)	(6)	(7)	(8)
A. New Orleans teachers	50.3%	36.9%	32.8%	21.9%
B. Other hurricane-affected teachers	80.1%	57.5%	73.2%	48.7%
C. Raw difference (A-B=C)	-29.9%	-20.5%	-40.4%	-26.8%
D. OLS estimate with teacher and school controls	-22.7%*	-10.0%*	-31.7%*	-14.6%*
E. OLS estimate with teacher, school, and hurricane effects controls	-15.8%*	-8.3%*	-16.6%*	-6.5%

Estimates in D are based on OLS estimation of linear proability models controlling for 2004-05 teacher characteristics (race, gender, experience, education) and 2004-05 school characteristics (failing school, school performance score, percent black students, percent FRL students). Estimates in E add additional controls for principal components of damage related to hurricanes Katrina and Rita, measured at the parish level. Estimates include two principal components with eigenvalues greater than one based on measures of: damaged homes, damaged roads, FEMA funding for school repairs, post-hurricane changes in school enrollment, and post-hurricane changes in employment rates. Panel A compares 2004-05 New Orleans teachers to teachers from all other parishes in Lousiana. Panel B restricts the comparison group to parishes that suffered major or severe hurricane damage to homes, roads, or schools. * indicates difference is statistically significant at $p<0.05$ based on robust standard errors for clustering within school districts.

Table 3: Estimated Effects of Teacher and School Characteristics on Re-employment

	Employed in 2007	Employed in 2013
	(1)	(2)
Untenured (0-3 years)	-0.172*	-0.149*
	(0.024)	(0.022)
10-14 years	0.007	0.015
	(0.030)	(0.028)
15-19 years	0.068*	-0.024
	(0.031)	(0.029)
20-24 years	0.055	-0.077*
	(0.038)	(0.036)
25 or more years (retirement eligible)	-0.132*	-0.331*
	(0.022)	(0.021)
Education level		
Masters degree	0.001	-0.003
	(0.018)	(0.017)
Masters +30 hours or more	0.039	-0.005
	(0.031)	(0.029)
Undergraduate college location		
Orleans Parish	0.153*	0.139*
	(0.021)	(0.020)
Other Louisiana parish	0.137*	0.154*
	(0.026)	(0.024)
Teacher demographics		
Black	-0.015	0.043*
	(0.020)	(0.019)
Other race	-0.004	0.056
	(0.045)	(0.042)
Female	-0.003	0.009
	(0.019)	(0.017)
Pre-Katrina school characteristics		
Failed state report card	-0.003	-0.053*
	(0.026)	(0.024)
School performance score	0.004	-0.003
	(0.005)	(0.004)
Proportion black students	-0.099	-0.196*
	(0.091)	(0.086)
Proportion FRL students	0.021	0.051
	(0.050)	(0.047)
Observations	4,332	4,332
% positive outcomes	50.3%	36.9%

Coefficients based on OLS estimation of linear probability models. Includes all New Orleans teachers from the 2004-05 cohort. The omitted group is white, male, with an out-of-state bachelors degree, and 4-9 years of teaching experience, and from a non-failing pre-Katrina school. The dependent variable is positive if the teacher was employed in a teaching or administrative position in any publicly-funded traditional public school or charter school in Louisiana. *p<0.05

Table 4: Multinomial Logit Estimation of Re-Employment by Location and School Type

	Panel A: Employment and Location						Panel B: New Orleans School Type					
	2007			2013			2007			2013		
	New Orleans odds ratio (se)	Other Parish odds ratio (se)	Not Employed reference group	New Orleans odds ratio (se)	Other Parish odds ratio (se)	Not Employed reference group	RSD odds ratio (se)	charter odds ratio (se)	OPSB reference group	RSD odds ratio (se)	charter odds ratio (se)	OPSB reference group
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Untenured (0-3 years)	0.497*	0.481*		0.501*	0.591*		1.826	1.976		3.378*	2.298*	
	(0.055)	(0.067)		(0.059)	(0.078)		(0.664)	(0.705)		(1.868)	(0.759)	
10-14 years	1.062	0.976		1.051	1.080		0.840	0.605		0.861	0.695	
	(0.147)	(0.165)		(0.150)	(0.173)		(0.295)	(0.208)		(0.539)	(0.211)	
15-19 years	1.311	1.417*		0.876	0.952		0.536	0.376*		0.590	0.348*	
	(0.189)	(0.240)		(0.129)	(0.157)		(0.178)	(0.123)		(0.366)	(0.102)	
20-24 years	1.307	1.225		0.781	0.661		0.407*	0.360*		0.544	0.234*	
	(0.235)	(0.265)		(0.144)	(0.147)		(0.164)	(0.142)		(0.407)	(0.086)	
25 or more years (retirement eligible)	0.605*	0.542*		0.240*	0.189*		0.409*	0.370*		1.767	0.607	
	(0.063)	(0.070)		(0.029)	(0.027)		(0.111)	(0.098)		(0.890)	(0.168)	
Education level												
Masters degree	1.031	0.950		0.993	0.982		0.831	0.710		1.222	0.774	
	(0.087)	(0.101)		(0.095)	(0.110)		(0.172)	(0.143)		(0.466)	(0.164)	
Masters +30 hours or more	0.976	1.564*		0.792	1.283		1.201	0.628		0.668	0.856	
	(0.146)	(0.260)		(0.143)	(0.250)		(0.434)	(0.229)		(0.558)	(0.359)	
Undergraduate college location												
Orleans Parish	1.846*	2.062*		1.861*	2.056*		1.527	1.961*		2.040	1.696	
	(0.183)	(0.266)		(0.212)	(0.276)		(0.407)	(0.516)		(1.103)	(0.475)	
Other Louisiana parish	1.448*	2.561*		1.793*	2.640*		1.531	2.111*		0.740	2.017*	
	(0.181)	(0.385)		(0.256)	(0.422)		(0.505)	(0.679)		(0.583)	(0.699)	
Teacher demographics												
Black	1.136	0.673*		1.503*	0.936		0.702	0.360*		0.781	0.527*	
	(0.109)	(0.075)		(0.164)	(0.111)		(0.204)	(0.096)		(0.454)	(0.157)	
Other race	1.126	0.760		1.572	1.048		0.474	0.685		0.771	0.330	
	(0.246)	(0.220)		(0.373)	(0.297)		(0.342)	(0.453)		(0.780)	(0.197)	
Female	0.890	1.239		0.986	1.142		1.212	1.022		0.842	1.060	
	(0.077)	(0.141)		(0.097)	(0.133)		(0.264)	(0.214)		(0.361)	(0.243)	
Pre-Katrina school characteristics												
Failed state report card	1.097	0.784		0.852	0.649*		2.400*	0.995		3.042	1.074	
	(0.132)	(0.116)		(0.112)	(0.100)		(0.814)	(0.309)		(2.014)	(0.354)	
School performance score	1.054*	0.945*		1.038	0.901*		0.838*	0.984		0.954	0.930	
	(0.023)	(0.026)		(0.025)	(0.027)		(0.052)	(0.053)		(0.112)	(0.054)	
Proportion black students	0.730	0.538		0.505	0.254*		0.002*	0.000*		0.001*	0.000*	
	(0.312)	(0.291)		(0.236)	(0.146)		(0.003)	(0.000)		(0.003)	(0.000)	
Proportion FRL students	0.935	1.490		1.075	1.759		51.543*	86.557*		14.765*	27.704*	
	(0.222)	(0.434)		(0.289)	(0.539)		(31.698)	(51.194)		(17.875)	(17.397)	
Observations		4332			4332			1420			948	
% positive outcomes	32.8%	17.5%	49.7%	21.9%	15.1%	63.1%	35.9%	50.1%	13.9%	5.2%	76.4%	18.5%

Coefficients expressed as log odds from multinomial logit estimation. Panel A includes all New Orleans teachers from the 2004-05 cohort. Log odds in Panel A are estimated relative to the reference outcome of being not employed in 2007 and 2013. Panel B includes teachers from the New Orleans 2004-05 cohort who were re-employed in New Orleans traditional public or charter schools in 2007 or 2013. Log odds in Panel B are estimated relative the reference outcome being employed in a traditional OPSB-run school. RSD schools are takeover public school, temporary operated by the state. Charter schools are independently operated by CMOs. The omitted group for all regressions is white, male, with an out-of-state bachelors degree, and 4-9 years of teaching experience, and from a non-failing pre-Katrina school. *p<0.05

Table 5: Demographics of Post-Katrina New Teacher Hires

	(1) 2007	(2) 2013
Education level		
Bachelors degree	84.0	80.1
Masters degree	15.1	17.4
Masters +30 hours or more	0.8	2.5
Undergraduate college location		
Orleans Parish	22.8	11.0
Other Louisiana parish	7.5	3.6
Out of State	56.6	41.7
Teacher demographics		
Black	32.1	35.2
Other race	7.2	5.9
White	60.7	58.9
Female	68.6	68.4
Number of new teachers hired	601	472

Author calculations from LDOE employment files. Includes all new hires in 2007 and 2013 at New Orleans schools, including charter schools, OPSB schools, and RSD takeover schools.

Supplemental Materials

Appendix A: Size and Characteristics of Louisiana Public Schools, by Hurricane Damage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		2004			2007			2013	
	New Orleans	Other Parishes, Hurricane Damaged	Other Parishes, Not Hurricane Damaged	New Orleans	Other Parishes, Hurricane Damaged	Other Parishes, Not Hurricane Damaged	New Orleans	Other Parishes, Hurricane Damaged	Other Parishes, Not Hurricane Damaged
Population Measures									
Students	60,227	418,698	177,027	29,223	410,576	178,486	41,486	435,894	180,730
Teachers	4,332	33,505	14,000	2,541	32,956	13,663	3,064	31,715	12,690
Schools	127	886	448	78	871	448	89	856	402
School characteristics									
Charter schools	2	8	3	39	8	3	77	19	8
RSD takeover schools	0	0	0	33	0	0	5	9	1
Pct black students	0.93	0.39	0.49	0.90	0.40	0.48	0.83	0.39	0.47
Pct frl students	0.74	0.59	0.60	0.84	0.62	0.63	0.82	0.66	0.67
Pct sped students	0.09	0.13	0.12	0.07	0.12	0.11	0.00	0.00	0.00
Teacher characteristics									
Pct black teachers	0.72	0.19	0.23	0.61	0.20	0.23	0.48	0.19	0.21
Pct teacher with masters or above	0.31	0.30	0.34	0.29	0.29	0.34	0.32	0.30	0.36
Pct first-year teachers	0.07	0.05	0.05	0.25	0.06	0.05	0.17	0.06	0.06
Pct failing schools	0.53	0.06	0.09	0.31	0.04	0.06	0.11	0.05	0.10
No. of parishes	1	39	28	1	38	28	1	39	28

Author calculations of means (standard deviations) based on LDOE adminsitrative employment and student enrollment files. Hurricane-damanged parishes suffered major or severe hurricane damage to homes, roads, or schools due to Hurricanes Katrina or Rita.

Appendix B: Estimated Effects of Dismissal and Reform on Teacher Employment, Logit

Panel A: New Orleans vs. All Other Parishes	Employed Anywhere in Lousiana		Employed in the Same Parish as 2004	
	2007	2013	2007	2013
	(1)	(2)	(3)	(4)
A.New Orleans teachers	50.3%	36.9%	32.8%	21.9%
B. Other teachers	80.2%	57.3%	73.3%	48.4%
C. Raw difference (A-B=C)	-29.9%	-20.3%	-40.5%	-26.5%
D. Logit estimate with teacher and school controls	-20.5%*	-12.9%*	-33.6%*	-20.0%*
E. Logit estimate with teacher, school, and hurricane effects controls	-10.5%*	-10.3%*	-14.8%*	-11.5%*

Panel B: New Orleans vs. Hurricane-Affected Parishes	Employed Anywhere in Lousiana		Employed in the Same Parish as 2004	
	2007	2013	2007	2013
	(5)	(6)	(7)	(8)
A. New Orleans teachers	50.3%	36.9%	32.8%	21.9%
B. Other hurricane-affected teachers	80.1%	57.5%	73.2%	48.7%
C. Raw difference (A-B=C)	-29.9%	-20.5%	-40.4%	-26.8%
D. Logit estimate with teacher and school controls	-20.6%*	-12.1%*	-32.6%*	-18.6%*
E. Logit estimate with teacher, school, and hurricane effects controls	-11.5%*	-10.7%*	-14.8%*	-10.7%*

Resuts replicate Table 2 estimates of the difference in employment outcomes for New Orleans 2004-05 teachers and comparison teachers. Results in this table are from a logit model instead of LPM.