*Technical Report*

# HOW DID THE NEW ORLEANS SCHOOL REFORMS INFLUENCE SCHOOL SPENDING?

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# How Did the New Orleans School Reforms Influence School Spending?

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## Abstract

After Hurricane Katrina, the state of Louisiana took over almost all traditional public schools in New Orleans and eventually replaced them with charter schools that have autonomy over their budget and resource allocation. The resulting governance structure creates autonomy, performance-based accountability, and competition at the school level. This paper analyzes how these education reforms impacted education expenditures and revenues. We find that operating expenditure increased by $1,358 (13 percent) per pupil relative to a synthetic control group, financed through additional revenues from federal grants, local property taxes, and private donations. The effect is driven by a spending growth for administrative and purchased services. The increase in administrative expenditure is explained by a rise in average administrative salaries and an increase in the ratio of administrators to pupils. In contrast, we see a decrease in per pupil instructional spending, driven by a reduction in average teacher experience and benefit payments per teacher. The differences are somewhat predictable based on changes in teacher hiring practices, pension rules, and the ability of schools to leverage economies of scale.

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## 1. Introduction

Public organizations of all sizes and types use contracts to support their missions. The U.S. federal government spends almost 20 percent of its annual budget through contracts, procuring an enormous variety of goods and services (Brown, Potoski, & van Slyke, 2010). Historically, contract spending has been even higher at the state and local levels, ranging from 25-40 percent of spending (Kelman, 2002). The value of these state and local contracts exceeds $1.5 trillion per year (McCue, Buffington, & Howell, 2007).

Over the last two decades, a new notion of contracting has gained popularity in education policy: charter schools. Charter schools are non-governmental organizations that receive public funding to run schools through contracts granted by government-designated authorizers. Charter schools may be non-profit or for-profit (depending on state charter laws) and have control over their own day-to-day operations. In some cases, charter management organizations (CMOs) control multiple charter schools, operating like their own school districts with some form of central office that supports the affiliated schools.

With 93 percent enrollment in charter schools, New Orleans has the greatest share of charter schools in public education nationwide (NAPCS, 2015). After Hurricane Katrina, public schools were turned over from the local school district to a state agency[3] and transformed into charter schools with their own governing bodies.[4] Almost all attendance zones were eliminated, creating school choice for families. Almost all employees of the school district governed by the Orleans Parish School Board (OPSB) were fired. The teacher union contract was allowed to expire and was never replaced. OPSB and state agencies provide only few services to charter

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[3] The state agency, Louisiana Recovery School District (RSD), directly operated 33 schools in New Orleans from 2007/08 to 2009/10. The number was gradually reduced to 5 direct run schools in 2013/24 and then to no directly operated schools in 2014/15.
[4] Charter schools under the umbrella of a CMO have the same governing board.

schools as for instance the centralized enrollment system, facilities, and maintenance (Buerger & Harris, 2015; Perry et al., 2015; Newmark & DeRugy, 2006).

In this study, we start by estimating how the reforms impacted New Orleans' total per pupil operating expenditures. While prior studies have expressed skepticism about the importance of school funding (Hanushek, 1996), a growing number of more rigorous studies find positive effects on test scores and college graduation as well as later life outcomes such as wages and poverty (Jackson, Johnson, & Persico, 2016; Lafortune, Rothstein, & Whitmore Schanzenbach, 2016; Hyman, 2016). By studying total operating spending, we can help interpret the large improvement in student outcomes after the New Orleans school reforms (Harris & Larsen, 2015).

Of equal interest is how schools use their funds and whether they behave in ways different from traditional public schools. Charter schools have autonomy over their budget and resource allocation and also have different demands placed on them through the market competition that comes with school choice and the intense test-based accountability that comes with performance-based contracts. We therefore decompose spending, first, into shifts across instructional and administration and further into salaries, benefits, and other expenses. Moreover, we decompose changes in salaries into average salaries and pupil-staff ratios.

A general challenge in estimating how the New Orleans reforms impacted spending is that a simple comparison between spending patterns before and after the reforms could lead to misleading results. Other factors such as the Great Recession or changes in the state's funding formula could have influenced spending trends even in absence of the reforms. To address this challenge, we select a comparison group using the synthetic control group approach (Abadie & Gardeazabal, 2003; Abadie et al., 2012; Abadie et al., 2015). Specifically, we create a synthetic

control from comparable school districts in Louisiana that experienced shifts in state-wide spending trends but did not experience a transition to charter school dominance. The synthetic control estimates serve as a counterfactual for what New Orleans would have spent in the absence of the reform policies.

Another major challenge for the estimation of reform effects is that New Orleans spent large amounts of money to rebuild the school system after Hurricane Katrina, and we are more interested in the long-term, equilibrium differences in spending. We use four approaches to overcome this problem. First, we exclude infrastructure expenditures and focus exclusively on operating expenditures, which are much less influenced by efforts to rebuild the school district.[5] This is made easier by the fact that all capital-related activities were outsourced after the storm and clearly separated in the data (Dreilinger, 2013; Louisiana Legislative Auditor, 2012).[6] Second, as a robustness check, we restrict the synthetic control group to districts that were also impacted by Hurricane Katrina but did not experience the reform policies. Third, we use a data set that includes nine years post-Katrina and focus on the most recent years to measure causal effects, well after the rebuilding costs were incurred. For these reasons, we believe our estimates reflect only the equilibrium effects of the reforms and not the storm itself.

Our synthetic control group analysis suggests that the reforms in New Orleans increased per pupil spending by $1,358 (13 percent) in 2014. Most of this is explained by a large increase in administrative spending and purchased services. This is offset by large declines in instructional expenditures, which is driven by a reduction in benefit payments and a decrease in

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[5] For the revenue analysis, we exclude income dedicated to capital projects.
[6] This was to prevent fraud. Jacobs/CSRS partnership is the contractor for the management and execution of the rebuilding efforts. The partnership received in 2013 the third three-year contract from the Recovery School District. The outsourcing practices by the school district and state have raised concerns regarding the oversight and monitoring of current and ongoing capital projects (Dreilinger, 2013; Louisiana Legislative Auditor, 2012).

average teacher salaries. Teachers earn more after the reforms for the same level of experience, but this is more than offset by the large decline in teacher experience.

The findings are similar to studies comparing spending patterns in charter and traditional schools using descriptive analyses. Baker and Miron (2015)[7], using Texas and New Jersey school spending data, find that charter schools and particularly KIPP schools spend more on administrative service than traditional schools in a comparable urban setting. For Michigan, Arsen and Ni (2012) and Izraeli and Murphy (2012) show that charter schools spend more on administration compared to traditional schools controlling for student characteristics and enrollment. We add to this literature by using causal evaluation methods, measuring spending changes for a school district almost entirely consisting of charter schools, and decompose changes in spending categories further into salaries and benefits.

The paper proceeds as follows. Section 2 provides additional detail about New Orleans and the school reforms. Next, we provide a theoretical framework that helps us predict changes in school spending by category. This is followed by sections describing the empirical methods, sample, and data. The final sections discuss the results and their interpretation.

## 2. New Orleans Background Information

*2.1 Governance Structure*

Historically, the OPSB operated all public schools in New Orleans. Prior to the school reforms, public schools in New Orleans were performing poorly, apart from a handful of high-

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[7] See Baker, Libbey, and Wiley (2012) for an analysis of CMOs spending practices.

performing and selective admission schools.[8] Additionally, the district was plagued by frequent financial and corruption scandals.[9] Between 1995/96 and 2004/05, the district lost 17,200 students, about 21 percent of its enrollment.

Partly to address these problems, the state of Louisiana created the RSD in 2003 to take over failing schools in the state. In November 2005, following Hurricane Katrina, the legislature passed a new law automatically transferring more than 100 failing schools from OPSB to the state-run RSD. The remaining schools were closed. In the 2013/14 school year, the last year of the data set we use later, the RSD oversaw 57 charter and 5 direct-run schools (Buerger and Harris 2015; Perry et al., 2015). The RSD monitors charter schools and provides very few central services. In addition to approving charters for schools under the RSD's jurisdiction, the Board of Elementary and Secondary Education (BESE) also oversaw four directly authorized charter schools in the 2013/14 school year.

In the wake of Hurricane Katrina, the city was evacuated and almost all schools were closed for the 2005/06 school year. As the evacuation continued, RSD took over most of the district-run schools. By the 2014/15 school year, the OPSB oversaw 14 charter schools and only six remaining direct-run schools (Buerger & Harris, 2015; Perry et al., 2015). OPSB provides all central services to direct-run schools and provides some services to its charter schools, such as accommodations for students with disabilities.

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[8] In the 2004/05 school year, Orleans Parish public schools ranked 67th out of 68 districts in mathematics and reading test scores in the Louisiana accountability system. Further, 63 percent of all public schools in New Orleans were deemed "academically unacceptable" by Louisiana accountability standards, compared to the Louisiana state average of eight percent. The graduation rate for Orleans Parish public schools was 56 percent, 10 percentage points below the state average. (Buerger & Harris, 2015).

[9] In 2003, a private investigator found that the school system inappropriately provided checks to nearly 4,000 people and health insurance to 2,000 people. In 2004, the Federal Bureau of Investigation issued indictments against 11 people for criminal offenses against the district related to financial mismanagement. Among them was a former school board president who accepted $140,000 in bribes in exchange for supporting the district's purchase from a particular vendor (Buerger & Harris, 2015).

Charter schools in New Orleans are overseen by one of district's three governing bodies: the locally-elected Orleans Parish School Board (OPSB), the state-elected Board of Elementary and Secondary Education (BESE), or the Recovery School District (RSD), which was created by the Louisiana State Legislature in 2003 to take over failing schools across the state. CMOs provide some form of central office for their affiliated schools (Miron & Gulosina, 2013; Furgeson et al., 2012). In 2014, there were 12 CMOs in New Orleans that operated two to six schools each and 64 percent of the total schools. The remaining 30 schools were operated as single-site charter schools. While some states have for-profit charter schools, all CMOs and single-site schools in New Orleans are non-profit organizations with their own boards.[10]

The reforms impacted all schools in New Orleans regardless of whether they were authorized by BESE, RSD, or OPSB because attendance zones for all schools were eliminated, and all school potentially compete against each other. Thus, we sum operating expenditures of all three governing bodies, all CMOs, and all free-standing charter schools. This strategy enables us to make comparisons between spending for the entire school system in New Orleans before and after the reforms.

*2.2 Human Resource Practices*

New Orleans does not have collective bargaining agreements, and charter schools decide which teachers and administrators they want to hire or fire. Kena et al. (2016) show that salaries and benefits make up 80 percent of all operating expenditure on average for school districts in the U.S. Thus, changes in human resources practices are important for analyzing spending changes in New Orleans after the reform. Several studies investigate these changes.

Barrett and Harris (2015) compare data on teacher characteristics from 2005 to 2014. They show that teacher experience levels in New Orleans dropped considerably after the school

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[10] The state apparently had a preference for non-profit CMOs (Bross & Harris, 2016).

reforms. For instance, the number of teachers with five or fewer years of experience increased from 33 to 54 percent. While at the same time, the percent of teachers with 20 or more years of experience dropped by over 20 percentage points. In addition, the percentage of teachers who are certified dropped from 79 percent before the storm to 56 percent after.

Lincove, Barrett, and Strunk (2016a, 2016b) compare hedonic wage function estimates for charter school teachers and principals in New Orleans with those in more traditional school districts. They find evidence that New Orleans charter schools reward the same teacher characteristics typically included in district collective bargaining agreements. In fact, compared with traditional public schools, they tend to pay larger premiums for degrees and experience for both teachers and leaders. In our analysis, we consider to what extent the decline in experience levels is offset by pay premiums for degrees and experience.

Charter schools can choose their own health benefit plans and decide between Teachers Retirement System of Louisiana (TRSL)[11] and the defined contribution plan 403(b).[12] TRSL has grown to become one of the most expensive public pension plans in the country, resulting in a large reduction in funds available for salaries and other expenditures (Backes et al., 2016). Required TRSL contributions saw a steady increase from 13.1 percent of teacher salaries in 2002/03, to 20.2 percent in 2010/11, and to 27.2 percent in 2013/14. Before the reforms, all public schools in New Orleans participated in TRSL. With increasing TRSL contribution rates, most charter schools opted out of TRSL and adopted 403(b) plans. In 2014, only 42 percent of schools in New Orleans were enrolled in the state pension plan (Barrett & Chanin, 2016).

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[11] TRSL is a defined benefit pension plan that requires contributions by both employer and employee and guarantees a set income for retirement. After five years of enrollment into TRSL, employees can claim pension payments based on the number of years they have been in TRSL and their highest salary earned. Employees enrolled fewer than five years have the right to their own contributions but cannot claim employer contributions. Neither employees nor employers pay into the Social Security system (Barrett & Chanin, 2016).

[12] The defined contribution (DC) plan does not offer a guaranteed income for retirement, but if teachers exit the charter school or the teaching profession, they are able to keep those funds. With DC plans, employees and employers also have to pay into Social Security system (Barrett & Chanin, 2016).

With the elimination of attendance zones, families now have the opportunity to choose schools through a centralized enrollment system. In a choice-based system, charter spending might also be influenced by parental demand as schools work to attract and retain students. Research on New Orleans suggests that parents have varying preferences across school characteristics (Harris & Larsen, 2015; Lincove, Cowen, & Imbrogno, 2017). Next to school performance, extracurricular activities (e.g., band) and sports (e.g., football) seem especially important to parents. This, in turn, has led schools to differentiate themselves on these and other dimensions (Arce-Trigatti et al., 2015).

## 3. Theoretical Framework

Basic economic theory predicts that market-based reforms, focused on choice, accountability, and competition, will make schools more efficient (Friedman, 1955, 1962; Chubb & Moe, 1988, 1990; Hoxby, 2002, 2003a, 2003b). School autonomy is potentially important because local decision-makers have a better understanding of their school's capacity and the demands of their student population. This knowledge, combined with market competition, may allow charter schools to make better resource decisions (Hanushek, Link, & Woessmann, 2013; Ouchi, 2003). Critics of the traditional school system argue that school autonomy is limited due to the political control exercised by school boards and administrative control of bureaucracies (Chubb & Moe, 1988, 1990).

Given the growing recognition of the importance of quality teachers and leaders in school success (Chetty et al., 2014; Grissom, Kalogrides, & Loeb, 2014), we would expect schools to direct more funds to hire and retain effective educators. However, since 80 percent of school spending typically goes to compensate educators, it would be difficult for schools to re-allocate

from other categories to raise average salaries. The most direct path to increasing salaries would be to hire fewer teachers or leaders and pay more to each of those hired (Figlio, 1997; Hanushek & Rivkin, 2006).[13] Overall, the effects of charter autonomy, choice, and competition on spending patterns is unclear, but the simple theory does predict that the result will be more efficient.

Other theories suggest that spending will be less efficient in a decentralized environment. Economies of scale exist when the cost per unit decreases as the number of units increases, something that is common in schooling (Andrews, Duncombe, & Yinger, 2002; Duncombe & Yinger, 2008). This is driven in part by fixed (or "lumpy") costs of administration, such as accountants, lawyers, and CMO leaders. The New Orleans school reforms decentralized almost all central services formerly provided by the school district, potentially leading to a loss in economies of scale that could increase spending for administrative and support services. CMOs, by creating their own district-like systems, may partly recover economies of scale, but being much smaller than most districts, the problem remains.

Transaction costs, also sometimes called coordination costs, are incurred when coordinating work across people and organizations (Coase, 1937; Williamson, 1975). These costs include, for instance, the search for charter school operators, negotiations over performance goals, contract monitoring and enforcement, and school closings. These transaction costs are largely absent in more hierarchical forms of organization, such as school districts.

While not a necessary aspect of charter schooling, the fact that charter schools have young teachers and high turnover (Barrett & Harris, 2015; Burian-Fitgerald, Luekens, & Strizek, 2004; Podgursky & Ballou, 2001) also creates higher costs for recruiting, hiring, and training teachers (Milanowski & Odden, 2007). Villar and Strong (2007) report that the costs of replacing a teacher can range from $10,500 to $16,000.

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[13] Schools might also determine salaries based on performance, but this is beyond of the present study.

Higher transaction costs and the loss of economies of scale may therefore work to undermine the efficiency gains that come with increased autonomy and market pressure. The net effect on spending is unclear, as is the effect on specific expenditure categories.

## 4. Synthetic Control Group Approach

A simple comparison between per pupil operating expenditure before and after the reforms could lead to misleading results because of the differences in the cost of providing education during both time periods, which is unrelated to reforms. To address this problem, we select a comparison group with similar spending trends prior to the policy intervention, providing a counterfactual for what New Orleans would have spent in the absence of the reform policies. To implement this approach, we use the synthetic control group method introduced by Abadie and Gardeazabal (2003) and further formalized in Abadie et al. (2012) and Abadie et al. (2015). The advantage of this approach is to create a weighted average of other school districts that simulates a "synthetic" Orleans Parish without education reforms, which we can then compare to the actual Orleans Parish with reforms.

Let $J$ be the number of school districts in Louisiana potentially serving as control group for New Orleans (donor pool). Define a ($J\times1$) vector of weights $W = (w_1, \dots, w_j)'$, which are nonnegative and sum up to one. The scalar $w_J$ ($j = 1, \dots, J$) represents the weight that each district receives in the synthetic New Orleans. Note that each change in $W$ creates a different synthetic New Orleans. Thus, it is important to choose a valid subset of school districts (also called donor pool) to create a synthetic New Orleans.

Let $X_1$ be a ($K\times1$) vector containing predictors of operating expenditures in New Orleans prior to the reforms. Let $X_0$ be the ($K\times J$) matrix containing the same predictors for the

school districts in the donor pool. Define $V$ as a $(K \times K)$ diagonal matrix with nonnegative components representing the relative importance of each predictor. The matrix $V$ is chosen among all positive definite matrices to minimize the average squared prediction error of the outcome variable during the period prior to Hurricane Katrina (Abadie et al., 2010, 2015).

The vector of weights $W^*$ defines the combination of non-reform districts that best resemble New Orleans' operating expenditure. Following Abadie et al. (2010, 2015), $W^*$ is chosen to minimize:

$$W^* = \arg\min_w (X_1 - X_0 W)' V (X_1 - X_0 W) \tag{1}$$

subject to $w_1 + \cdots + w_J = 1$ and $w_j \geq 0, \ for \ j = (1, \dots, J)$

The causal effect of the reforms is estimated in the following way. Let $Y_1$ be a $(T \times 1)$ vector whose elements are the per pupil operating expenditure for New Orleans during $T$ time periods. Let $Y_0$ be a $(T \times 1)$ matrix which contains spending for all school districts in the donor pool. The goal of the synthetic control group approach is to estimate the operating expenditure for New Orleans in absence of the reforms. This counterfactual is calculated as the per pupil operating expenditure of the synthetic New Orleans, $Y_1^* = Y_0 W^*$. Thus, the impact of the reforms is the difference between the actual New Orleans and the synthetic New Orleans.

## 5. Donor Pool and Data

To implement the synthetic control group approach, we use a donor pool consisting of 17 districts in Louisiana that resemble the socio-economic context of New Orleans.[14] Also, because all districts in the donor pool are located in Louisiana, these districts are subject to the same state policies, aside from the New Orleans school reforms.

To assess the impact of the reforms on spending, we created an annual district-level panel data set from 1990 to 2014 (single years, where used, refer to the spring of the academic year) using data from the Louisiana Department of Education (LDOE). Hurricane Katrina occurred during the 2005/06 school year. We drop this year from my panel because many schools were closed for part of the year and reliable information on expenditures is not available. Thus, the first year of the reforms is 2006/07, and there are 16 pre-reform and 7 post-reform years.

We focus throughout the analyses on operating expenditure to isolate the effect of the reforms on spending and to rule out any influence of the rebuilding efforts. We also sum all operating expenditures of the three governing bodies (BESE, RSD, and OPSB), all CMOs, and all single-site charter schools. While it is possible to isolate spending in the local district from the state, the reforms influenced both, making it difficult to interpret any differences.

Each charter school pays two percent of its total revenues as a fee to its authorizer. For authorizers, these fees represent revenue available to spend on their own administrative activities. The authorizer fee is double-counted in our data if administrative expenses are determined by adding up administrative spending for schools, CMOs, and authorizers.[15] In our

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[14] Appendix B shows a map of the selected districts, which overlap with metropolitan areas in Louisiana.
[15] If our data set added up expenditures across these various agencies, then the authorizer fee would be not only an expense for the charter schools, but also the source of revenue for additional expenditures for the authorizers. We inquired among CMO and authorizer leaders and received conflicting responses about whether double-counting might be occurring. We, therefore, use the most conservative estimates.

estimations we assume double counting of the fee, and hence provide a conservative estimate of the school reforms' effects on spending.[16]

In addition to per pupil operating expenditures, we analyze different categories of operating expenditures.[17] The categories, shown in Table 1, are by function and object code. In New Orleans, salaries for teachers make up 63 percent of total instructional spending, and salaries for administrators make up 44 percent for all administrative spending.[18] The remaining expenditures are mainly benefit payments, which make up 30 percent of instructional and 23 percent of administrative spending. These shares are very similar compared to other districts in Louisiana. Total operating expenditure and the functional expense classifications are taken from a public LDOE Fiscal Data Set. The variables defined by object code are taken from de-identified administrative employment files provided by LDOE.

Variables predicting operating expenditures, included in vector $X_1$ and $X_0$, are taken from different LDOE administrative student enrollment files and from the Common Core of Data from the National Center for Education Statistics (NCES).[19] Predictors capturing the composition of students in the district include shares of students with disability, receiving free lunch, having limited English proficiency, and white race/ethnicity.[20] We add predictors for school district size using measures of enrollment and enrollment change.

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[16] If administrative fees are not double-counted, the estimated growth in administrative expenses would be 13 percent greater. We calculated this number by taking two percent of total revenues (0.02 x $13,778 in the year 2013/14) and then dividing by total reported administrative spending ($2,113 in 2014). This yields: $\frac{.02 \times 13,778}{2,113} =$ 0.13.

[17] The Louisiana Accounting & Uniform Governmental Handbook includes all definitions for spending categories.

[18] Calculation is based on the Common Core of Data Finance Survey (F-33) using data for 2012/13.

[19] Several papers using the synthetic control group approach include pre-treatment measures of $Y_1$ and $Y_0$ in $X_1$ and $X_0$ (Abadie, Diamond, & Hainmueller, 2015).We also experimented with including these measures into $X_1$ and $X_0$. The inclusion of these variables did not change the results substantively.

[20] Harris and Larsen (2015) analyze the student composition before and after the storm and do not find statistically significant differences making these variables ideal predictors for spending in the synthetic control.

Further, vectors $X_1$ and $X_0$ comprise variables describing the socio-economic status of the areas served the school districts. We include the unemployment rate from the Bureau of Labor Statistics and median housing values and income levels from the U.S. Census Bureau and American Community Survey. If housing values or income levels are missing in a year, we imputed them linearly using time as predictor for housing and income levels.

We include the comparable wage index (CWI) developed by Taylor and Fowler for NCES into $X_1$ and $X_0$. The CWI is a measure of systematic, regional variations in the salaries of college graduates who are not educators (Taylor & Fowler, 2006),[21] we linearly impute values using time the years prior to 1996/97 for which the CWI is not available.

Table 2 compares the average pre-reform characteristics of the actual New Orleans, the synthetic New Orleans, and the State of Louisiana. For all variables predicting total per pupil operating expenditures, the difference between the actual and synthetic New Orleans is smaller than the difference between the actual New Orleans and the Louisiana district average. These findings show that the synthetic control group is better suited as a control group than the Louisiana average. The school districts receiving a positive weight $W^*$ are East Baton Rouge (0.422), Tangipahoa (0.445), and St. Charles (0.133). All other school districts in the urban donor pool are assigned a zero $W^*$ weight.[22]

## 6. Results

### 6.1 Results for Expenditures and Revenues

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[21] Comparable wage index values estimated by Lori Taylor using the methods developed for NCES for each district and each year in our sample are available at http://bush.tamu.edu/research/faculty/Taylor_CWI/.

[22] Further, Table 2 shows the weight V calculated for each variable predicting total per pupil operating expenditure. The share of students with disabilities (0.221) and median income (0.295) are the strongest predictors for the trend in operating expenditure. Because New Orleans had the largest total enrollment and the lowest share of white students in Louisiana, these variables cannot be fitted perfectly using a combination of comparison districts. However, the weight these variables receive in the creation of the synthetic control group is very low.

Figure 1 displays per pupil total revenue and expenditure for New Orleans from 1990 to 2014 adjusted to 2014 dollars. Hurricane Katrina and, subsequently, school reforms occurred during the 2005/06 school year. Expenditure and revenue are at the same level prior to the reforms averaging around $8,300 per pupil. Per pupil revenue is greater than expenditure during 2006/07 and 2007/08. During these years, the district received federal lump sum grants in addition to regular federal funding and large amounts of private donations to rebuild the district after Hurricane Katrina. Expenditure per pupil during these years is also relatively high as the school district had to be rebuilt and few students had returned to the district yet.[23] Total per pupil revenue and expenditure (including capital) between 2012 and 2014 are on average close to $15,000 (going forward we omit capital expenditures).

While the New Orleans trends in Figure 1 suggest a possible effect of the reforms on spending we cannot be sure without a comparison group and without excluding capital expenditures. Figure 2 displays the per pupil operating expenditure for actual New Orleans and synthetic New Orleans for the period from 1990 to 2014. Note that for the pre-Katrina period, spending between actual and synthetic New Orleans match closely. This suggests that the synthetic control provides a sensible approximation of per pupil expenditure that would have been observed in New Orleans between 2007 and 2014 in the absence of the educational reforms. For the time period between 2007 and 2009, the difference between actual and synthetic New Orleans is much greater compared to later years. In this time period, the district spent money to restart schools, and at the same time, only a small number of students had returned to the city (and recall that all spending is on a per-pupil basis). Afterwards, the disparities between actual

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[23] Revenue calculations are usually based on revenue amounts from two years prior to the actual year. OPSB owes schools money if the actual revenues are greater than the predicted revenues. The 2013 Super Bowl and increased property values lead to deferred revenues of $22,180,544 (Williams, 2014).

and synthetic New Orleans are much smaller, and their trends are stable. The difference between per pupil expenditure in the actual and the synthetic New Orleans is $1,359 (13 percent) in 2014.

Figure 3 shows the results of a robustness check using a donor pool of school districts affected by Hurricane Katrina. For the robustness check presented in Figure 3, we select 15 school districts into the donor pool. All of these districts received aid from the Federal Emergency Management Agency (FEMA) after Hurricane Katrina. Appendix B shows the location of the districts in this donor pool. Selecting this comparison group allows us to control for potential effects of Hurricane Katrina on operating expenditures. A disadvantage is that these districts are often less urban and differ in size and socio-economic composition when compared to New Orleans, so the goodness-of-fit is not as good as in the unrestricted synthetic control. Appendix C includes the falsification and robustness checks recommended in Abadie et al. (2012) and Abadie et al. (2015).

The districts receiving positive weights in this alternative synthetic control group are Calcasieu (0.37), Jefferson Davis (0.397), and Pointe Coupee (0.232). The synthetic control group matches the pre-reform trend relatively well except for 1992. Start up spending in New Orleans was much greater than in the other hurricane-affected areas included in the control group because hurricane-related damage was greatest in New Orleans. For the time period after 2009, the disparities between actual and synthetic New Orleans are much smaller and their trends follow somewhat similar pattern. The gap between start up spending in the actual and synthetic New Orleans is $1,414 (14 percent) in 2014. In general, our estimates pass the various validity tests and are robust across specifications and donor pools.

Figure 4 and Table 4 explain where these additional funds came from. We find that the increase is due to increases in local ($500 per pupil) and federal funds ($988 per pupil). The local

increase is due mostly to higher property tax revenues and the federal funds are due at least in part to competitive grants.[24] There were essentially no private donations for either group in the time prior to the reforms. Afterwards, New Orleans received relatively large amounts of donations leading to a difference of $350 after the reforms. In sum, all changes lead to a revenue increase of $1,669 per pupil. The per pupil revenues exceed the increase in operating expenditure by $310.

*6.2 Results by Spending Function and Object Category*

In this section, we break down operating expenditure in different spending activities (see Table 1 for categories and definitions). For each spending category, a separate synthetic control is estimated using the same donor pool as in the main specification. Table 5 summarizes the school districts receiving positive weights for each spending category.[25] As the table shows, school districts contributing to the synthetic control as well as the assigned weights vary across dependent variables. The three districts included in the main specification are included in all control groups and receive the greatest weights.

Differences between the actual and synthetic New Orleans are reported in Figure 5 for instructional and administrative expenses and in Figure 6 for the remaining support services. The first image in Figure 5 reports the results for instructional spending. The difference between actual and synthetic New Orleans is close to zero prior to the reforms. Then, the gap increases, reflecting start up spending after the hurricane. After the reforms, spending on instruction declines by $706 per pupil (10.1 percent) in 2014.

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[24] As the student population in New Orleans did not show signs of demographic change (Harris & Larsen, 2015), the federal increase is likely explained by the Charter Schools Federal Grant Program (up to 3 years at $200,000 per year for each school), and competitive grants such as Investing in Innovation (federal grant of $28 million and $5.6 million in private funds added) and the NOLA Teaching Incentive Fund ($13.2 million).

[25] Appendix D shows the results for the same analysis using the control group of the main specification. While the results are similar, the control group of the main specification shows less similar trends in the pre-reform period.

Figure 5b displays spending for overall administration. For New Orleans, recall that charter schools authorized by RSD and BESE generally do not receive central services from their authorizers. Also, CMOs and single-site schools have their own governing bodies and administrative operations. Overall, spending for administration increased after the reforms increased by $699 (66 percent) per pupil as of 2014.

The next three figures break up administrative spending into school, general, and central administration. The graphs show that school administration ($503 per student) is the strongest driver of increased administrative expenses followed by central services (including CMO-level spending).

Figure 6 presents spending differences for other non-instructional functions. After the reforms, spending for transportation and other expenditure (mainly consisting of purchased services) was $191 per pupil (34 percent) higher for transportation and $704 per pupil (33 percent) for other expenses in 2014.

Other categories show smaller and/or more erratic changes. Maintenance does not show a reform-related change in spending. Support services, including both pupil and staff support, and food-related expenditures show much more volatile spending patterns after the reforms. Spending for support services is $60 (4.7 percent) higher in 2014, and food spending is $172.5 (128.4 percent) greater in 2014. However, the volatility in both spending categories seems to indicate that New Orleans schools are still deciding how much they want to spend in these categories in the long term.

*6.3 Decomposition of Instructional and Administrative Spending*

The analysis of different spending categories showed two main reform effects. Instructional spending decreased, and administrative expenditure increased. In this section, we decompose both effects to understand better what is driving the effects. A first decomposition breaks down both spending activities into salaries, benefits, and other expenditures. Then, we further decompose changes in instructional and administrative salaries into changes in average salaries per staff and staff per pupil.

Three pre-intervention years are not enough to calculate weights for the synthetic control group. Therefore, we calculate difference-in-differences using salary information before and after the reforms and for New Orleans and a control group. Control groups are based on districts and weights displayed in Table 5 for *Instruction* and *Overall Administration*.

We start with the following identity as the basis for the decomposition:

$$Spending_{ij} = Salary_{ij} + Benefits_{ij} + Other_{ij} \tag{2}$$

where $i$ denotes spending in New Orleans or the control group, and $j$ denotes spending for either instruction or administration.[26] $Spending$ refers to total expenditure in the given function category, and this is the sum of $Salary$, $Benefits$ (contributions to pensions, 403(b), and Social Security as well as health benefits), and $Other$ (insurance, travel, training, office supplies, contracted services, etc.). The decomposition starts with dividing both sides of the equation by enrollment and taking the differences between the time periods before and after the reforms and between New Orleans and the control group. Note that the last two steps create a difference-in-differences framework.

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[26] We focus on instruction and administration only because other function categories include limited salaries and benefits.

$$\Delta_i \Delta_t \left( \frac{Spending_{ij}}{Enroll_i} \right) = \Delta_i \Delta_t \left( \frac{Salary_i}{Enroll_i} \right) + \Delta_i \Delta_t \left( \frac{Benefits_i}{Enroll_i} \right) + \Delta_i \Delta_t \left( \frac{Other_i}{Enroll_i} \right) \qquad (3)$$

where the first difference $\Delta_t$ represents the change before and after the reforms (2005 to 2014) and $\Delta_i$ is the difference between New Orleans and the synthetic control group.

To decompose *Salary* further, we begin with the identity:

$$Salary_{ij} = \overline{Salary_{ij}} \times N_{ij} \qquad (4)$$

where $\overline{Salary}$ captures the average salary and $N$ represents the number of staff. If personnel works in both categories, instruction and administration, we assume that the share in salary equals the amount of time spent for working in the category. In the next step, we take the natural log of both sides of Equation (4) to get direct estimates for average salary and the number of staff. Then, we take the difference between the pre- and post-reform periods and between New Orleans and the control group. Again, the last two steps create a difference-in-differences framework.

$$\Delta_i \Delta_t \left[ \frac{\ln(Salary_{ij})}{Enroll_i} \right] = \Delta_i \Delta_t \left[ \frac{\ln(\overline{Salary_{ij}})}{Enroll_i} \right] + \Delta_i \Delta_t \left[ \frac{\ln(N_{ij})}{Enroll_i} \right] \qquad (5)$$

This framework provides direct estimates on how much of the change in salaries is attributable to average salaries and to the number of staff per pupil.

Table 3 shows the results for the decompositions described in Equation (2) and (5). The calculations underlying these decompositions are shown in Appendix E. In the first part of the table, we decompose the change in instructional spending (-$706 per pupil) into salaries, benefits, and other expenditure. Benefits explain the greatest share in the decline of instructional spending with 50 percent, followed by salaries (33 percent), and other (17 percent). The decline in salaries itself is explained to 82 percent by a decrease in per pupil average salaries.

Breaking this down further, the decline in salaries is explained by 12-year drop in average teacher experience levels found by Barrett and Harris (2015) and Lincove, Barrett, and Strunk (2016). In all professions, including teaching, people are generally paid more when they have more experience. However, while average salaries for teachers in New Orleans decline as a result of the decrease in average experience, salaries for teachers with up to three years of experience are actually greater than in the comparison districts (Lincove, Barrett, & Strunk, 2016).

The next part of Table 3 displays the decomposition of the $699 per pupil increase in administrative spending. Fifty-one percent of the increase in administrative spending is explained by a change in salaries, and 3 percent is explained by a change in benefits. Expenses other than salaries and benefits, particularly fees paid to authorizers, explain 45 percent of the increase.[27] Further decomposing salaries ($363 out of $699), we find that 62 percent is explained by higher average salaries and 38 percent by a rise in the number of administrators per pupil.

## 7. Discussion

The New Orleans school reforms replaced traditional public schools with charter schools creating a governance structure that increased school autonomy, accountability, and competition.

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[27] We estimate the authorizer fee is .02 x $13,778 = $275, or 39 percent of total administrative spending ($699).

We also estimate that the reforms in New Orleans increased per pupil operating expenditures by $1,358 (13 percent). This may partially explain the 0.2-0.4 standard deviation effect of the reforms on student achievement (Harris & Larsen, 2015). Recent research suggests that such expenditures may increase achievement up to the lower end of that range (Jackson, Johnson, & Persico, 2016; Lafortune, Rothstein, & Schanzenbach, 2016), though this is almost certainly an over-estimate of the role that funding played in New Orleans. Other evidence suggests that at least one-third of the reform effect can be attributed to performance-based takeovers (Bross & Harris, 2016), and other evidence suggests that Teach for America teachers, who make up a large share of the New Orleans total (Barrett & Harris, 2015), generate more positive outcomes even with lower salaries (Glazerman, Mayer, & Decker, 2006).

If we did attribute the entire reform effect to these expenditure increases, the effectiveness-cost ratio would be about 10 times larger than necessary to break-even in cost-benefit terms (Harris, 2009; Harris & Larsen, 2015).

The large increase in administrative expenditures is not surprising. The devolution of responsibility to schools and CMOs represents loss of economies of scale that likely required more resources for some administrative services. This would explain, for example, why we see an increase in purchased services: schools may have tried to avoid fixed costs of some activities by contracting to other organizations that could provide these services to a larger number of schools. This decentralized schooling model also entails higher transaction costs as each school and CMO has to establish and monitor more contracts.

The combination of higher administrative spending and lower instructional spending may also have been a deliberate choice, resulting from charter leaders' rent-seeking behavior (for higher administrative salaries) or from CMO leaders' perceptions of the optimal ways of running

schools in urban settings. Most of the increase in administrative spending is at the school level, suggesting that schools may be spending more to manage their relatively young, inexperienced, and turnover-prone teachers. Also, charter schools seem to be hiring leaders from elite universities and business degrees, people with relatively high opportunity costs who require higher salaries.

The decline in fringe benefit costs also allowed schools to pay their young teacher workforce more than they would have received and still have funding left over for higher management spending. But this explanation also means the system may not be sustainable in the long run. If schools try to retain effective teachers, then experience levels will grow and salaries will increase. Also, recent evidence suggests that the numbers of young teachers are declining as organizations like Teach for America receive increasingly fewer applicants for their programs (Strauss, 2016; Klein, 2015; Rich, 2015). Legislation and lawsuits have also been introduced to force charter schools into the state pension system (SB-6, 2011; Louisiana Legislative Auditor, 2014; Vanacore, 2014). Either of these moves would greatly increase instructional costs and might force a reduction in administrative spending. Charter schools would then start to look more like traditional public schools.

Given the increase in outcomes that went along with these changes in spending, perhaps the key larger implication is that arguments about how schools—traditional or charter—spend their money are not very informative about their efficiency or effectiveness. Critics have long-complained about the large bureaucracies of traditional public schools (Chubb & Moe, 1988, 1990). While the criticism is as much a matter of the rules and constraints that school districts impose as the amount spent on them, the fact that large achievement gains were achieved with

lower instructional spending is noteworthy as elected officials and education leaders seek

changes in policies to improve the nation's school systems.

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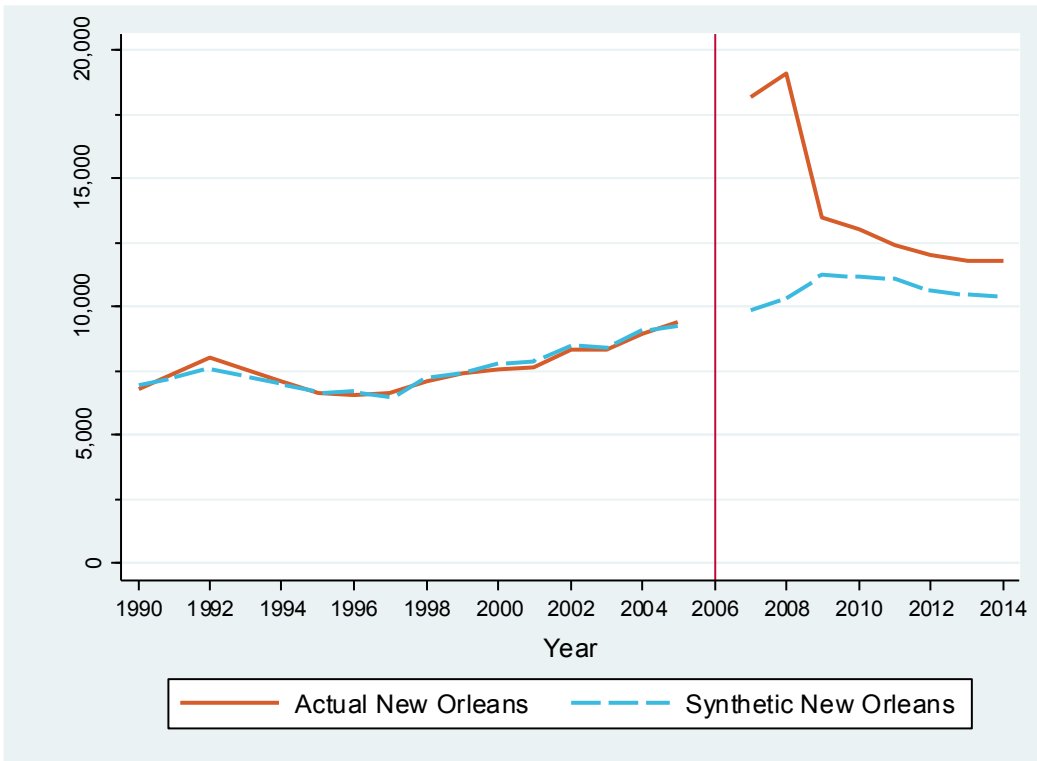
**Figures**

Figure 1: Total Expenditure and Revenue for New Orleans
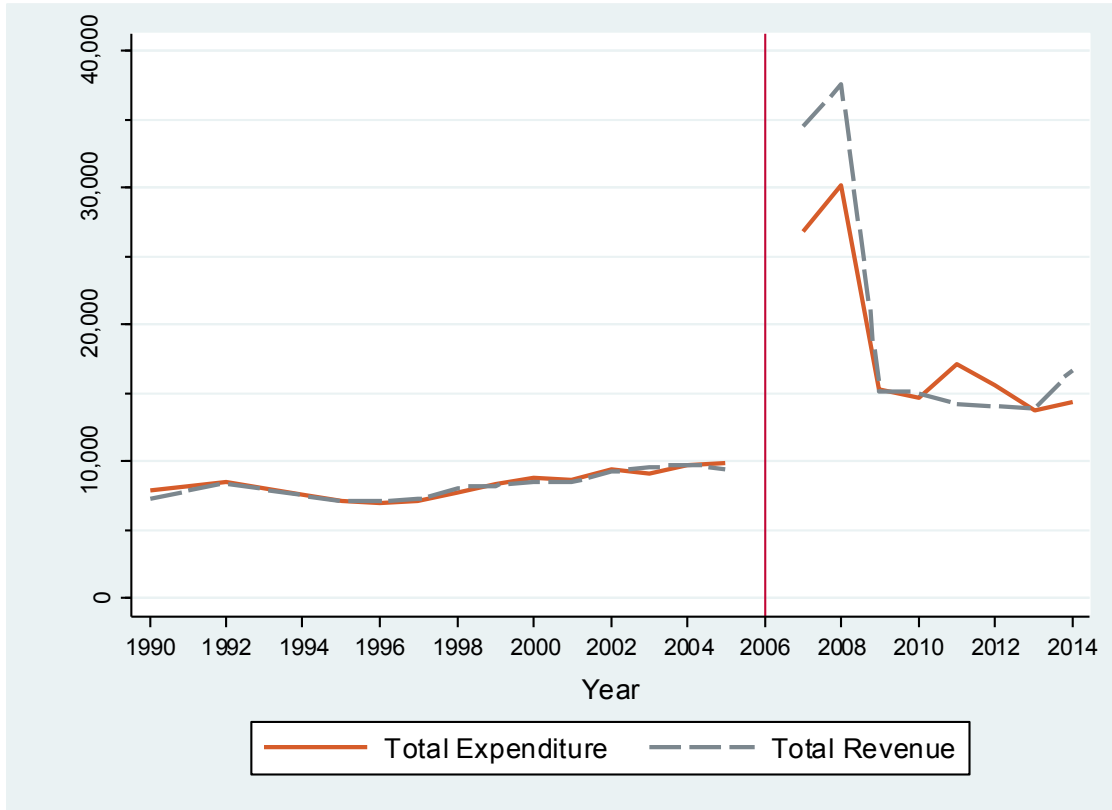


*Data:* LDOE Fiscal Data
*Notes:* The figure displays per pupil total expenditure and revenue in 2014 dollars. Both measures include money devoted to capital purposes.
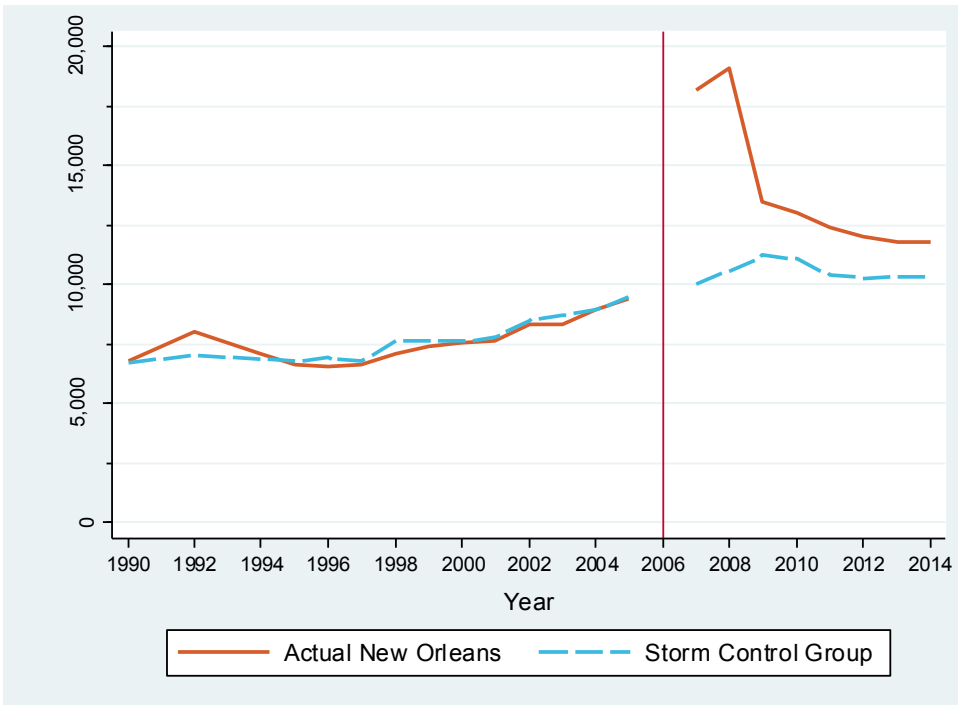
Figure 2: Trends in per pupil operating expenditure for actual and synthetic New Orleans



*Data:* LDOE Fiscal Data; LDOE Budget Letters; CWI based on Taylor & Fowler (2006), Bureau of Labor Statistics; U.S. Census

*Notes:* The donor pool for the synthetic control group consists of 17 urban school districts in Louisiana. School districts receiving positive weight *W* in the synthetic control are East Baton Rouge (0.422), Tangipahoa (0.455) and St. Charles (0.133). Variables to estimate the synthetic control group are share of students with disabilities, share of students receiving free lunch, share of students with limited English proficiency, unemployment rate, median housing value, comparable wage index, and enrollment.
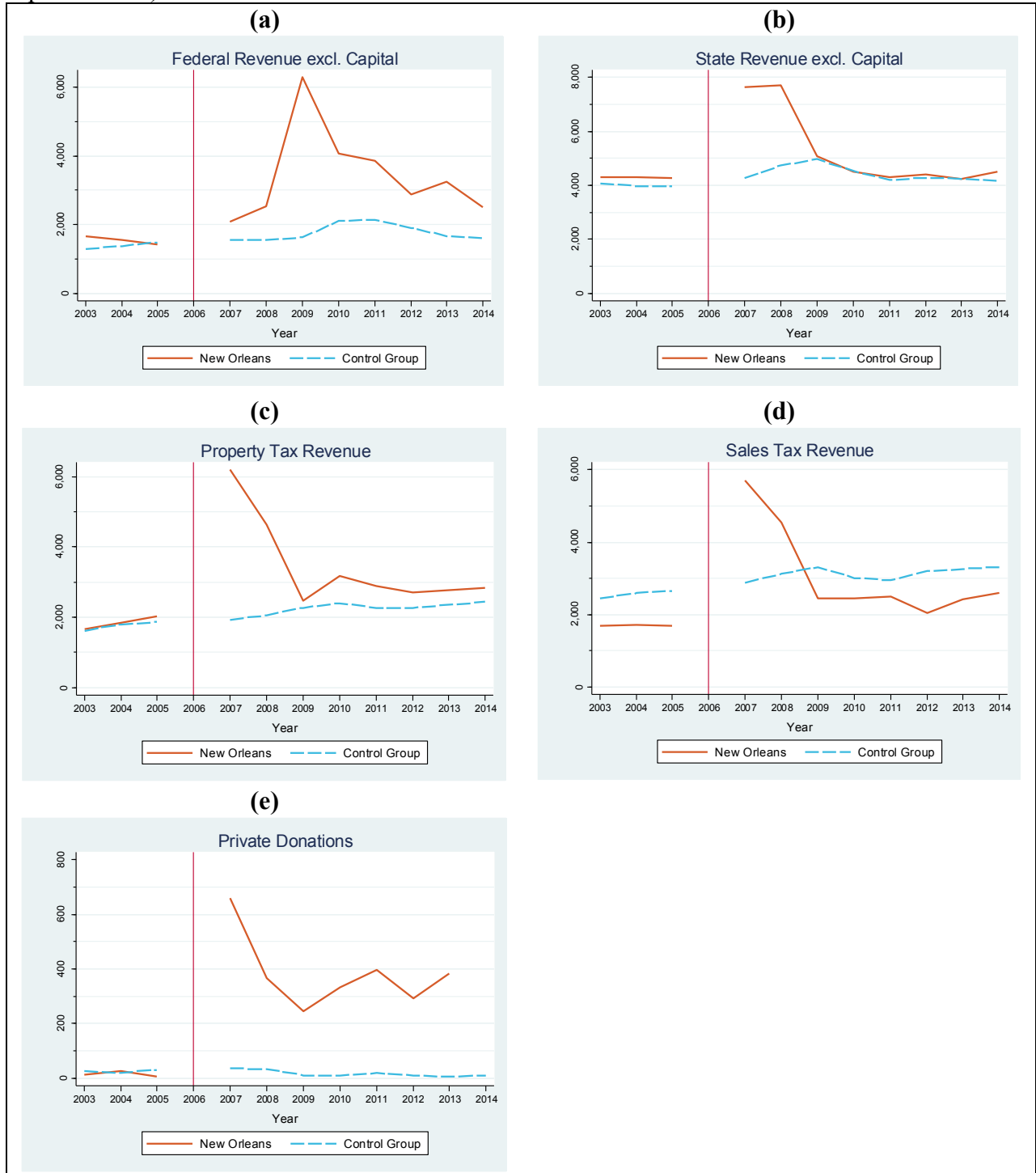
Figure 3: Robustness check using a donor pool of storm-affected school districts



*Data:* LDOE FISCAL DATA; LDOE Budget Letters; CWI based on Taylor & Fowler (2006), Bureau of Labor Statistics; U.S. Census

*Notes:* The donor pool for the synthetic control group consisted of 15 school districts affected by Hurricane Katrina that received aid from FEMA. The school districts receiving a positive weight $W$ in the synthetic control are Calcasieu (0.37), Jefferson Davis (0.397), and Pointe Coupee (0.232). Variables to estimate the synthetic control group are share of students with disabilities, share of students receiving free lunch, share of students with limited English proficiency, unemployment rate, median housing value, comparable wage index, and enrollment.
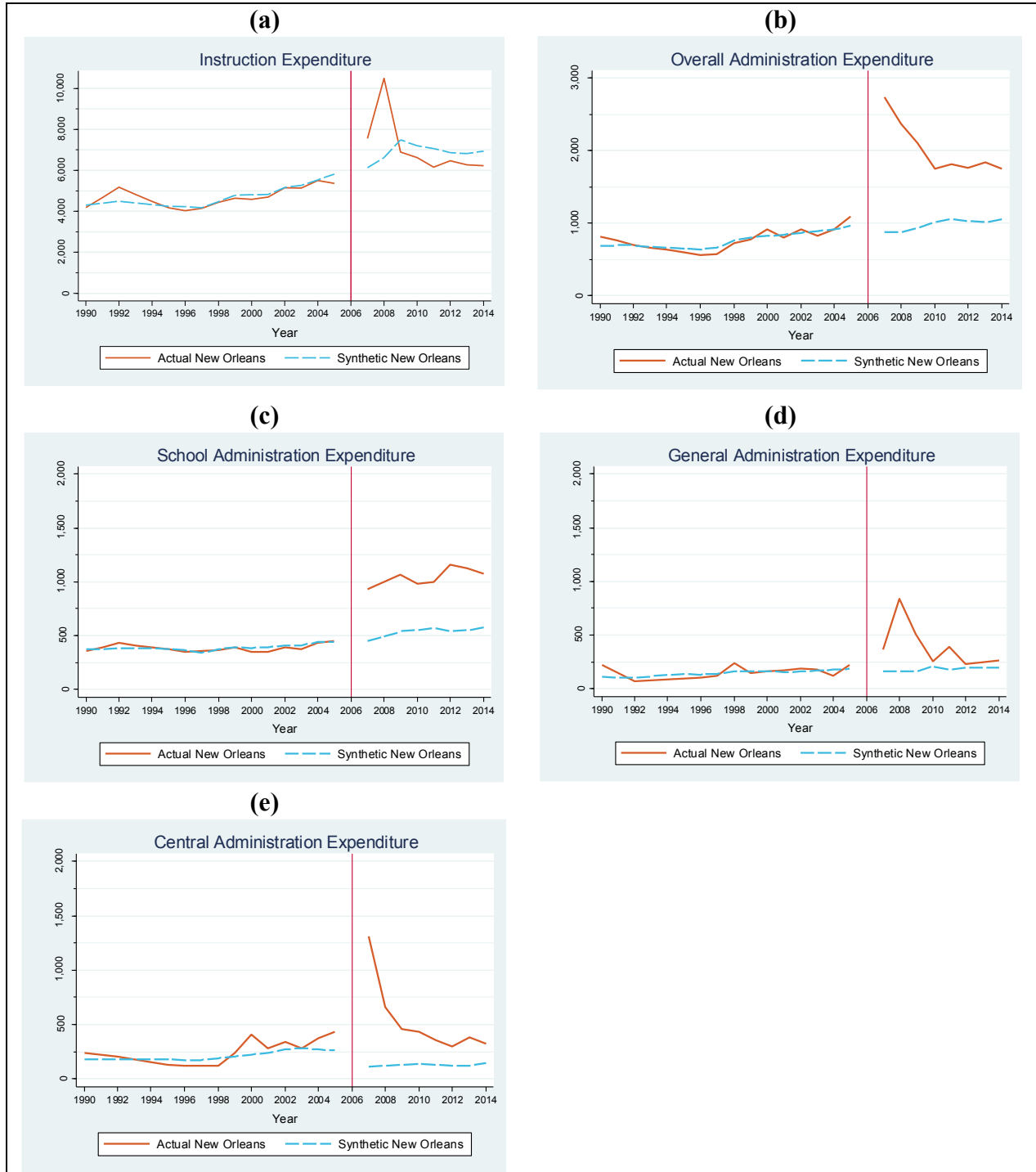
Figure 4: Revenue Differences between New Orleans and Control Group (based on main specification)



(a)

Federal Revenue excl. Capital

(b)

State Revenue excl. Capital

(c)

Property Tax Revenue

(d)

Sales Tax Revenue

(e)

Private Donations

*Data:* LDOE FISCAL DATA; LDOE Budget Letters

*Notes:* Control group is based on the districts and weights of the main specification. Only federal and state revenues exclude capital spending.

Figure 5: Differences between New Orleans and Synthetic Control for Spending in Instructional and Administrative Functions
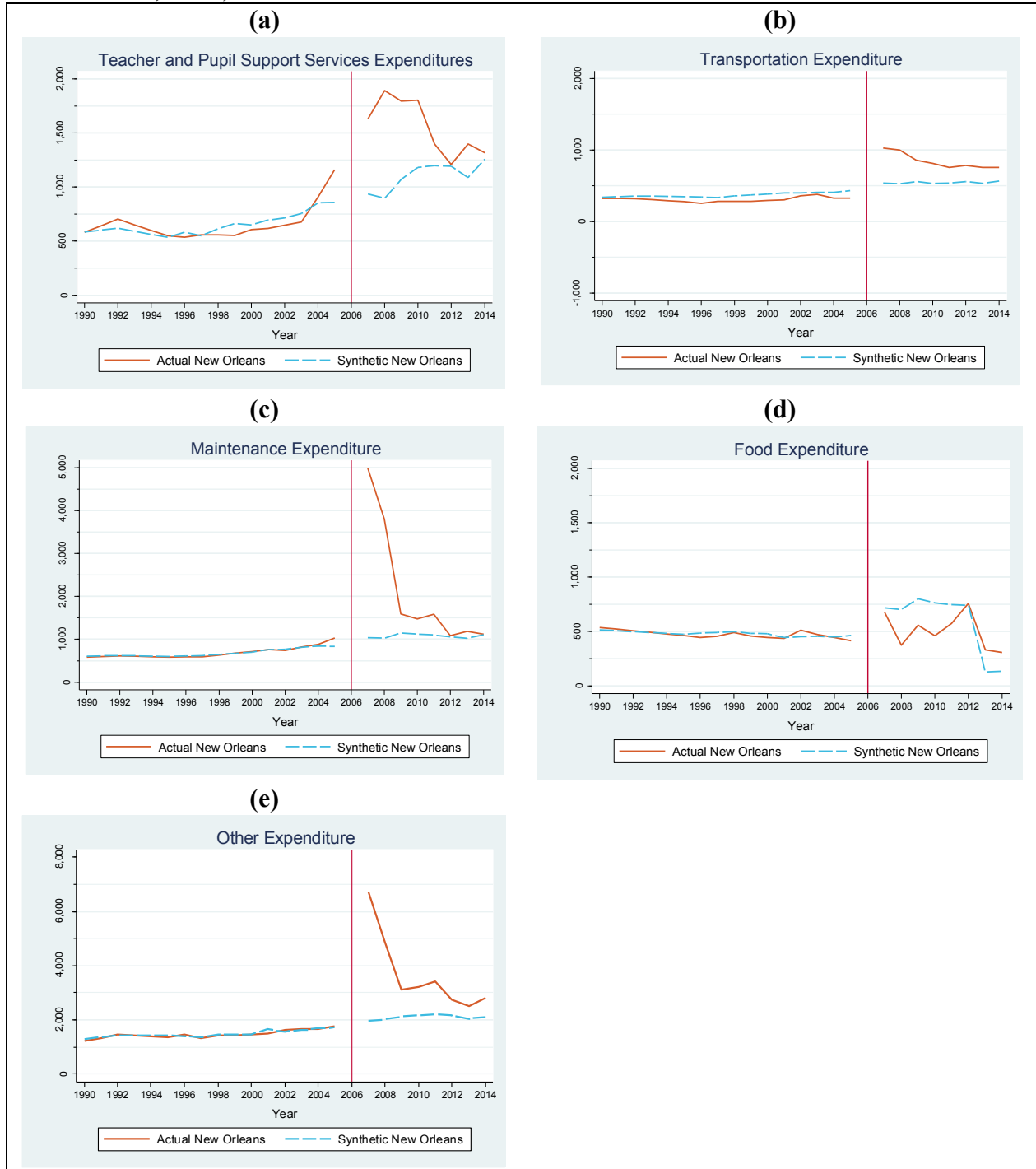
*Notes:* Scale of the y-axis differs between some of the graphs. The donor pool consists of 17 urban school districts in Louisiana. There is a different synthetic control for each expenditure category (see Table 2). Instructional expenditures are all activities dealing directly with the interaction between teachers and students. Overall administration consist of school, general, and central administration. School administration includes all activities concerned with the administrative responsibility of a school, for instance running the principal's office. General

administration consists of all activities concerned with establishing and administering policies for operating the local education agency (LEA). The values is adjusted for double counting of authorizer fees. Central services are activities such as planning, research, development, evaluation, information, staff, and IT activities for the entire LEA.

Figure 6: Differences between New Orleans and Synthetic Control for Transportation, Maintenance, Food, and Other



**(a)**
Teacher and Pupil Support Services Expenditures

**(b)**
Transportation Expenditure

**(c)**
Maintenance Expenditure

**(d)**
Food Expenditure

**(e)**
Other Expenditure

*Data:* LDOE FISCAL DATA; LDOE Budget Letters; CWI based on Taylor & Fowler (2006), Bureau of Labor Statistics; U.S. Census

*Notes:* Scale of the y-axis differs between some of the graphs. The donor pool consists of 17 urban school districts in Louisiana. There is a different synthetic control for each expenditure category (see Table 2). Support services includes payments for pupil and staff programs. Pupil services consist of social work, guidance, and medical programs. Staff services are mainly trainings for teacher to improve classroom-related activities. Transportation services include all expenditures for transporting children to and from school and other activities, including field

trips. Maintenance services consist of all activities to keep grounds, buildings, and equipment in effective working condition and state of repair. Food services are all expenditures used in the school food service program. Other spending includes all expenditure categories not included in the previous categories. These functions include mainly purchased services which were not reported separately for all time periods.

**Tables**

Table 1: Spending Categories

| Spending category | Definition |
|---|---|
| Operating expenditure | Category includes the following spending categories as defined below: instruction, teacher and pupil support, school administration, general administration, central administration, transportation, maintenance, food, and other. The category excludes all capital and debt payments. |
| | We subtract two percent of the total per pupil revenue from the per pupil operating expenditure to adjust for double counting of authorizer fees. Double counting occurs if the fee is considered an expenditure for charter schools and a revenue for authorizers that is spent for administrative purposes. |
| | **Categorization according to spending activity (by function)** |
| Instruction | Activities dealing directly with the interaction between teachers and students, for instance teaching inside and outside the classroom, special education programs, and co–curricular activities. |
| Teacher and pupil support | Support services are narrowly defined as assistance to pupils and staff. Pupil services consist of social work, guidance, and medical programs. Staff services are mainly trainings for teachers to improve classroom-related activities. |
| Overall administration | Category includes school and general administration, and central services as defined below. |
| School administration | Activities concerned with the administrative responsibility of a school, such as running the principal's office. |
| General administration | Activities concerned with establishing and administering policies for operating a local education agency (LEA) as for instance board of education services or activities associated with the executive responsibility for the entire LEA. |
| | We subtract two percent of the total per pupil revenue from general administration measures to adjust for double counting of authorizer fees. |
| Central services | Activities, other than general administration, that support each of the other instructional and supporting services programs. These activities include planning, research, development, evaluation, information, staff, and administrative technology services. This category includes spending at the CMO level. |
| Transportation | Activities concerned with conveying students to and from school, as provided by state and federal law. This function includes trips between home and school, as well as trips to school activities, including field trips. |
| Maintenance | Activities to keep grounds, buildings, and equipment in effective working condition and state of repair. |
| Food | Activities concerned with providing food to students and staff in a school or LEA to meet the nutritional needs of children as defined in U.S.D.A. child nutrition regulations. Activities may include the operation of breakfast, lunch, snacks, catering, and nutrition education. |
| Other | Other spending includes all expenditure categories not included in the previous categories. |

These functions primarily include purchased services that were not reported for all time periods.

| **Categorization according to service or commodity bought (by object)** | |
|---|---|
| Salaries | Amounts paid to both permanent and temporary LEA employees, including personnel substituting for those in permanent positions. This expenditure includes gross salary for personal services rendered while on the payroll of an LEA. |
| Benefits | Amounts paid by the LEA on behalf of employees. These amounts are not included in the gross salary but are in addition to that amount. Such payments are fringe benefit payments and, while not paid directly to employees, are, nevertheless, part of the cost of personal services. |
| | We focus in the analysis exclusively on pension-related benefits, as other benefits are not reported for all time periods. |
| Other | All other expenses not included in salaries and benefits. |

Note: All definitions are taken from the Louisiana Accounting & Uniform Governmental Handbook (LAUGH Guide, 2010).

Table 2: Average Pre-Reform Characteristics

| Variables | Actual New Orleans | Synthetic New Orleans | Donor Pool Urban School Districts | Weight V |
|---|---|---|---|---|
| Share students with disability | 9.59 | 10.34 | 12.5 | 0.221 |
| Share FRPL students | 69.69 | 65.2 | 58.01 | 0.139 |
| Share LEP students | 1.32 | 1.29 | 1.52 | 0.185 |
| Share white students | 5.63 | 44.95 | 54.99 | 0.020 |
| Unemployment rate | 6.23 | 6.28 | 6.37 | 0.027 |
| Median income | 35,851 | 38,056 | 49,154 | 0. 295 |
| Median housing value | 146,533 | 145,524 | 115,004 | 0.022 |
| Comparable wage index | 0.88 | 0.82 | 1.33 | 0.009 |
| Enrollment | 79,129 | 21,680 | 18,723 | 0.010 |
| Enrollment change | -1.57 | -0.59 | -0.24 | 0.080 |

*Data:* LDOE FISCAL DATA; LDOE Budget Letters; CWI based on Taylor & Fowler (2006), Bureau of Labor Statistics; U.S. Census

*Notes:* All variables are averaged for the time period prior to the reforms 1990 – 2005. The last column reports the weight *V* each variable receives in estimating the synthetic control group. The school districts receiving a positive weight *W* in estimating the synthetic control group are East Baton Rouge (0.41), Tangipahoa (0.45), and St. Charles (0.14).

Table 3: Results for Synthetic Control Group Models and Decomposition (Equations 3 and 5)

| | | |
|---|---|---|
| Change in Operating Expenditure (urban sample) | | $1,359 (13%) |
| Change in Operating Expenditure (storm sample) | | $1,414 (14%) |
| Change in Instructional Expenditure | | $706 (10.1%) |
|     Per Pupil Instructional Salaries | -33.12% | |
|       Per Pupil Average Salary Instruction | -82.64% | |
|       Instructors per Students | -17.83% | |
|     Per Pupil Instructional Benefits | -50.17% | |
|     Per Pupil Instructional Other | -16.71% | |
| Change in Administrative Expenditure | | $699 (66%) |
|     Per Pupil Administrative Salaries | 51.28% | |
|       Per Pupil Average Salary Administration | 61.80% | |
|       Administrators per Students | 38.04% | |
|     Per Pupil Administrative Benefits | 3.27% | |
|     Per Pupil Administration Other | 45.46% | |
| Change in School Administration Expenditure | | |
| Change in General Administration Expenditure | | |
| Change in Central Administration Expenditure | | |
| Teacher and Pupil Support Services Expenditure | | $60 (4.7%) |
| Transportation Expenditure | | $300 (33%) |
| Maintenance Expenditure | | $11 (1%) |
| Food Expenditure | | $173 (128%) |
| Other Expenditure (Purchased Services) | | $704 (33%) |

*Data:* LDOE Salary and Experience Information; LDOE FISCAL DATA; LDOE Budget Letters; CWI based on Taylor & Fowler (2006), Bureau of Labor Statistics; U.S. Census
*Notes:* Table shows the results for the synthetic control group models and calculates percentages for decomposition based on results in Appendix E.

Table 4: Difference-in-Differences Estimate for Revenues

| | 2003-2005 Mean | | 2012-2014 Mean | | Difference in Differences |
|---|---|---|---|---|---|
| | Control | New Orleans | Control | New Orleans | |
| Per Pupil Federal Revenues excl. Capital | $ 1,382 | $ 1,542 | $ 1,725 | $ 2,873 | $ 988 |
| Per Pupil State Revenues excl. Capital | $ 4,007 | $ 4,293 | $ 4,243 | $ 4,384 | $ (146) |
| Per Pupil Revenues Property Tax | $ 1,762 | $ 1,845 | $ 2,328 | $ 2,815 | $ 406 |
| Per Pupil Revenues from Sales Tax | $ 2,560 | $ 1,690 | $ 3,258 | $ 2,350 | $ (37) |
| Per Pupil Donations to Schools | $ 25 | $ 14 | $ 9 | $ 345 | $ 348 |

*Data:* MFP Budget Letters; LDOE Fiscal Data; Charter School Audits
*Notes:* Table calculates difference-in-differences using a control group based on the districts and weights of the main specification and New Orleans. The pre-reform measures are calculated using the mean of revenues between 2003 and 2005, and the post-reform measures are calculated using the mean of revenues between 2012 and 2014.

Table 5: School districts receiving positive weights for the synthetic control groups using different categories of spending activities

| Main Specification | |
|---|---|
| East Baton Rouge | 0.422 |
| St. Charles | 0.133 |
| Tangipahoa | 0.445 |
| | |
| *Instruction* | |
| East Baton Rouge | 0.713 |
| St. James | 0.287 |
| | |
| *Overall Administration* | |
| East Baton Rouge | 78.9 |
| Caddo | 21.1 |
| | |
| *School Administration* | |
| East Baton Rouge | 0.53 |
| St. Martin | 0.47 |
| | |
| *General Administration* | |
| Caddo | 0.028 |
| East Baton Rouge | 0.84 |
| Jefferson Davis | 0.132 |
| | |
| *Central Administration* | |
| East Baton Rouge | 0.744 |
| St. James | 0.256 |
| | |
| *Support Services* | |
| St. James | 0.169 |
| Tangipahoa | 0.831 |
| | |
| *Transportation* | |
| Caddo | 0.683 |
| East Baton Rouge | 0.041 |
| St. Martin | 0.276 |
| | |
| *Maintenance* | |
| Caddo | 0.209 |
| East Baton Rouge | 0.678 |
| East Carroll | 0.043 |
| Jefferson Davis | 0.001 |
| St. Helena | 0.069 |

*Food*

| | |
|---|---|
| Tangipahoa | 0.609 |
| St. James | 0.005 |
| East Baton Rouge | 0.325 |
| Jefferson Davis | 0.061 |
| | |
| *Rest* | |
| East Baton Rouge | 0.69 |
| Jefferson Davis | 0.001 |
| St. Landry | 0.309 |

*Data*: LDOE FISCAL DATA; LDOE Budget Letters; CWI based on Taylor & Fowler (2006), Bureau of Labor Statistics; U.S. Census

*Notes:* The donor pool consists of 17 urban school districts in Louisiana. There is a different synthetic control for each expenditure category. Presented are the weights *W* greater than zero received by school districts applying the synthetic control method.

**Appendix A: New Orleans Revenues**

Revenue Sources

School funding in New Orleans, as in most other states in the U.S., has three main sources: federal revenues (26.4 percent in 2013/14), state revenues (27 percent in 2013/14), and local revenues (46.6 percent in 2013/14). Federal revenues are administered to the state and given directly to RSD and BESE schools. OPSB receives federal dollars for its direct-run and charter schools. The money is used to provide services for direct-run or charter schools.

The state calculates the revenue that a school district receives using the Minimum Foundation Program (MFP). The formula gives additional weight to students who live in poverty or have limited English proficiency, receive vocational training, have a disability, carry a gifted designation, or live in a small school district. OPSB distributes state revenues to its charter schools as a per pupil average, without considering the state's categories for weighting. Thus, schools enrolling greater shares of students with disabilities compared to the average school receive less than what they are entitled to according to the MFP. OPSB has the discretion to determine budget allocations for its few remaining direct-run schools. RSD has its own formula for distributing state revenues to schools that distinguishes between types of disabilities but does not distribute state revenue on a per pupil basis for FRLP and gifted students[28]. BESE schools receive per pupil funding according to the MFP formula.

OPSB is the only school-governing body that has the right to collect local revenues including property and sales taxes. Therefore, OPSB levies taxes for all schools in the district and then distributes revenues equally on a per pupil basis. Further, OPSB is the only entity allowed to incur debt. The district carried over a debt of $350 million from the financial periods prior to the storm including approximately $250 million from bonds issued in the 1990s. In the years after the hurricane, the OPSB levied a specific millage for this debt, and all schools operating in OPSB-owned buildings contributed revenue from this millage to debt payments (BGR, 2014; Cowen Institute, 2011).

Additional Revenue Sources after Hurricane Katrina

It is important to mention that New Orleans received a large number of federal lump sum block grants in addition to regular federal funding to rebuild the district after Hurricane Katrina. These grants included Immediate Aid to Restart Public Schools (RESTART), the Hurricane Educator Assistance Program (HEAP), and the Hurricane Katrina Foreign Contributions Program. For the 2008/09 school year, the Cowen Institute (2011) reports the citywide spending[29] of these grants: RESTART aid $3,092,570; HEAP $299,559; and Foreign Contributions Program $1,098,950[30].

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[28] Act 467, established in 2015, requires OPSB and RSD for the 2015/16 school year to come up with a common funding formula based on student characteristics.

[29] Federal grants are provided on a reimbursement basis, so the spending reported in school audits reflects the actual money that schools received from the federal government. OMB Circular No. A-133 requires a differentiated audit of expenses for federal grants over $300,000.

[30] All numbers are based on the Cowen Institute report "A Look at School-by-School Finances in New Orleans, 2009-2010: An Addendum to the March 2011 State of Public Education in New Orleans School Finances Report" (Cowen Institute, 2011).

These numbers are based on charter school audits and are likely a lower-bound estimate. Non-profits do not have to separately report spending of federal revenues under $300,000 (OMB Circular No. A-133). Further, the numbers do not include spending at the level of the governing agency. However, the numbers show that New Orleans received relatively large amounts of one-time aid after the storm. Yet, the spending of additional federal one-time aid did not last. In the 2009/10 school year, spending from these grants decreased drastically by 91 percent for RESTART, 51 percent for HEAP, and 47 percent for Foreign Contributions Program (Cowen, 2011).

Two additional one-time aid sources came and still come from the Federal Emergency Management Agency (FEMA) and Public Charter Schools Federal Grant Program. FEMA provided a lump sum $1.8 billion grant to the RSD and the OPSB to rebuild New Orleans public school campuses (BGR, 2013). In May 2015, 33 school projects were completed, 31 were under construction, 4 were in the procurement phase, and 16 in the design phase (FEMA, 2015). Further, FEMA loaned the school board nearly $60 million for operating expenses following Hurricane Katrina. FEMA subsequently forgave the entire balance of the FEMA Community Disaster Loan of $60 million (OPSB Comprehensive Financial Report, 2014). The Public Charter Schools Federal Grant Program provides financial assistance for the planning, program design, and initial implementation of charter schools and for the dissemination of information on charter schools. Currently, new charter schools in Louisiana are eligible to receive funding under this program for up to 3 years at $200,000 per year.

Apart from one-time aid and regular revenue streams from federal, state, and local sources, some charter schools in New Orleans received money through grants that were won through competitive processes. Two examples are the Investing in Innovation (i3) and the NOLA Teaching Incentive Fund. The i3 grant was received by the non-profit organization New Schools for New Orleans (NSNO) and helped restart schools in New Orleans. The organization supplemented the $28 million federal i3 grant with $5.6 million in private funds. NSNO applied with RSD for resources from the NOLA Teaching Incentive Fund. Both organizations received a grant of $13.2 million to provide performance incentives and professional development opportunities to about 25 schools (NSNO, 2015).

Another source of funding is philanthropic revenues. We use audit data from 2006/07 to 2012/13 to determine the amount of philanthropic revenues that New Orleans charter schools received after Hurricane Katrina. In these years, charter schools received a total of $76,851,734[31] in contributions and donations. The per pupil amounts varied widely between schools. Some schools did not receive any philanthropic contributions, while others received more than $6,000 per pupil. On average, between 2006/07 and 2012/13, New Orleans schools received $732 per pupil in philanthropic revenues with a standard deviation of $1,954.

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[31] In 2013 dollars.

## Appendix B: Louisiana Maps

Figure B.1: Donor pool urban districts in Louisiana
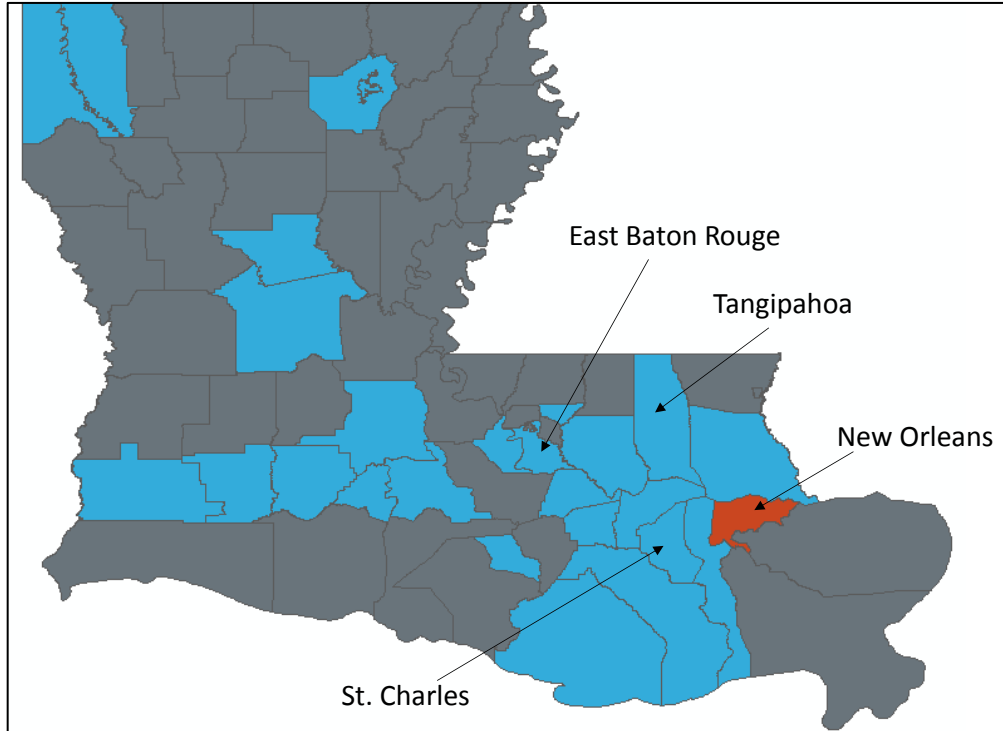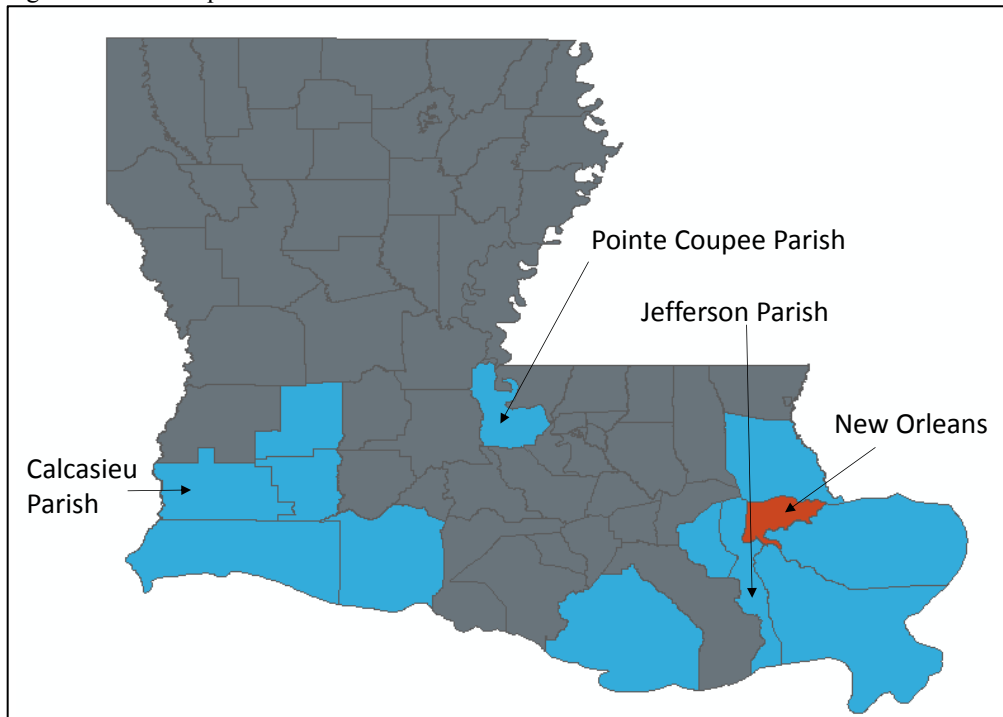


Figure B.2: Donor pool storm-affected districts in Louisiana

**Appendix C: Falsification Tests and Robustness Checks**

<u>Falsification Tests</u>

The idea behind the falsification test is simple. If the main results are truly associated with the New Orleans reforms, they should only hold during the relevant time period and only for New Orleans.

We start by creating a false intervention period that begins in 1999 and ends in 2005. The selection of the starting point is based on the implementation of the Louisiana school accountability system. This intervention may have caused spending differences between school districts, potentially biasing our results. Also, 1999 is almost in the middle of the pre-reform period in the data, which allows us to observe nine years before and seven years after the false intervention. The result of the main specification would be called into question if the false intervention led to a sizable positive difference in per pupil spending between the actual and synthetic New Orleans.

The estimated model is based on the same donor pool and variables as used in the main specification. Figure C.1 presents the result for the first falsification test. Prior to false intervention, the synthetic New Orleans almost exactly reproduces the per pupil expenditure of actual New Orleans. After the false intervention, the line for the synthetic New Orleans is above the actual New Orleans, demonstrating a similar trend. The result suggests a small but negative difference in per pupil operating expenditures, and the greatest difference between synthetic and actual New Orleans expenditures is $371. Given the small and negative results of the test, the result of the main specification is confirmed.

The next falsification test iteratively reassigns the reforms to the 17 school districts in the donor pool. This process provides us with a distribution of estimated spending gaps for districts without education reforms. The result of the main specification is corroborated if the gap in operating expenditures for New Orleans is consistently larger than the gap of the false interventions.

Figure C.2 displays the results of the second falsification test. The thick orange line represents the difference in spending between the actual and synthetic New Orleans, and the grey lines depict the gap between actual and synthetic spending for the 17 school districts in the donor pool. Each grey line is associated with the run of a false intervention. For all school districts, the synthetic control group provides a good fit for per pupil operating expenditures prior to the reforms. After the reforms, only New Orleans shows consistently a large difference between synthetic and actual spending. For the districts in the donor pool, the majority of gaps are negative, and the few positive gaps do not have the size and consistency of the gap in New Orleans. Thus, the second falsification test confirms the findings of the main specification.

<u>Robustness Check</u>

Another concern in calculating the difference in expenditures before and after the reforms is the sensitivity to changes in the district weight $W$. Recall that the synthetic control is estimated as a weighted average of East Baton Rouge, Tangipahoa, and St. Charles parishes. In this robustness

check, we iteratively re-estimate the baseline results of per pupil expenditures omitting one of the districts included in the synthetic control. We will lose some goodness of fit but have greater transparency on how each district influences the main results.

Figure C.3 displays the results of the sensitivity check in grey lines while also incorporating the results of the main specification. The grey lines show that per pupil calculations are fairly robust to the exclusion of any particular school district from the donor pool. Leaving out either East Baton Rouge or Tangipahoa school district leads to a very similar gap in spending between actual and synthetic New Orleans relative to the main specification. Leaving out St. Charles school district results in a greater difference in spending. Overall, the results confirm the findings of the main specification.

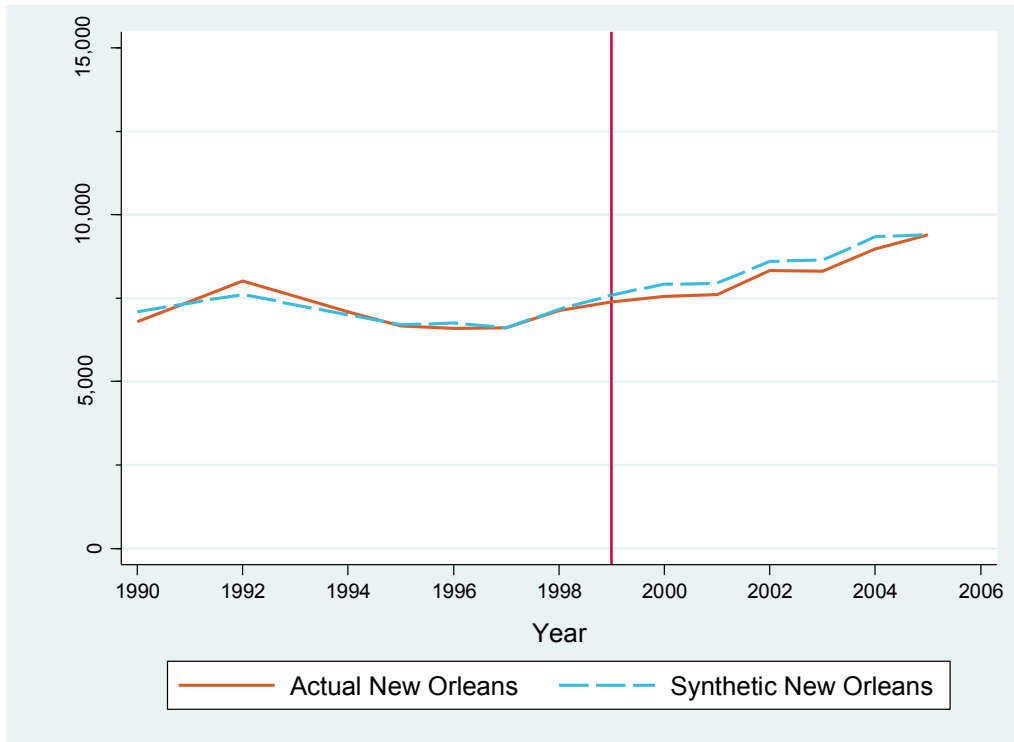Figure C.1: Falsification test using a false intervention time



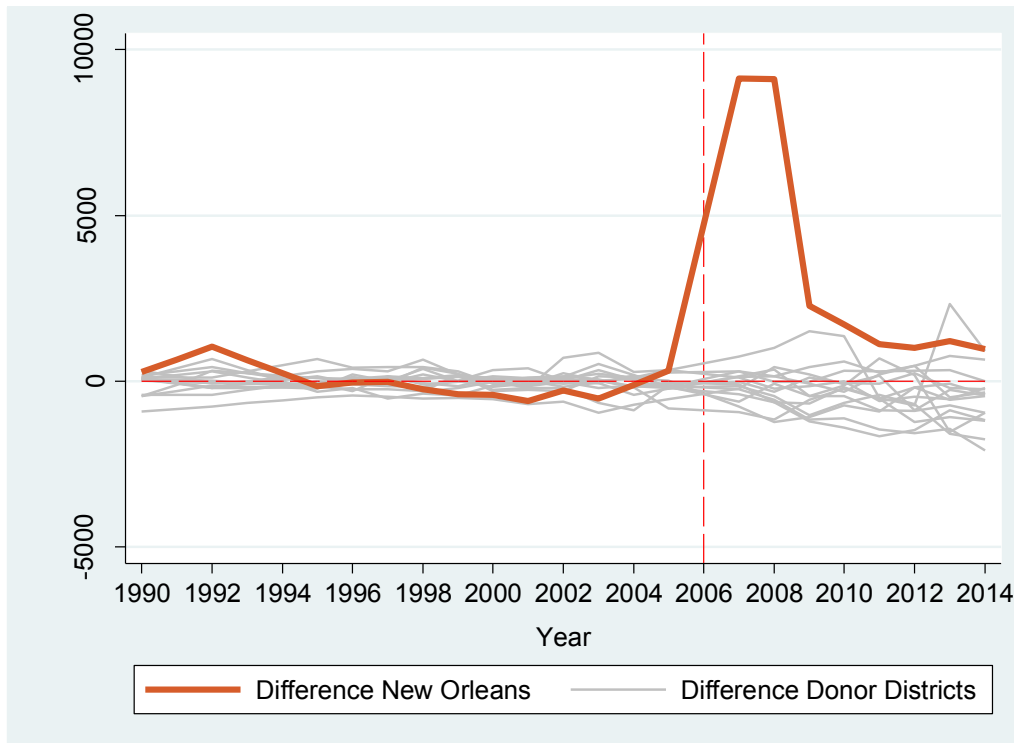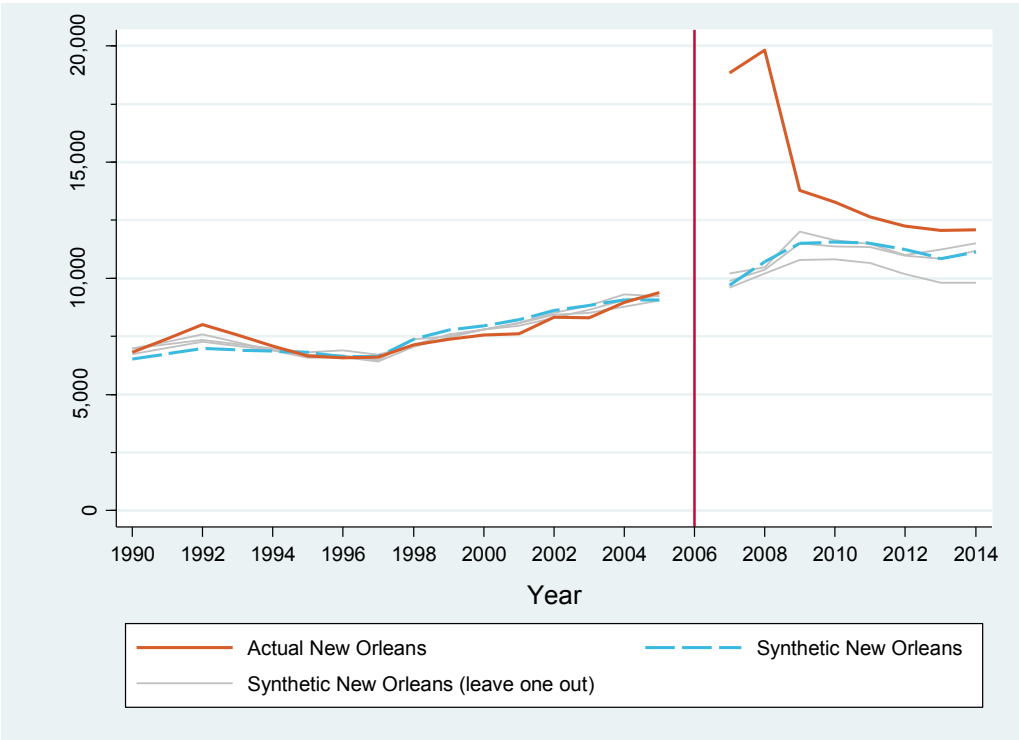Figure C.2: Falsification test assigning the reforms to all districts in the donor pool

Figure C.3: Robustness check leaving one district out of the synthetic control group out of the donor pool

# Appendix D: Spending Functions Using the Control Group of the Main Specification

Figure D.1: Differences between New Orleans and the Synthetic Control for Spending in Instructional and Administrative Functions Using the Control Group of the Main Specification
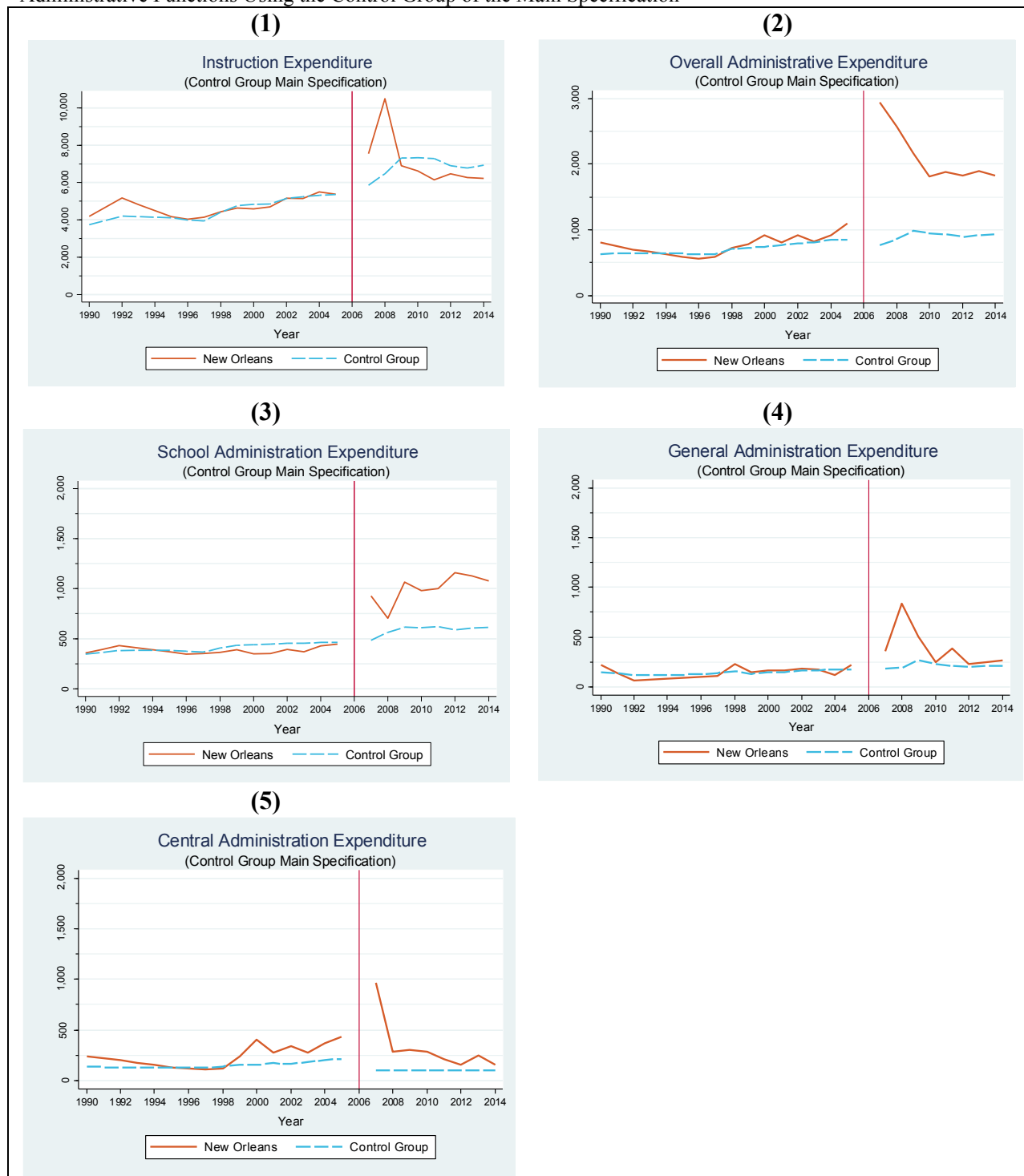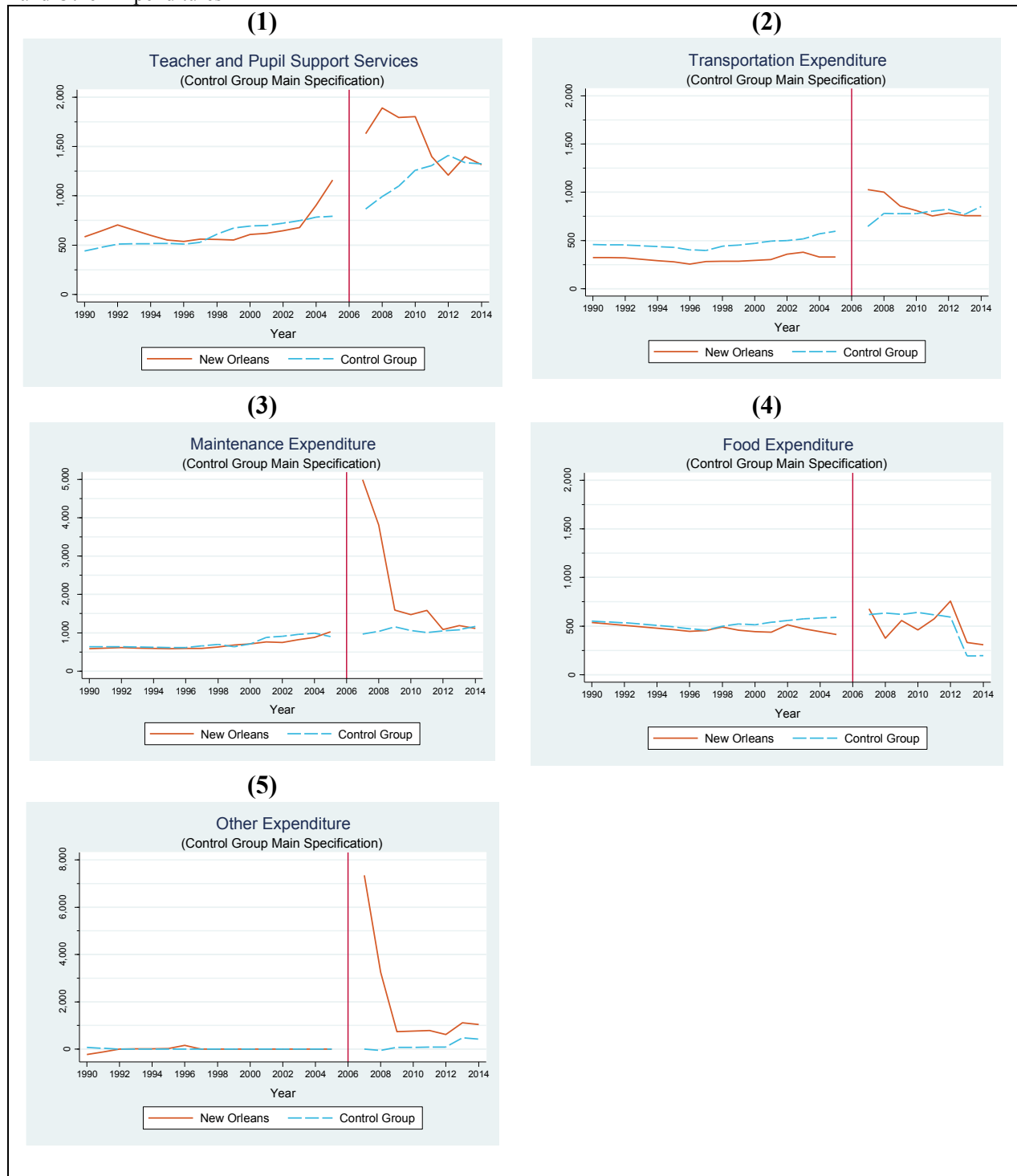
Figure D.2: Differences between New Orleans and the Synthetic Control for Transportation, Maintenance, Food, and Other Expenditures

## Appendix E: Difference-in-Differences Results for Decompositions

Table E.1: Difference-in-Differences Estimates for Decomposition

| | 2003-2005 Mean | | 2012-2014 Mean | | Dif Di |
|---|---|---|---|---|---|
| | Control | New Orleans | Control | New Orleans | |
| **Difference-in-Differences: Instruction** | | | | | |
| (6a) Per Pupil Instructional Salaries | $3,527.07 | $3,064.57 | $3,975.63 | $3,283.37 | |
| (6b) Per Pupil Instructional Benefits | $480.96 | $433.32 | $953.16 | $557.52 | |
| (6c) Per Pupil Instructional Other | $1,532.63 | $1,790.50 | $1,947.50 | $2,089.46 | |
| **Difference-in-Differences: Administration** | | | | | |
| (6d) Per Pupil Administrative Salaries | $580.83 | $541.67 | $619.15 | $942.43 | |
| (6e) Per Pupil Administrative Benefits | $75.62 | $76.55 | $134.46 | $158.48 | |
| (6f) Per Pupil Administration Other | $220.06 | $325.67 | $124.76 | $551.70 | |
| **Difference-in-Differences: Instructional Salaries** | | | | | |
| (7a) Per Pupil Average Instructional Salaries | $7.97 | $0.63 | $8.79 | $1.01 | |
| (7b) Per Pupil Average Instructional Salaries (Two or Less Years of Experience) | $7.06 | $0.51 | $7.25 | $0.92 | |
| (7c) Average Teacher Experience | 10.22 | 14.91 | 11.44 | 3.93 | |
| (7d) Instructors per Students | 0.073 | 0.071 | 0.078 | 0.070 | |
| **Difference-in-Differences: Administrative Salaries** | | | | | |
| (7e) Per Pupil Average Administrative Salary | $6.06 | $0.62 | $6.44 | $1.25 | |
| (7f) Administrators per Students | 0.012 | 0.013 | 0.013 | 0.016 | |

*Data:* LDOE Salary and Experience Information; LDOE FISCAL DATA
*Notes:* Table calculates difference-in-differences based on decompositions in Equations 2-5. The pre-reform measures are calculated using the mean based on the years 2003-2005, and the post-reform measures are calculated using the years 2012-2014. Numbers based on Equation 5 exclude the log in the calculations to give a more meaningful interpretation. All numbers shown in the main text follow exactly Equation 5. Also, 7b and 7c show changes in experience to understand better what is driving alterations in average teacher salaries.