SCHOOL FINANCE REFORM: DO EQUALIZED EXPENDITURES IMPLY EQUALIZED TEACHER SALARIES?

Meg Streams

Department of Public Administration
Tennessee State University
Nashville, TN 37203-3401
mstreams@tnstate.edu

J. S. Butler

Martin School of Public Policy and Administration
University of Kentucky
Lexington, KY 40506-0027
jsbutl3@uky.edu

Joshua Cowen

Martin School of Public Policy and Administration
University of Kentucky
Lexington, KY 40506-0027
joshuacowen@uky.edu

Jacob Fowles

Department of Public Administration
University of Kansas
Lawrence, KS 66045
jacob.fowles@ku.edu

Eugenia F. Toma

(corresponding author)
Martin School of Public Policy and Administration
University of Kentucky
Lexington, KY 40506-0027
eugenia.toma@uky.edu

Abstract

Kentucky is a poor, relatively rural state that contrasts greatly with the relatively urban and wealthy states typically the subject of education studies employing large-scale administrative data. For this reason, Kentucky's experience of major school finance and curricular reform is highly salient for understanding teacher labor market dynamics. This study examines the time path of teacher salaries in Appalachian and non-Appalachian Kentucky using a novel teacher-level administrative data set. Our results suggest that the Kentucky Education Reform Act (KERA) provided a salary boost for all Appalachian teachers, resulting in a wage premium for teachers of low and medium experience and equalizing pay across Appalachian and non-Appalachian districts for teachers of high experience. However, we find that Appalachian salaries fell back to the level of non-Appalachian teachers roughly a decade following reform, at which point the pre-KERA remuneration patterns re-emerge.

1. INTRODUCTION

Many states have adopted educational reforms designed to close the achievement gap and increase the achievement of traditionally underserved student populations. A common early approach with these reforms was financial reform that reduced the variation in per pupil expenditures between the richest and poorest districts, a metric used as prima facie evidence of the inequality of the public schooling systems in many states.

There is a great deal of evidence that the state finance reforms were quite successful when evaluated on the criterion of reduced public fund inequality in per pupil resources (Murray, Evans, and Schwab 1998; Moser and Rubenstein 2002). However, empirical literature unsurprisingly documents that secondary, unintended effects also accompanied the spending reforms.[1] Given practical realities as well as the "does money matter" studies (Coleman et al. 1966; Greenwald, Hedges, and Laine 1996; Hanushek 1986, 1989), researchers and policy makers interested in the continuing achievement gap have shifted attention beyond the surface level of available resources to the strategic expenditure choices made by districts and schools. Of these strategic expenditures, there is growing consensus that, of all categories of educational expenditures, teachers matter most.

Recent research has emphasized the importance of the link between quality teachers and student achievement (Sanders and Rivers 1996; Darling-Hammond 1999; Rowan, Correnti, and Miller 2002; Rivkin, Hanushek, and Kain 2005; Guarino, Santibanez, and Daley 2006; Johnson 2006), a finding so critical that it became one of the focal points for the No Child Left Behind (NCLB) legislation enacted in 2001 and continues to be a driver of the emphasis on data collection in the federal Race to the Top competition. Ultimately, to attract and retain high-quality teachers, schools must be able to offer sufficient pecuniary and nonpecuniary benefits to prevent teachers from choosing alternative labor market opportunities—including more lucrative teaching (or administrative) positions at other schools or in other districts (Murnane and Olsen 1990; Figlio 1997; Loeb and Page 2000).

There has been little research that has examined in detail the relationship between resources available to schools and the salaries paid to teachers.[2] Using a rich, longitudinal, statewide data set on teacher salaries and teacher attributes, we capitalize on a finance reform that reduced resource variation

1. For example, students in wealthier districts opted out of the public schools in California and attended private schools with the long-run consequence of less support for public schools in the state (Downes and Schoeman 1998). Education was also forced to compete with other state-provided services that contributed to reduced long-run support for public schools (Theobald and Picus 1991).
2. There has been some work on performance accountability and teacher salaries. See Bifulco (2010).

across districts. We find that in the short run, the reform also changed relative teacher salaries across districts in Kentucky in the direction intended in the legislation. However, less than a decade following enactment of reforms, districts had begun to allocate resources differently. Salary differentials that existed between Appalachian and non-Appalachian districts reasserted themselves, with the result that current salary patterns closely resemble those that existed prior to the finance reform. The findings provide potentially important insights into how school districts allocate resources in response to new sources of revenues and, in particular, raise questions about the goal of salary equalization as a means of closing the achievement gap.

2. BACKGROUND

Whether the gap is defined as between rich and poor, black and white, or suburban and inner-city children, study after study continues to find performance differences related to student socioeconomic or geographic status. But as described above, policy makers and researchers are now looking at the quality of teachers as a large part of the answer to this achievement gap. Most studies that have looked at teacher quality and the achievement gap from a location perspective have tended to focus on the differences between suburban and urban (and particularly inner-city) schools (Chester and Beaudin 1996; Lankford, Loeb, and Wyckoff 2002; Boyd et al. 2005). Much less thoroughly studied are the challenges faced by rural schools relative to their suburban and urban counterparts (Ballou and Podgursky 1995; Sherwood 2000; Arnold et al. 2005).

The majority—nearly 56 percent—of public school districts in the United States are located in rural areas. While city-located districts are larger in terms of total student population compared with rural districts (30.4 percent versus 21.3 percent), the number of public school students attending rural schools is nontrivial: over 10.3 million students attend rural public schools, almost half of whom attend schools located in either “distant” or “remote” rural areas (Provasnik et al. 2007). Even more to the point is the relationship between high-poverty states and the location of schools. Among the ten states with the highest rates of poverty, 57 percent of the districts and 36 percent of students are located in rural areas. Ultimately the unique problems that these schools face in bridging the achievement gap, especially in terms of teacher quality, are worthy of study.

The public school system of Kentucky provides a valuable opportunity to fill this void. Kentucky is relatively rural and relatively poor. With almost 17 percent of its population in poverty, Kentucky is currently ranked among the four states with the highest poverty rates. It has experienced long-standing

Table 1. Socioeconomic and Demographic Characteristics of Kentucky and Selected States

	KY	NY	FL	NC
Population, 2007	4,241,474	19,297,729	18,251,243	9,061,032
Bachelor's degree or higher, 2000, age 25+	17.1%	27.4%	22.3%	22.5%
High school graduates, 2000, age 25+	74.1%	79.1%	79.9%	78.1%
Population density, 2000, persons per square mile	101.7	401.9	296.4	165.2
Median household income, 2007	40,299	53,488	47,804	44,772
Persons below poverty level	17.2%	13.8%	12.1%	14.3%
Number of Appalachian counties (ARC definition based on federal statute as of 2008)	54	14	0	29
Number of FY 2009 fiscally distressed counties (ARC definition)	38	0	0	0

Source: Demographic data are from the U.S. Census Bureau. Appalachian regional data are from the Appalachian Regional Commission (ARC).

achievement gaps between the poorer, rural areas and the higher income, urban areas of the state—gaps that many argue are at the root of the huge variation in college attendance, economic prosperity, and health outcomes observed across the state. Kentucky, like other high-poverty states, also contains a large number of small, rural school districts: 53 percent of its school districts and 39 percent of its students are in rural areas. Of great interest for the purposes of this article, the state underwent a major school finance reform in 1990. The Kentucky Education Reform Act (KERA), in addition to curricular and governance changes, changed the formula for state funding of schools with the goal of reducing disparities in resources between wealthier and poorer districts.

Many recent insights into teacher quality have emerged because of the increasing availability of statewide administrative data. Kentucky is now joining other states in making these data available for research purposes. But as suggested above, Kentucky is not just another state, and studies of its teachers, students, and policy innovations are not just "more of the same." As table 1 illustrates, along several critical socioeconomic and demographic dimensions, Kentucky is markedly different from Florida, New York, and North Carolina, some of the states with existing longitudinal teacher and student data sets frequently analyzed in the existing literature. Kentucky is smaller, less densely populated, less educated, and poorer than others that have been studied extensively. The rural, poor nature of the state of Kentucky makes these data particularly valuable, and they should offer insights into not only Kentucky but other rural and poor states that data from wealthier states cannot provide.

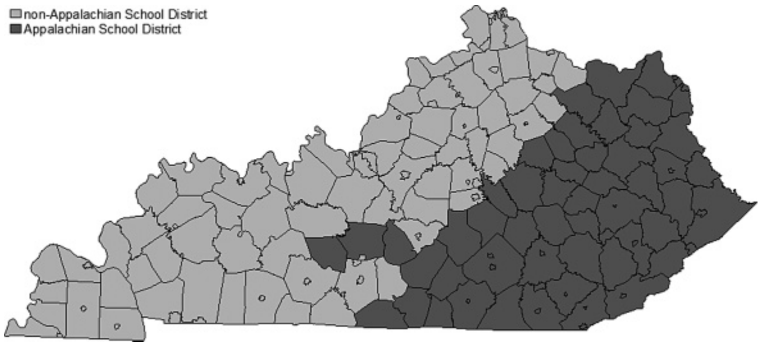

Figure 1. Appalachian school districts in Kentucky. *Notes:* Classification of counties shown as Appalachian is based on the Appalachian Regional Commission definitions as of 2005 (the final year of data in the study; the counties so classified are specified in the U.S. Code Appalachian Regional Development Act of 1965 with subsequent amendments. In 2008 three additional counties were added via amendment, three years after the end of the study period).

Kentucky is interesting not only because it differs significantly from many of the other states currently being studied intensively but because of the significant socioeconomic and geographical variance across school districts within the state. In particular, a major impetus for school finance reform in Kentucky derived from the underlying population differences across the state, especially between the Appalachian and non-Appalachian areas. Figure 1, relying on data published by the Appalachian Regional Commission (ARC), displays the geographic divide in Kentucky between the fifty-one Appalachian counties and the sixty-nine non-Appalachian counties.[3]

Table 2 illustrates the dramatic differences that exist across these two regions. For instance, 63 percent of the population in Appalachia has at least a high school degree as compared with 78 percent of the remaining state population. Similar differences hold across other measures of socioeconomic conditions. The extent of the population in poverty is over 24 percent in the Appalachian counties and approximately 14 percent in the remaining counties. The data in tables 1 and 2 reveal that Kentucky is not only different from other states typically used in studies of this type due to data availability, but the populations within Kentucky greatly differ by locality. The presence of comprehensive education finance reform and the state's demographic characteristics combine to provide an uncommon opportunity for researchers to

3. The definitions of *Appalachian* and *non-Appalachian* presented here reflect Appalachian Regional Commission definitions in effect in 2005 (the final year included in the current analysis). Three years after the end of the study period, three additional counties (Metcalfe, Nicholas, and Roberts) were reclassified by statute as Appalachian. The analyses presented throughout this article are based on the 2005 classification, but the pattern of results is the same if the 2008 definition is used. All results referenced but not reported here are available upon request from the authors.

Table 2. Variation of Population Characteristics within Kentucky between Appalachian and non-Appalachian Counties

	Appalachian Counties (51)	Non-Appalachian Counties (69)
Educational attainment, persons 25 years and over: Percent high school graduate or higher (2000)	62.9	78.8
Educational attainment, persons 25 years and over: Percent bachelor's degree or higher (2000)	10.7	19.8
Median household income (2007)	$31,729	$45,352
People of all ages in poverty: Percent (2007)	24.3	14.5
Population per square mile (2000)	66.3	139.5

Source: FedStats.

study the potential and limitations of large-scale policy interventions targeting educational disparities suffered by at-risk populations.

Socioeconomic disparities within the state have historically been linked to both resource and performance gaps across school districts. Under the assumption that resources and performance by districts were correlated, the state began addressing the resource differences as early as 1976 with the introduction of a power equalization funding program. Large differences in per pupil revenues across school districts continued, however, throughout the 1980s (Flanagan and Murray 2004). For example, average district per pupil spending for instruction ranged from $1,750 to $3,709 as late as 1989–90 (Hoyt 1999, p. 23). One component of this disparity was local tax effort. The 1976 power equalization program introduced a funding formula in which state funding was inversely related to local revenues but did not require a matching contribution from the local districts. Given this incentive structure, many local districts relied heavily on state funds, chose to assess property at less than market value, and chose local tax rates on the property values that were significantly lower than other higher-spending districts.[4]

In response to a lawsuit filed on behalf of some districts from the Appalachian region of the state, the Supreme Court of the Commonwealth in *Rose v. Council for Better Education* (1989) mandated that the legislature create a new system of public schooling, including a new system of finance. As a result of the mandate, in 1990 the legislature changed the funding mechanism to a base plus funding formula known as the Support Educational Excellence in Kentucky (SEEK) formula.[5] The Kentucky Legislative Research Commission

4. In 1987–88, 65 percent of revenues to school districts came from the state (NCES 1990, table 148).
5. This summary of SEEK is based on the Legislative Research Commission (1997, 2002). The funding change was one part of a comprehensive change to the school system that also affected governance and curriculum.

(2002, p. xiii) describes this policy's support and equity goals: "to provide a minimum level of education funding for each student regardless of the wealth of the student's school district; require at least a minimum level of effort to provide funding from each school district; make spending per pupil more equal across Kentucky by basing the amount of state aid per pupil on the wealth of the local school district; and within the constraint of keeping funding per pupil relatively equal, encourage local school districts to increase education funding."

The state guaranteed each district a base amount of per pupil funding that was augmented for special needs such as at-risk students. But significantly, the state also required a local minimum effort from local districts as a requirement for receiving the state funds. A minimum property tax (or its equivalent in other taxes) levy of 30 cents per $100 of (full) assessed value was required. The difference between the base guarantee and local effort was funded by the state. Districts were allowed to increase funding up to 15 percent of the base guarantee and still receive state funding if property value per pupil was less than 150 percent of the state average. Other funding increases were allowed by districts only with voter approval. The net effect of KERA was an increase in the level of revenues contributed both by the state and by previously low-tax effort local governments. Because of the state-mandated increase in local funding, the share of revenues originating from the state actually grew from the pre-KERA era to the present day and is currently 57 percent (NCES 1990, 2009).

The finance portion of KERA was explicitly designed to raise school revenues, reduce inequality in per pupil expenditures, and, by extension, reduce inequality in teacher pay between wealthier and poorer school districts. As a result of KERA, real spending per pupil in Kentucky increased 30 percent from 1989–90 to 1995–96—the highest spending increase observed in the fifty states over this time period (Hoyt 1999). The state increase in expenditures was accompanied by a decline in expenditure variance pre- and post-KERA (Flanagan and Murray 2004; Picus, Odden, and Fermanich 2004).[6] Hoyt (1999) found that the Gini coefficient had declined to 0.07 in 1994–95. This represented nearly a 30 percent decline in inequality from 1989–90 and suggests near equality of expenditures

6. Flanagan and Murray (2004, pp. 203–4) summarize several measures of funding inequality in Kentucky at specified time points: 1986–87, 1991–92, and 1996–97. The measures used were the Gini coefficient, the ratio of expenditures between the districts at the 95th and 5th percentiles of per pupil spending, and the Theil index. For each measure a declining trend in inequality is observed over the period, and the larger share of the drop in inequality was observed between the earlier two time points.

across districts.[7] In dollar terms, Hoyt, Jepsen, and Troske (2008, p. vi) found:

> The gap in current expenditures per student between metropolitan and non-metropolitan districts fell from $600 in 1987 to $10 in 2006. Over this same time period districts in the Eastern part of the state went from having the lowest level of current expenditures per student to having the highest expenditures per student.

Policy makers intended that the increased expenditures would raise teacher salaries across the state, thereby making teaching a more attractive career option in Kentucky. The equalization of revenues across districts was intended to specifically target teacher salaries in poorer, rural eastern Kentucky school districts. The underlying assumptions of the finance reform were that raising all teacher salaries and changing the relative salaries of Appalachian teachers were the keys to improving student performance. The remainder of this article examines salaries of instructional staff in detail to assess whether the financial reforms embodied in KERA (i.e., the centrally mandated increase in expenditures, the mandated increase in tax contributions, especially from Appalachian districts, and the reduced variance in per pupil expenditures) changed teacher salaries in rural Appalachian districts relative to the more urban non-Appalachian region. Our goal is not to evaluate the goal of equalization of expenditures and salaries but rather to look at the response of local districts in terms of teacher salaries to these state-mandated changes in school finance.

3. TEACHER SALARY DATA AND ANALYSIS

In Kentucky, like other states, teacher salaries follow a schedule based on years of experience and rank, which is a function of educational attainment.[8] The highest rank (Rank I) requires a master's degree plus thirty additional hours of approved graduate credit. Rank II requires a master's degree, while Rank III requires only a bachelor's degree. Ranks IV and V are for teachers with emergency certification only and from 64 to 128 credits of approved college

7. Consider that the Gini coefficient, or percentage deviation from equality of salary or income, rarely drops below 0.25 for countries, even those considered to have relatively even income distributions such as Sweden, so the coefficient indicates that there is near equality of spending in Kentucky districts (Gini by country 1992–2007, United Nations Development Programme 2009).
8. Rank can also be obtained through alternative certification criteria as governed by the Kentucky Educational Professional Standards Board (KY EPSB), although the vast majority of teachers obtain rank through the traditional mechanism.

training (Kentucky Revised Statutes 2000).[9] Like many states, Kentucky long ago adopted a statewide minimum teacher salary schedule. While the lack of availability of adequate records leaves the exact date of enactment of the minimum salary requirement unknown, a historical review of Kentucky statutes and administrative regulations shows that it certainly preceded the enactment of KERA.[10] In addition, districts may choose to exceed the state minimum as long as their revenues allow them to do so. All district total expenditures, and by extension teacher salaries, are subject to the district revenue limits described above.

One possibility for examining salaries by type of district would be to collect all the salary schedules from each school district each year, compare across time based on experience and rank, and simply calculate the differences. The schedules, however, are not readily available to researchers for the entire time period. But actual salary data for teachers are available in Kentucky and have been collected annually at the state level for many years.[11] The Kentucky EPSB has provided a historic series of teacher data covering the period 1980–2005. In addition to teacher base salary, data are also available for other teacher characteristics including rank, experience level, and location of the school(s) at which they teach.

To begin our look at teacher salaries, we examined mean salaries for teachers in Appalachian versus non-Appalachian districts over time. We simply calculated the annual mean of all individual teacher salaries for those teaching in Appalachian districts and the annual mean for those teaching in non-Appalachian districts. Figure 2 illustrates the time path of the gap between "raw" mean district salaries in Appalachian and non-Appalachian districts in real terms, unadjusted for rank or experience of teachers. As this figure reveals, the unadjusted average teacher salaries were lower in Appalachian districts in the years preceding finance reform. Salaries grew in both Appalachian and non-Appalachian districts following the passage of KERA, but the gap in unadjusted mean salaries remained.

Nonetheless, average salaries in the two regions of the state do not provide information about the attractiveness of teaching by locality. If regional differences in average rank and experience level exist, for example, unadjusted comparisons are not meaningful. Therefore we can isolate any potential

9. In analyses throughout, we combine Ranks IV and V into a single fourth rank indicator variable; the numbers of individuals in Rank V are small and the ranks are very similar except for the number of college credits held.
10. The exact date of enactment of minimum salary schedules is not clear, but 1988 statutes KRS 157.320 and 157.390 as well as regulation 702 KAR 3:070 clearly indicate that a minimum salary predated the enactment of KERA in Kentucky.
11. The legislature designated the KY EPSB as the repository for the data on Kentucky teachers.

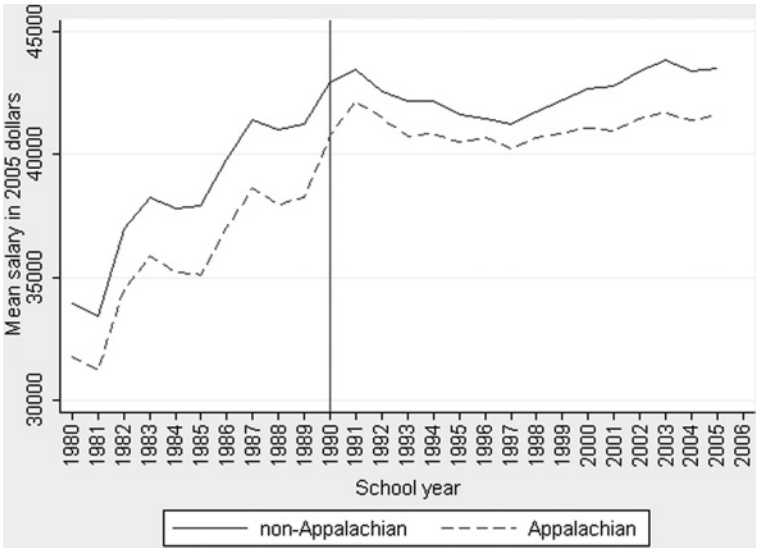

Figure 2. Unadjusted Mean Kentucky Public School Teacher Salaries in Appalachian and non-Appalachian Districts (Constant 2005 Dollars). *Note:* The vertical line represents the enactment of KERA.

Appalachian effect on teacher salary by estimating the following random effects generalized least squares regression equation:[12]

$$\begin{aligned}\ln(Y_{ij}) = \beta_0 + \beta_1(\text{Experience})_{ij} + \beta_2(\text{Experience}^2)_{ij} + \beta_3(\text{Rank})_{ij} \\ +\beta_4(\text{Appalachian})_{ij} + \beta_5(\text{Year})_{ij} \\ +\beta_6(\text{Appalachian} * \text{Year})_{ij} + u_j + \varepsilon_{ij}. \quad (1)\end{aligned}$$

In this equation, Y_{ij} represents the real base salary of teacher i in district j;[13] experience is teacher's experience in the Kentucky public school system measured in years and includes the quadratic term in order to capture the nonlinear effect of experience on salary. Teacher rank is represented by a vector of indicator variables; Appalachian is a dummy variable that equals one if district j is identified as Appalachian and zero otherwise; and year is a vector

12. Random effects are more efficient than fixed effects but produce potentially biased coefficients. A post-estimation Hausman test of the null hypothesis that the fixed and random effects specifications produce equivalently consistent results was not rejected ($p = 0.9994$), justifying the utilization of the random effects specification.
13. The logged specification of the dependent variable was utilized after a Box-Cox regression found the natural log to be the optimal parameter for transformation. This article focuses on base salary. Both before and after KERA, districts have retained small amounts of money for supplementary pay for special duties assigned to teachers. Our data on the supplementary pay does not cover the full range of years under study, but our tentative examination of this special pay suggests that it is small in magnitude and is primarily utilized by districts to pay teachers who also coach athletic teams.

of dummy variables representing school year. The model also includes an interaction between Appalachian status and time so we can account for the possibility of differential effects of Appalachian location on teacher salaries over time. Finally, u_j represents the district-specific random intercept and ε_{ij} is the residual. Standard errors are calculated using the Huber-White correction for heteroskedasticity and are clustered on districts.[14]

Before addressing the impact of Appalachian location on teacher salaries, note in table 3 that the coefficients on the other independent variables do take the expected signs and patterns. For example, table 3 illustrates that a Rank 2 teacher earns $4,934 less than her Rank 1 counterpart, holding experience constant at its conditional mean for Rank 1 teachers (approximately 16 years) and averaging across district location and time. Similarly, compared with a Rank 2 teacher, a Rank 3 teacher earns $4,192 less, holding experience constant at its conditional mean for Rank 2 teachers (approximately 11.5 years) and averaging across district location and time. The table also shows that a one-year increase in teacher experience from its unconditional mean value of 11.5 to 12.5 nets a pay increase of $1,416, averaged across district location and years and holding rank constant at its modal value (Rank 2).[15] The percent of variation in real base salary explained by the model is approximately 86 percent. A high R^2 is expected since we incorporated the key variables that should determine teacher salary by schedule. The number of teachers observed in the data varied by year, starting at 20,867 in 1980 and nearly doubling to 37,427 in 2005.[16]

Table 4 provides the cumulative partial effect of Appalachian location on salaries over time by combining the coefficients of the Appalachian indicator variable with the coefficient on the interaction term between the Appalachian indicator variable and school year. As this table reveals, teachers in Appalachian districts consistently earned lower pay prior to the passage of KERA. For years prior to 1990, the combined coefficient shows that the mean annual salary for teachers in Appalachian districts is significantly lower than those for teachers in non-Appalachian districts, controlling for rank and experience.[17] For example, an Appalachian Rank 1 teacher with 16.1 years of experience (the

14. As a robustness test, we alternatively estimated the model year by year with individual district fixed effects to examine the change in effect of Appalachian status over time. The results are qualitatively unchanged from those presented in the text and are available from the authors upon request.
15. Logged salary was transformed into dollar amounts utilizing the procedure outlined by Wooldridge (2008, p. 212).
16. The data on teachers include all districts over the entire time period. The doubling of teachers in Kentucky is a real phenomenon as opposed to more reporting districts over time. We discuss this later in the article.
17. Each year is tested by combining the main effect of Appalachia (−0.046) with the two-way interaction effect of year and Appalachia (e.g., 0.050 in 1990). The statistical significance of this sum is tested using an F-test.

Table 3. Regression of Logged Teacher Base Salary, Focusing on the Impact of Appalachian Location over Time

	Coefficient	SE
Dummy, rank = 2	−0.092**	0.002
Dummy, rank = 3	−0.191**	0.004
Dummy, rank = 4	−0.223**	0.006
Experience	0.033**	0.002
Experience squared	−0.001**	0.001
Dummy, Appalachia = 1	−0.046**	0.012
Dummy, year = 1981	−0.029**	0.002
Dummy, year = 1982	0.061**	0.010
Dummy, year = 1983	0.086**	0.012
Dummy, year = 1984	0.064**	0.014
Dummy, year = 1985	0.060**	0.014
Dummy, year = 1986	0.101**	0.014
Dummy, year = 1987	0.132**	0.014
Dummy, year = 1988	0.117**	0.014
Dummy, year = 1989	0.117**	0.016
Dummy, year = 1990	0.153**	0.018
Dummy, year = 1991	0.162**	0.018
Dummy, year = 1992	0.139**	0.018
Dummy, year = 1993	0.128**	0.017
Dummy, year = 1994	0.129**	0.016
Dummy, year = 1995	0.120**	0.016
Dummy, year = 1996	0.117**	0.016
Dummy, year = 1997	0.119**	0.016
Dummy, year = 1998	0.139**	0.014
Dummy, year = 2000	0.167**	0.009
Dummy, year = 2001	0.176**	0.007
Dummy, year = 2002	0.191**	0.006
Dummy, year = 2003	0.196**	0.005
Dummy, year = 2004	0.189**	0.006
Dummy, year = 2005	0.199**	0.006
Dummy, Appalachia = 1 & Year = 1981	0.004*	0.002
Dummy, Appalachia = 1 & Year = 1982	0.012	0.010
Dummy, Appalachia = 1 & Year = 1983	0.019	0.011
Dummy, Appalachia = 1 & Year = 1984	0.017	0.014
Dummy, Appalachia = 1 & Year = 1985	0.014	0.014
Dummy, Appalachia = 1 & Year = 1986	0.021	0.013
Dummy, Appalachia = 1 & Year = 1987	0.023*	0.014
Dummy, Appalachia = 1 & Year = 1988	0.017	0.013
Dummy, Appalachia = 1 & Year = 1989	0.020	0.015
Dummy, Appalachia = 1 & Year = 1990	0.050**	0.018
Dummy, Appalachia = 1 & Year = 1991	0.070**	0.018

Table 3. Continued.

	Coefficient	SE
Dummy, Appalachia = 1 & Year = 1992	0.077**	0.019
Dummy, Appalachia = 1 & Year = 1993	0.068**	0.017
Dummy, Appalachia = 1 & Year = 1994	0.066**	0.016
Dummy, Appalachia = 1 & Year = 1995	0.067**	0.016
Dummy, Appalachia = 1 & Year = 1996	0.069**	0.016
Dummy, Appalachia = 1 & Year = 1997	0.064**	0.016
Dummy, Appalachia = 1 & Year = 1998	0.053**	0.014
Dummy, Appalachia = 1 & Year = 2000	0.039**	0.010
Dummy, Appalachia = 1 & Year = 2001	0.030**	0.008
Dummy, Appalachia = 1 & Year = 2002	0.025**	0.008
Dummy, Appalachia = 1 & Year = 2003	0.023**	0.007
Dummy, Appalachia = 1 & Year = 2004	0.023**	0.008
Dummy, Appalachia = 1 & Year = 2005	0.022**	0.008
Constant	10.284**	0.005
N	782,760	
R^2 (overall)	0.8559	
R^2 (within)	0.8998	
R^2 (between)	0.4942	
*p < 0.01; **p < 0.001		

mean experience value for Rank 1 teachers in the sample) earned an average of $1,614 less in real base pay than her non-Appalachian counterpart from 1980 to 1989. However, this relationship changed following the implementation of school finance reform, with the immediate effect of equalizing pay levels across the two district types in 1990. For the next few years through 1997, the salary differences by location reversed: in these years, teachers in Appalachian districts on average received slightly higher salaries than their counterparts in non-Appalachian districts, holding rank and experience constant. Beginning in 1998 the salary patterns again converged so that Appalachian teachers no longer received a wage premium compared with their non-Appalachian counterparts. Indeed, by 2002 the remuneration pattern observed before KERA was such that teachers in Appalachian districts were paid significantly less than teachers in non-Appalachian districts on average for all years after 2001.[18] Returning to our hypothetical Rank 1 teacher with 16.1 years of experience, the average salary differential between Appalachian and non-Appalachian teachers for all years after 2001 is $1,363. Figure 3 displays this trend graphically

18. Kentucky has two large urban districts that are both located in non-Appalachia. In order to ensure that the estimates presented were not being driven by these two districts, the analysis was repeated with these districts omitted. The substantive results remained unchanged.

Table 4. Partial Effect of Appalachian Location on Salary, by Year

Year	Coefficient
1981	−0.042**
1982	−0.033**
1983	−0.027**
1984	−0.028**
1985	−0.031**
1986	−0.025**
1987	−0.022**
1988	−0.028**
1989	−0.026**
1990	0.004
1991	0.025**
1992	0.031**
1993	0.022**
1994	0.020**
1995	0.021**
1996	0.023**
1997	0.018**
1998	0.008
2000	−0.007
2001	−0.015
2002	−0.021*
2003	−0.023*
2004	−0.023*
2005	−0.024*

*$p < 0.05$; **$p < 0.01$.

by replicating figure 2, except that figure 3 controls for teacher rank and experience.

Although the policy makers who designed KERA may or may not have considered it, we raise one additional factor that may influence the attractiveness of teaching by locality. Imazeki (2005), Stoddard (2005), and Rose et al. (2008) have stressed the importance of local labor market conditions in teacher salary determination. Conceptually, districts with higher cost of living would have to pay more to attract a teacher of the same rank and experience as a lower cost-of-living district. At the same time, a district with more amenities available for its residents would be able to pay less because the district is a more

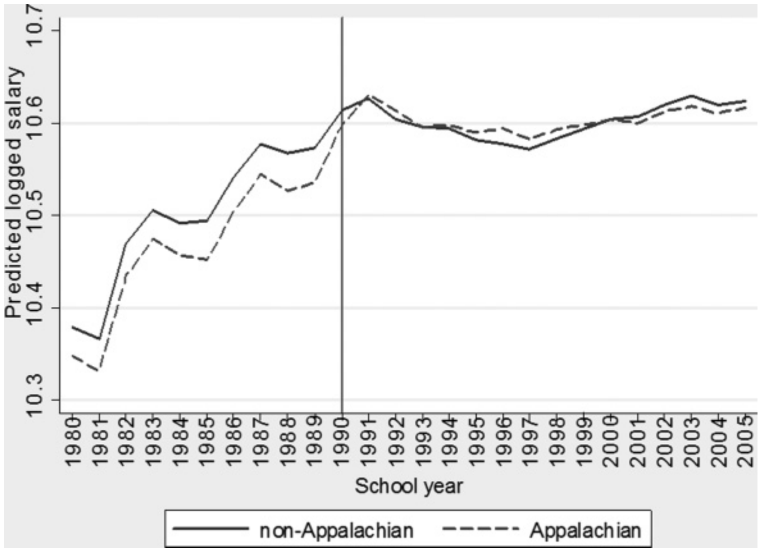

Figure 3. Mean Logged Teacher Salaries in Appalachian and non-Appalachian Districts, Controlling for Rank and Experience. *Note:* The vertical line represents the enactment of KERA.

desirable place to live (Stoddard 2005). Indeed, Taylor and Fowler (2006) have developed a comparable wage index that captures both these factors. A priori, the combined effect of the lower cost of living and available amenities makes it somewhat unclear whether a given salary in the two locales should attract a higher- or lower-quality teacher. The net effect may depend on whether the prospective teacher with regional preferences for Appalachia is of equal quality to the prospective teacher who is likely trained outside Appalachia and must be attracted to the area. We used an approximation for local conditions but found that it did not change the salary patterns described above.[19]

While the above results suggest that the increased revenues to Appalachian districts after KERA did not produce a persistent relative salary change (whether or not a control for district per capita income is included), they also raise additional questions. First, is it possible that other studies have incorrectly

19. While not a perfect measure, we can control for local labor markets and their amenities and opportunities to some degree by including the district per capita income as a control variable in the model. When we do so, we find that teachers in Appalachia on average were paid salaries that were not significantly different from those in non-Appalachia prior to KERA. In other words, local income-adjusted salaries were not significantly different across regions. With the passage of KERA, salaries of Appalachian teachers rose to levels exceeding those of the non-Appalachian teachers, controlling for income differences in the districts. But just as with the results from the model that does not include per capita salary (described throughout the article), the pre-KERA wage pattern again reasserted itself after 1998. Whether higher salaries generated by KERA were necessary to attract higher-quality teachers to Appalachia is not clear. What is clear at this point is that KERA had a temporary effect on the relative salaries paid in Appalachian school districts versus those outside Appalachia but that the pattern was not sustained over time.

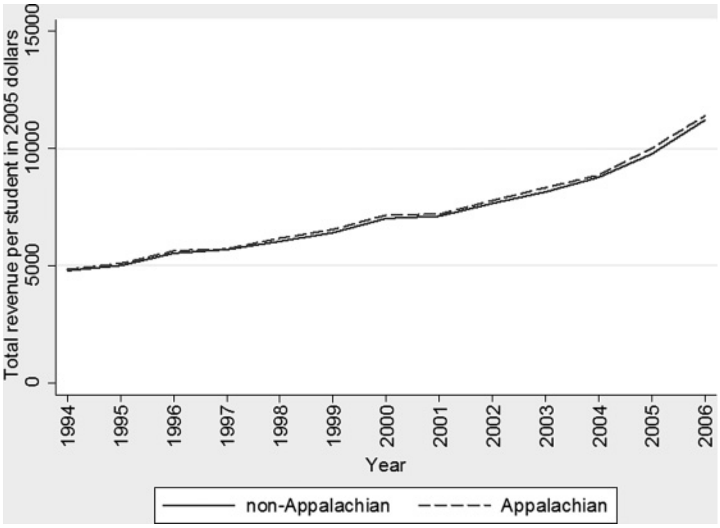

Figure 4. Mean Total School District Revenue per Student in Appalachia and non-Appalachia, by Year

concluded that per pupil revenues (or alternatively per pupil expenditures) have equalized post-KERA? Using district-level data from the Common Core of Data (CCD), we look at per pupil total revenues for Appalachian versus non-Appalachian districts for the post-KERA time period. Figure 4 shows the same pattern found by previous researchers—that is, there are no statistically significant differences between Appalachian and non-Appalachian districts in terms of total district revenues post-KERA (Hoyt 1999; Flanagan and Murray 2004; Hoyt, Jepsen, and Troske 2008). Although total revenues per student have grown over time, the differences between revenues of Appalachian and non-Appalachian districts are insignificant for all years shown.

Our results support previous findings that KERA essentially equalized per pupil revenues across districts. At the same time we find that salary differences between teachers in Appalachian and non-Appalachian districts that disappeared immediately following the passage of KERA have reemerged. So why did the relative salary change fail to persist over time? Alternatively stated, how did Appalachian districts spend the additional revenues if not on teacher salaries? The remainder of this article addresses this question.

One interesting avenue to explore is the breakdown of the spatial salary difference by experience levels.[20] Looking descriptively at the data set and averaging over time for all teachers, the ones in the highest experience category

20. We are grateful to an anonymous referee for this suggestion. We drop per capita income in this model for ease of comparison. As above, inclusion does not alter the results.

earned on average \$8,323 more than teachers in the middle experience category and \$16,783 more than the average for teachers in the lowest experience category. We want to know whether there is any evidence that the Appalachian districts used the infusion of new resources to reward teachers already in the district (i.e., teachers with experience) rather than using the additional money to attract new, more highly qualified teachers. To address this issue we examine the experience premium for teachers to see if it remained constant over time for teachers in Appalachian districts relative to non-Appalachian ones by estimating the following equation:

$$\begin{aligned}\ln(Y_{ij}) = \beta_0 &+ \beta_1(\text{Experience})_{ij} + \beta_2(\text{Rank})_{ij} + \beta_3(\text{Appalachian})_{ij} \\ &+ \beta_4(\text{Year})_{ij} + \beta_5(\text{Appalachian} * \text{Year})_{ij} \\ &+ \beta_6(\text{Experience} * \text{Year})_{ij} + \beta_7(\text{Appalachian} * \text{Experience})_{ij} \\ &+ \beta_8(\text{Appalachian} * \text{Experience} * \text{Year})_{ij} + u_j + \varepsilon_{ij}. \qquad (2)\end{aligned}$$

In order to simplify interpretation, experience was changed from a continuous variable into a series of three indicator variables: a variable set equal to one if a teacher has between zero and three years of experience, zero otherwise; a variable set equal to one if a teacher has between four and twelve years of experience, zero otherwise; and a variable set equal to one if a teacher has more than twelve years of experience, zero otherwise. The full results of the estimation of equation 2 are available in the appendix. Figure 5 displays the mean (logged) salaries for Appalachian and non-Appalachian teachers predicted by the regression, disaggregated by experience level and time.

These results provide valuable insights. First, as one would expect, there are substantive predicted differences in teacher base salaries among the three categorical experience levels. Looking at differences between Appalachian and non-Appalachian teachers within experience categories, note that prior to KERA there was no substantively or statistically significant difference in teacher salary for teachers of low or medium experience across locales. This implies that the observed salary gap (tables 3 and 4) for Appalachian teachers was largely driven by differences in salary among highly experienced teachers. These teachers earned significantly less than teachers with the same experience levels in non-Appalachian schools. One explanation for this may be that teachers in Appalachia have to move out of the region to find alternative employment that pays as well as teaching. Teachers who chose to stay in the region for an extended period, in other words, may have been demonstrating their willingness to accept lower salaries

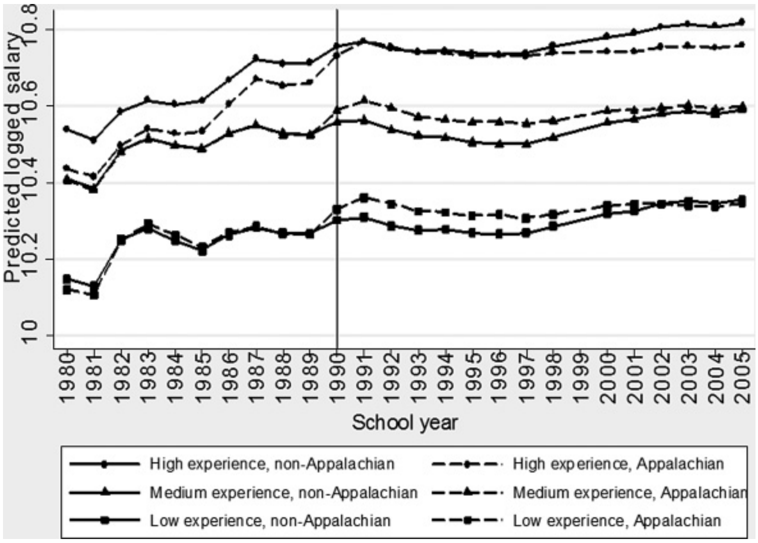

Figure 5. Mean Predicted Teacher Salary in Appalachian and non-Appalachian Districts, by Year and Experience Level. *Note:* The vertical line represents the enactment of KERA.

because the amenities of the region are consistent with their nonpecuniary preferences.

The infusion of additional resources to Appalachian schools raised the relative salaries of teachers across the spectrum of experience from 1991 through 2001. Over this time period, a KERA premium was paid to both new and mid-level teachers in Appalachia. In other words, these teachers began earning higher salaries than those in non-Appalachian schools. Over the same period, teachers with the highest levels of experience no longer had a salary gap in Appalachia. They too shared the benefits reaped from the additional KERA resources. Whether this was optimal or whether it bestowed rents on experienced teachers cannot be discerned from these data. However, the results in figure 5, like those in tables 3 and 4, indicate that the remuneration patterns that existed prior to KERA have since reemerged. Teachers with twelve or fewer years of experience earn the same base salary whether in Appalachia or non-Appalachia, and the most experienced teachers in Appalachia have again lost ground relative to their counterparts in non-Appalachian schools.

To continue addressing the question of where the Appalachian districts are spending the added revenues if not on existing teacher salaries, we next examine the numbers of pupils per teacher by locale of district using data from the CCD (NCES, various years). As illustrated in table 5, we now see a change that occurred with the implementation of KERA that has persisted. Prior to 1990, class sizes in Appalachia and in the non-Appalachian regions

Table 5. Partial Effect of Appalachian Location on Pupil-Teacher Ratios by Year

Year	Coefficient
1987	0.0518
1988	−0.0458
1989	−0.1227
1990	−0.4878**
1991	−0.4926**
1992	−0.7039**
1993	1.4342
1994	−0.0732
1995	−0.6410**
1996	−0.6252*
1997	−0.9483**
1998	−1.0838**
2000	−0.6749**
2001	−0.6148**
2002	−0.6163**
2003	−0.6126**
2004	−0.5195*
2005	−0.5203*

*$p < 0.05$; **$p < 0.01$.

of the state were not significantly different.[21] But with the passage of KERA, the Appalachian districts reduced class size by a statistically significant degree relative to the reduction in the rest of the state.[22] Interestingly, however, the magnitude of the difference in class size across the regions is quite small. With the exception of two years (one of which is insignificant), the coefficients are less than one, suggesting that any economically meaningful difference in class size is difficult to discern across the two locales.

Figure 6 graphs the nonteaching certified personnel hired by the district in Appalachian districts relative to non-Appalachian districts using data from the CCD (NCES, various years). Here we have data only since 1994, but the gap appears to reinforce that of the teaching personnel. The difference is

21. Limitations on the availability of student head counts in Kentucky school districts prevent us from calculating pupil-teacher ratios in any years prior to 1987, leaving us with three years of data before the enactment of KERA.
22. This finding reinforces that of Rose et al. (2008) for California districts. They found that higher-income school districts were unable to reduce salaries and attract teachers. Instead they increased class size.

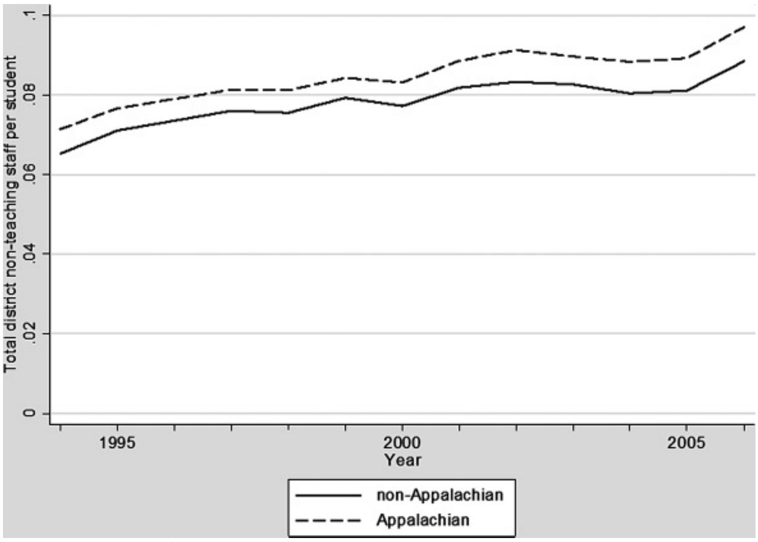

Figure 6. Nonteaching Certified Staff per Student in Appalachian and non-Appalachian Districts

positive over the entire period presented here, and the statistically significant differences grow over time. The combined year effects and the Appalachian effect are both positive and significant over time.[23] The Appalachian districts hire more persons in nonteaching certified roles, adjusted for enrollment, than do the non-Appalachian districts.[24]

Taken together, our results suggest that the Appalachian districts and non-Appalachian districts allocate their post-KERA equalized resources differently. It appears that school districts within Appalachia received sufficient new resources with the passage of KERA to both initially increase wages relative to the rest of the state and slightly reduce class size relative to the rest of the state. With the passage of time, the class size difference has continued (i.e., once additional teachers were hired, it appears that the districts have continued to maintain the relative class size reduction). The Appalachian districts chose not only to hire teachers but to hire more nonteaching certified staff as well. On the other hand, the wage differential that accompanied the initial passage of KERA has not been maintained. The districts have chosen to adjust pay scales over time so that the differential between teacher salaries in the two regions resembles that existing before reform.

23. Data for nonteaching personnel in 1996 were omitted due to inconsistencies in how these data were reported by the state.
24. We are unable to examine the noncertified personnel (personnel that do not require EPSB certification as a prerequisite for employment) for similar hiring trends because a sufficient time series for these data was not maintained.

Policy makers in Kentucky intended teacher salaries to be the instrument through which they improved the quality of teachers and reduced the achievement gap when they passed KERA. Regardless of whether they were correct in believing that salaries in Appalachia should be raised relative to those of non-Appalachian schools in order to ultimately raise teacher quality, their proximal goal was met only in the short term. Local school officials either found that differentially higher salaries were not necessary to attract the quality of teachers they desired or found higher payoffs—academically and/or politically—from hiring additional instructional and non-instructional personnel than from sustaining the higher pay structures. Rose et al. (2008) found results similar to these in that higher income school districts in California had higher pupil-teacher ratios than lower income districts. Their argument was that higher salaries were required to attract teachers to the high-income districts and that an equal revenue constraint forced the same districts to increase pupil-teacher ratios. Given the widely differing constraints in Appalachian and non-Appalachian districts, the answer here is likely a combination of factors. Higher salaries may not have been required to attract higher-quality teachers to Appalachia in the long run, there may have been larger gains to Appalachian schools from reducing class size than from increasing salaries, or political payoffs may have contributed to the increased personnel in the Appalachian schools. Trying to discern the underlying cause of the findings will be the subject of future research.

4. CONCLUDING COMMENTS

This article is among the first to look at teacher salaries and school finance reform. The administrative data used here are particularly rich in that they cover an extended period of time, both before and after a major education reform. Kentucky, of course, is one of a large number of states to have undergone court-ordered school finance reform. The court orders as well as the long-term U.S. trend toward more equalized financing generally make the questions in this article relevant to many states. Its relevance is perhaps greatest for those states with wide disparities in socioeconomic conditions.

With a focus on one policy variable—teacher salaries—we illustrate that after a short period of increased relative salaries, Appalachian districts used the additional resources to reduce class size slightly and particularly to hire more nonteaching certified staff per student rather than to maintain the short-run bonus that teachers received for teaching in Appalachia. As with most research, this article calls for yet more study. Whether the patterns we found represent optimal use of resources by the school districts in Appalachia or those in other regions of the state is beyond the scope of our analysis. We can reasonably expect local school districts to set teacher salaries to reflect local constraints whether those constraints pertain to the characteristics of the population, the economic conditions of the area, or the political constraints of their locale. The combination of these differs for each district, and it seems unlikely that a state mandate to equalize revenues would translate into equal choices about uses of those revenues by districts in a way that could be maintained in the long run. Our evidence suggests that this is indeed the case for Kentucky. Regardless of the explanation for the patterns exhibited in this article, it should be of great interest to policy makers and researchers alike to learn that a major education finance reform that equalized resources across districts resulted in equalized salary schedules only in the short run. In the longer run, teacher compensation reverted to its pre-reform pattern in Kentucky's Appalachian and non-Appalachian school districts.

The authors are grateful to Sean Corcoran and others for comments at the November 2009 meeting of the Association for Public Policy Analysis and Management and to anonymous referees for valuable suggestions. The Spencer Foundation (Grant No. 201000055) provided funding for this research under the project title *Teaching Careers in Rural Schools*. We extend our thanks to the Kentucky Education Professional Standards Board for making administrative data available for research purposes and to Terry Hibpshman for his invaluable assistance with the data. We thank Mattie Toma for assistance in preparing the final manuscript.

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APPENDIX

Table A.1. Regression of Logged Teacher Base Salary, Focusing on the Impact of Appalachian Location over Time and Differentiating by Experience Level

	Coefficient	SE
Dummy, rank = 2	−0.102***	0.002
Dummy, rank = 3	−0.208***	0.002
Dummy, rank = 4	−0.256***	0.005
Dummy, Appalachia = 1	−0.041***	0.008
Dummy, year = 1981	−0.020***	0.003
Dummy, year = 1982	0.103***	0.012
Dummy, year = 1983	0.135***	0.015
Dummy, year = 1984	0.107***	0.018
Dummy, year = 1985	0.085***	0.020
Dummy, year = 1986	0.128***	0.018
Dummy, year = 1987	0.149***	0.017
Dummy, year = 1988	0.137***	0.015
Dummy, year = 1989	0.138***	0.017
Dummy, year = 1990	0.175***	0.019
Dummy, year = 1991	0.186***	0.019
Dummy, year = 1992	0.164***	0.019
Dummy, year = 1993	0.155***	0.018
Dummy, year = 1994	0.160***	0.017
Dummy, year = 1995	0.155***	0.017
Dummy, year = 1996	0.156***	0.019
Dummy, year = 1997	0.159***	0.019
Dummy, year = 1998	0.178***	0.016
Dummy, year = 2000	0.206***	0.014
Dummy, year = 2001	0.214***	0.012
Dummy, year = 2002	0.232***	0.010
Dummy, year = 2003	0.237***	0.010
Dummy, year = 2004	0.229***	0.011
Dummy, year = 2005	0.237***	0.011
Dummy, Appalachia = 1 * year = 1981	0.009**	0.004
Dummy, Appalachia = 1 * year = 1982	0.033***	0.012
Dummy, Appalachia = 1 * year = 1983	0.045***	0.015
Dummy, Appalachia = 1 * year = 1984	0.046**	0.018
Dummy, Appalachia = 1 * year = 1985	0.045**	0.020
Dummy, Appalachia = 1 * year = 1986	0.043**	0.018
Dummy, Appalachia = 1 * year = 1987	0.041**	0.017
Dummy, Appalachia = 1 * year = 1988	0.034**	0.015
Dummy, Appalachia = 1 * year = 1989	0.037**	0.017

Table A.1. Continued.

	Coefficient	SE
Dummy, Appalachia = 1 * year = 1990	0.066***	0.020
Dummy, Appalachia = 1 * year = 1991	0.089***	0.020
Dummy, Appalachia = 1 * year = 1992	0.098***	0.021
Dummy, Appalachia = 1 * year = 1993	0.089***	0.020
Dummy, Appalachia = 1 * year = 1994	0.086***	0.019
Dummy, Appalachia = 1 * year = 1995	0.086***	0.019
Dummy, Appalachia = 1 * year = 1996	0.089***	0.020
Dummy, Appalachia = 1 * year = 1997	0.081***	0.020
Dummy, Appalachia = 1 * year = 1998	0.077***	0.018
Dummy, Appalachia = 1 * year = 2000	0.065***	0.016
Dummy, Appalachia = 1 * year = 2001	0.064***	0.014
Dummy, Appalachia = 1 * year = 2002	0.051***	0.013
Dummy, Appalachia = 1 * year = 2003	0.042***	0.012
Dummy, Appalachia = 1 * year = 2004	0.042***	0.012
Dummy, Appalachia = 1 * year = 2005	0.042***	0.013
Dummy, experience = 2	0.219***	0.005
Dummy, experience = 3	0.376***	0.020
Dummy, Appalachia = 1 * experience = 2	0.027***	0.006
Dummy, Appalachia = 1 * experience = 3	−0.046**	0.020
Dummy, year = 1981 * experience = 2	−0.008**	0.003
Dummy, year = 1981 * experience = 3	−0.014***	0.003
Dummy, year = 1982 * experience = 2	−0.037***	0.007
Dummy, year = 1982 * experience = 3	−0.073***	0.008
Dummy, year = 1983 * experience = 2	−0.041***	0.009
Dummy, year = 1983 * experience = 3	−0.083***	0.009
Dummy, year = 1984 * experience = 2	−0.032***	0.008
Dummy, year = 1984 * experience = 3	−0.073***	0.010
Dummy, year = 1985 * experience = 2	−0.015	0.010
Dummy, year = 1985 * experience = 3	−0.050***	0.012
Dummy, year = 1986 * experience = 2	−0.019**	0.009
Dummy, year = 1986 * experience = 3	−0.044***	0.008
Dummy, year = 1987 * experience = 2	−0.017**	0.007
Dummy, year = 1987 * experience = 3	−0.014**	0.006
Dummy, year = 1988 * experience = 2	−0.022***	0.006
Dummy, year = 1988 * experience = 3	−0.018***	0.006
Dummy, year = 1989 * experience = 2	−0.026***	0.006
Dummy, year = 1989 * experience = 3	−0.018***	0.007
Dummy, year = 1990 * experience = 2	−0.030***	0.006
Dummy, year = 1990 * experience = 3	−0.017**	0.008
Dummy, year = 1991 * experience = 2	−0.035***	0.006
Dummy, year = 1991 * experience = 3	−0.016**	0.007
Dummy, year = 1992 * experience = 2	−0.038***	0.006
Dummy, year = 1992 * experience = 3	−0.016**	0.007
Dummy, year = 1993 * experience = 2	−0.042***	0.006

Table A.1. Continued.

	Coefficient	SE
Dummy, year = 1993 * experience = 3	−0.016**	0.007
Dummy, year = 1994 * experience = 2	−0.050***	0.005
Dummy, year = 1994 * experience = 3	−0.020***	0.007
Dummy, year = 1995 * experience = 2	−0.055***	0.005
Dummy, year = 1995 * experience = 3	−0.020***	0.007
Dummy, year = 1996 * experience = 2	−0.059***	0.005
Dummy, year = 1996 * experience = 3	−0.024***	0.007
Dummy, year = 1997 * experience = 2	−0.061***	0.006
Dummy, year = 1997 * experience = 3	−0.025***	0.007
Dummy, year = 1998 * experience = 2	−0.061***	0.006
Dummy, year = 1998 * experience = 3	−0.024***	0.008
Dummy, year = 2000 * experience = 2	−0.056***	0.009
Dummy, year = 2000 * experience = 3	−0.031***	0.008
Dummy, year = 2001 * experience = 2	−0.056***	0.009
Dummy, year = 2001 * experience = 3	−0.029***	0.009
Dummy, year = 2002 * experience = 2	−0.060***	0.009
Dummy, year = 2002 * experience = 3	−0.032***	0.009
Dummy, year = 2003 * experience = 2	−0.061***	0.008
Dummy, year = 2003 * experience = 3	−0.032***	0.008
Dummy, year = 2004 * experience = 2	−0.060***	0.008
Dummy, year = 2004 * experience = 3	−0.028***	0.008
Dummy, year = 2005 * experience = 2	−0.058***	0.008
Dummy, year = 2005 * experience = 3	−0.028***	0.008
Dummy, Appalachia = 1 * year = 1981 * experience = 2	−0.010**	0.004
Dummy, Appalachia = 1 * year = 1981 * experience = 3	−0.005	0.004
Dummy, Appalachia = 1 * year = 1982 * experience = 2	−0.031***	0.008
Dummy, Appalachia = 1 * year = 1982 * experience = 3	−0.022**	0.009
Dummy, Appalachia = 1 * year = 1983 * experience = 2	−0.039***	0.010
Dummy, Appalachia = 1 * year = 1983 * experience = 3	−0.024**	0.010
Dummy, Appalachia = 1 * year = 1984 * experience = 2	−0.040***	0.009
Dummy, Appalachia = 1 * year = 1984 * experience = 3	−0.027***	0.010
Dummy, Appalachia = 1 * year = 1985 * experience = 2	−0.042***	0.010
Dummy, Appalachia = 1 * year = 1985 * experience = 3	−0.031**	0.013
Dummy, Appalachia = 1 * year = 1986 * experience = 2	−0.038***	0.010
Dummy, Appalachia = 1 * year = 1986 * experience = 3	−0.013	0.008
Dummy, Appalachia = 1 * year = 1987 * experience = 2	−0.035***	0.008
Dummy, Appalachia = 1 * year = 1987 * experience = 3	−0.002	0.007
Dummy, Appalachia = 1 * year = 1988 * experience = 2	−0.034***	0.007
Dummy, Appalachia = 1 * year = 1988 * experience = 3	0.000	0.007
Dummy, Appalachia = 1 * year = 1989 * experience = 2	−0.034***	0.007
Dummy, Appalachia = 1 * year = 1989 * experience = 3	0.000	0.008
Dummy, Appalachia = 1 * year = 1990 * experience = 2	−0.031***	0.008
Dummy, Appalachia = 1 * year = 1990 * experience = 3	−0.002	0.009
Dummy, Appalachia = 1 * year = 1991 * experience = 2	−0.032***	0.007

Table A.1. Continued.

	Coefficient	SE
Dummy, Appalachia = 1 * year = 1991 * experience = 3	−0.002	0.008
Dummy, Appalachia = 1 * year = 1992 * experience = 2	−0.035***	0.007
Dummy, Appalachia = 1 * year = 1992 * experience = 3	−0.006	0.008
Dummy, Appalachia = 1 * year = 1993 * experience = 2	−0.033***	0.007
Dummy, Appalachia = 1 * year = 1993 * experience = 3	−0.007	0.007
Dummy, Appalachia = 1 * year = 1994 * experience = 2	−0.030***	0.006
Dummy, Appalachia = 1 * year = 1994 * experience = 3	−0.007	0.008
Dummy, Appalachia = 1 * year = 1995 * experience = 2	−0.024***	0.006
Dummy, Appalachia = 1 * year = 1995 * experience = 3	−0.009	0.008
Dummy, Appalachia = 1 * year = 1996 * experience = 2	−0.024***	0.007
Dummy, Appalachia = 1 * year = 1996 * experience = 3	−0.011	0.008
Dummy, Appalachia = 1 * year = 1997 * experience = 2	−0.023***	0.008
Dummy, Appalachia = 1 * year = 1997 * experience = 3	−0.010	0.008
Dummy, Appalachia = 1 * year = 1998 * experience = 2	−0.029***	0.007
Dummy, Appalachia = 1 * year = 1998 * experience = 3	−0.016*	0.008
Dummy, Appalachia = 1 * year = 2000 * experience = 2	−0.032***	0.010
Dummy, Appalachia = 1 * year = 2000 * experience = 3	−0.021**	0.009
Dummy, Appalachia = 1 * year = 2001 * experience = 2	−0.038***	0.010
Dummy, Appalachia = 1 * year = 2001 * experience = 3	−0.031***	0.009
Dummy, Appalachia = 1 * year = 2002 * experience = 2	−0.030***	0.009
Dummy, Appalachia = 1 * year = 2002 * experience = 3	−0.022**	0.009
Dummy, Appalachia = 1 * year = 2003 * experience = 2	−0.020**	0.009
Dummy, Appalachia = 1 * year = 2003 * experience = 3	−0.014*	0.009
Dummy, Appalachia = 1 * year = 2004 * experience = 2	−0.021**	0.009
Dummy, Appalachia = 1 * year = 2004 * experience = 3	−0.016*	0.009
Dummy, Appalachia = 1 * year = 2005 * experience = 2	−0.022**	0.009
Dummy, Appalachia = 1 * year = 2005 * experience = 3	−0.016*	0.008
Constant	10.295***	0.006
N	782,760	
R^2 (overall)	0.8231	
R^2 (within)	0.8663	
R^2 (between)	0.4729	

*p < 0.01; **p < 0.05; ***p < 0.001