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Teacher Salary Raises and Turnover: Evidence from the First Year of the Arkansas LEARNS Act

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Abstract

Attracting and retaining high-quality teachers is a pressing policy concern. Increasing teacher salaries and creating more attractive compensation packages are often proposed as a potential solution. Signed into law in March 2023, the LEARNS Act increased Arkansas's minimum teacher salary from $36,000 to $50,000, guaranteed all teachers a minimum raise of $2,000, and added flexibility allowing school districts to deviate from seniority-based traditional salary schedules. To study school districts' adjustments to the new legislation, we collected information about districts' teacher compensation policies one year before and the first year of implementation. We also integrated this data with teachers' administrative records to study patterns of teacher retention and mobility. Our results reveal a more equitable distribution of starting teacher salaries across districts, with minimal variation. The LEARNS Act notably increased funding for rural and high-poverty districts, mitigating the negative association between starting salaries and district poverty rates. However, the initial effects on teacher retention and mobility were modest. While some positive trends emerged, such as reduced probabilities of teachers transitioning to non-instructional roles and increased new teacher placement in geographic areas of shortage, broader impacts on retention and mobility were limited in the first year of implementation.

Keywords: teacher compensation, teacher retention, teacher turnover

JEL Codes: I20, I22, J18

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1. Introduction

Attracting and retaining high-quality teachers is a matter of significant policy concern. Policy proposals aimed at these issues often include increasing teacher salaries and/or creating more attractive compensation packages. However, average inflation-adjusted teacher salaries have stagnated over the past several decades (Kraft and Lyon, 2024). Public school teachers' wages also appear lower or, at most, on par with those of other college graduates (Allegretto and Mishel, 2020; Taylor, 2008; Richwine and Biggs, 2011; West, 2014). Considered together with the declining prestige of the profession and lower enrollment in traditional preparation programs (Kraft and Lyon, 2024), a lack of growth in compensation has put the teaching profession in a challenging position.

Increasing teacher salaries could help support the supply of teachers by retaining and attracting more and higher-quality teachers in the profession. Early research highlighted the importance of teacher salaries along with other working conditions (e.g. student body characteristics, discipline, or leadership) in teachers' turnover decisions (see, e.g., Hanushek et al., 2004; Horng, 2009; Loeb et al., 2005). Hendricks (2014) used administrative data from Texas to study the relationship between teacher pay and turnover, employing variation in base salaries over time, across experience levels and districts. He finds a statistically significant effect of increases in teachers' base pay on reducing district-level teacher turnover. The effects on out-of-district turnover were larger for less experienced teachers and decreased as teachers gained experience, disappearing after 19 years of experience. Interestingly, Hendricks (2024) uses simulation models to document the potential effects of changes in the structure of teacher pay and finds that, assuming no effects on teacher motivation and effort for more experienced teachers, a flat teacher salary schedule could be beneficial for increasing retention and student outcomes.

Sun et al. (2024) employ legislative funding changes in Washington State to study the effect of increases in certified base teacher salaries, particularly for more senior teachers, on teacher retention and hiring. Their results show a significant reduction in average teacher turnover rates for mid-career (8-15 years of teaching experience) and late-career teachers (23 or more years of teaching experience) in the first year of implementation of the reform. Their analysis, however, did not show any significant effects on teacher hiring during the first two years of implementation. Overall, these papers suggest that we could see positive effects on teacher retention of increases in teachers' minimum salaries.

In addition to increasing pay, providing schools with more flexibility in designing teacher compensation could also help attract and retain high-quality teachers. Most public schools in the U.S. employ rigid salary schedules, with pay increases determined entirely by experience and

education credentials. Schools do not generally differentiate pay based on performance or working conditions. Breaking free of traditional salary schedules would allow schools to be more innovative and responsive to staffing needs and local labor market conditions. When schools in Wisconsin were given the autonomy to redesign teacher compensation, districts that transitioned from seniority-based salary schedules to pay-for-performance models attracted higher-quality teachers and achieved better student outcomes (Biasi, 2021). More generally, evidence suggests that implementing teacher-pay incentives to attract new teachers or reward existing highly effective teachers may be an effective tool, especially for schools serving a higher proportion of students from disadvantaged backgrounds or in poverty (Pham et al., 2021).

To date, lawmakers in at least 23 states have proposed bills that increase minimum teacher salaries and offer other bonuses to improve teacher recruitment and retention (Stanford, 2023), particularly in shortage areas. Six of these bills, including the Arkansas LEARNS Act, have become law. Signed in March 2023, The LEARNS Act is one of the most comprehensive statewide changes in teacher compensation policy in several decades. The new legislation increased the state's minimum teacher salary from $36,000 to $50,000, guaranteed all teachers a minimum raise of $2,000 above their 2022-23 salaries, removed the minimum teacher salary schedule, and relaxed other salary schedule requirements in state law. The state is providing all funds for the required salary increases, which represents an increase of 6.5% (approximately $183 million) in state education funding. The LEARNS Act provides districts with additional flexibility to either continue to reward educators primarily based on experience and education or to implement more creative approaches to teacher compensation.

We collected information about Arkansas districts' teacher compensation policies one year before the implementation of the LEARNS Act (2022-23) and during the first year of implementation (2023-24). We then merged this information with other district characteristics from the Arkansas Department of Education data system and the National Center for Education Statistics' Common Core of Data. Finally, as part of an ongoing research-practice partnership with the Arkansas Department of Education, we integrated this district-level data with administrative job assignment data. These administrative data cover the universe of public school employees, enabling us to track individual teachers throughout their time in the Arkansas education workforce. We use this comprehensive dataset to address the following research questions:

1. How have Arkansas school districts adjusted their teacher compensation policies in response to the LEARNS Act? How has the comparison of teacher salaries changed across different regions of the state?
2. How have the relationships between teacher salaries and district characteristics changed due to the LEARNS Act?
3. How have new salary schedules impacted teacher retention, beginning teachers' location, and mobility patterns, particularly in geographic shortage areas?

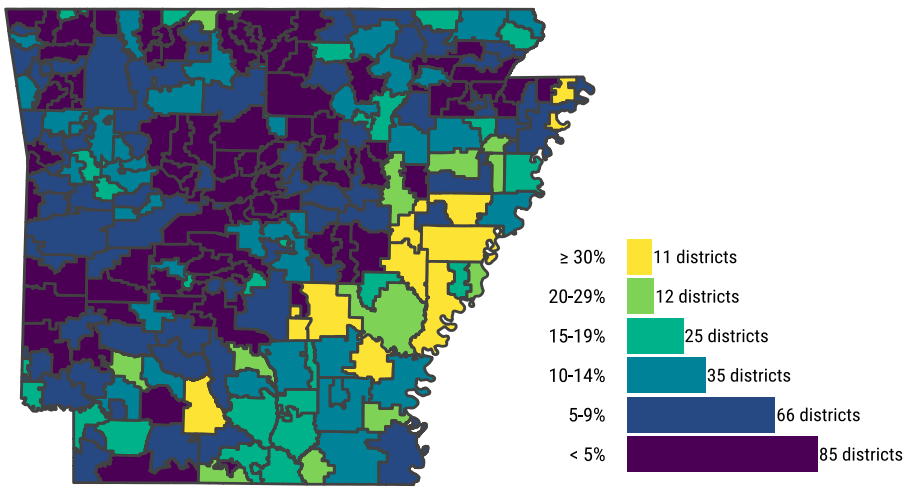
2. The Arkansas Context

Arkansas is a mid-size state located in the South-Central United States. The state's public school system serves about 490,000 students with 31,500 teachers employed each year. Reflecting the national trend, most teachers in Arkansas are women (77%) and identify as white (87%).

Arkansas has significant subject and geographic shortage areas. In many parts of the state, districts struggle to hire teachers who are certified to teach the subjects/grades to which they are assigned. The proportion of Arkansas teachers with some type of licensure waiver has been between 8 to 9% in the past few years, more than double the national average of about 3%[1]. The Arkansas Department of Education identifies teacher shortage areas based on, among other measures, the proportion of teachers who teach more than half of the school day in subject areas and/or grades for which they are not licensed. Figure 1 shows this proportion for each school district between the 2021-22 and 2023-24 school years. As we can see in this figure, most geographical teacher shortage areas in the state are in the Southeast, Northeast, and Southwest areas of the state.

Figure 1. Average Percentage of Teachers Who Are Not Licensed to Teach More Than Half Their Classes.

2021-22 through 2023-24



[1] https://nces.ed.gov/fastfacts/display.asp?id=58.

3. Data

To study how school districts adjusted to the new legislation, we collected salary schedules for school districts in Arkansas one year before the implementation of the LEARNS Act (2022-23) and during the first year of implementation (2023-24)[2]. We were able to obtain salary-schedule data for both years from nearly all public school districts (230 out of 234 traditional public school districts), as well as for 9 out of 12 of the charter school operators that were present in both years and were subject to the law. We then merged this information with other district characteristics from the Arkansas Department of Education data system and the National Center for Education Statistics' Common Core of Data, including urbanicity (urban district, rural district, suburban district, or town), districts' student enrollment information, percentage of white students in the district, and percentage of children aged 5-17 that live in poverty in a district's attendance zone as measured by the U.S. Census Bureau's Small Area Income and Poverty Estimates. As these measures of poverty are only available for traditional public school districts, we focus our analysis on traditional public schools and do not consider charter schools in our analysis[3].

Finally, we integrated this district-level data with teachers' administrative data maintained by the Office of Education Policy and the Department of Education Reform at the University of Arkansas. These data cover the universe of traditional public and charter school teachers from 2016-17 through the 2023-24 school years and allow us to track individuals throughout their time in the Arkansas education workforce. As before, as poverty measures are only available for traditional public school districts, we focus our analysis on data from traditional public school teachers for whom we have salary-schedule information.

We use these longitudinal data to track teacher turnover. A person is considered a teacher in an Arkansas school if they are a teacher of record for one or more classes or serve as a special education inclusion teacher for at least one class.[4] At the beginning of each school year, we

[2] Salary schedules were collected through web searches and direct district communication, and were primarily received as PDFs. We then used R programming to extract the necessary information from the PDFs. This worked for about half of the cases. For the rest, the team of researchers in the project manually coded the data from the PDFs. In both cases, the quality of data was checked by one other member of the research team.
[3] Analysis including both traditional public school and charter schools but using the percentage of students who qualify as free or reduced-price lunch lead to similar conclusions. Results available from the authors upon request.
[4] For teachers who work in multiple schools, we assign them to up to four separate schools within the district each school year.

create a categorical variable for each teacher to capture five possible employment decisions. Teachers who remain in an instructional role at their current school are labeled as "Stayers." If a teacher moves to another school within the same district, they are categorized as "Movers Inside." Teachers who continue teaching in Arkansas but in a different district are classified as "Movers Outside." If someone stops teaching but remains employed in the state's public education system (e.g., as a principal or instructional coach), they are termed a "Switcher." If a teacher leaves the state's public education workforce entirely, they are classified as an "Exiter.[5]"

Figure 2. Arkansas Public School Teachers' Employment Decisions from 2016-17 to 2023-24

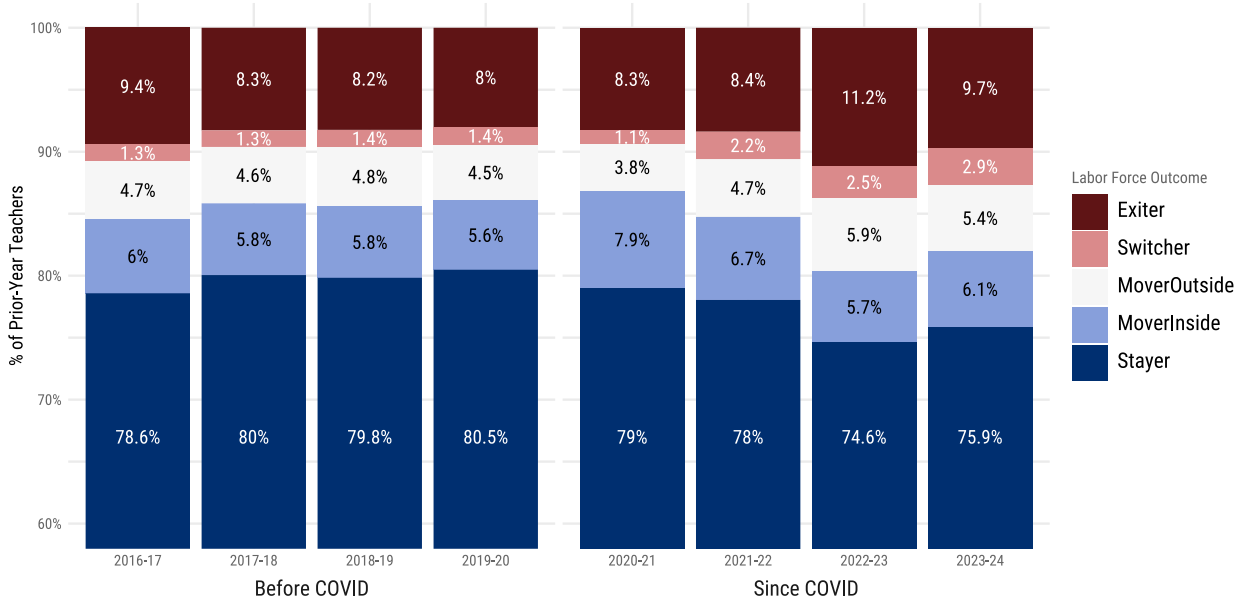


Figure 2 presents the patterns of teachers' employment decisions for traditional public-school teachers in our analytical sample from 2016-17 to 2023-24, the latter being the first year of LEARNS Act implementation. As documented in Camp, Zamarro, and McGee (2023) we observe stable patterns of teacher retention ("Stayers") in the first two pandemic years 2020-21 and 2021-22, followed by a sharper decline in teacher retention in 2022-23 school year. We observe that reduced retention in the 2022-23 school year is not only due to an increase in

[5] Although our analysis focuses on traditional public school teachers, both traditional public schools and charter school teachers are considered to define these variables. Therefore, for example, if a teacher moves from a traditional public school to a charter at the beginning of a certain school year, she will be considered a "Mover Outside."

teacher exits but also to an increase in the percentage of teachers switching to non-instructional roles and moving outside the district.

Entering the first school year of LEARNS Act implementation, 2023-24, we observe an improvement in teacher retention along with a reduction in the percentage of teachers exiting the Arkansas education labor force. It is noteworthy that the proportion of teachers switching to non-instructional roles and moving between districts remained relatively elevated compared with pre-pandemic years.

While teacher turnover remained elevated in 2023-24 compared with pre-pandemic levels, the observed reduction in teachers' exits could be an indication that the dynamics of the teacher workforce might be returning to pre-pandemic levels. Similar signs of recovery have also been documented in other states like North Carolina (Bastian and Fuller, 2024). It could also be an indication that the salary increases during the first year of implementation of the LEARNS Act are having a positive impact in helping retain teachers, a possibility that we study in the next sections.

4. Analytical Strategy

We first use the collected district-level salary schedule information to study how school districts adjusted their teacher compensation policies in response to the LEARNS Act (Research Question 1). Then, we further study how the LEARNS Act might have improved the competitiveness of those school districts in rural areas or that serve higher proportions of disadvantaged students (Research Question 2). To do so, we use linear regression models to study the association between the salaries of teachers with differing levels of experience (i.e., 5, 10, and 15) and district characteristics, including urbanicity[6], district enrollment, districts' student demographics (i.e., percentage of white students in the district), and poverty levels[7]. For this descriptive analysis, we focus primarily on the salaries of teachers with a bachelor's degree. For

[6] We use the following definitions for differing levels of urbanicity: rural areas have a population under 5,000, suburban areas are located near a census-designated principal city, town school districts are located in areas with between 5,000 and 50,000 residents, and urban districts are located in areas with more than 50,000 residents.
[7] We define poverty level as the percentage of school-age children who live in a district's attendance zone and have household incomes at or below the poverty level.

comparability across districts, we do not consider intermediate lanes in a salary schedule that would compensate teachers for credit hours in pursuit of an advanced degree.

Finally, we use an interrupted time series analysis with one-year post-LEARNS reform (2023-24) to study whether the new salary schedules that were implemented to satisfy the requirements of the LEARNS Act have impacted the patterns of teacher retention and mobility as described in Figure 2 above. While the LEARNS Act guaranteed a salary increase of at least $2,000, many teachers saw substantially larger increases in compensation because the new $50,000 minimum was greater than all steps and lanes in their districts' salary schedules. Teachers experienced different size salary changes based on their pre-LEARNS salary, level of education, and years of experience. We follow Sun et al. (2024) and allow for a dosage effect depending on the difference between each teacher's anticipated salary based on their district's pre-LEARNS schedule and their district's post-LEARNS schedule.

In particular, we use a multinomial logit model for five different employment transitions as follows:

$$\Pr(Y_{ik} = j|X_{ik})) = \frac{\exp\left(\left[\beta_1^j PostLearns_i + \beta_2^j PostLearns * SalaryChange_i + \beta_3^j X_i + \beta_3^j X_k + \gamma_R\right]\right)}{\sum_{l=1}^{5} \exp\left(\left[\beta_1^j PostLearns_i + \beta_2^j PostLearns * SalaryChange_i + \beta_3^j X_i + \beta_3^j X_k + \gamma_R\right]\right)} \quad (1)$$

$$\text{where } j = \begin{cases} 1 & Stayer \\ 2 & Mover\ Inside \\ 3 & Mover\ Outside \\ 4 & Switcher \\ 5 & Exiter \end{cases}$$

Our main variables of interest are an indicator for the post-LEARNS academic year 2023-24 ($PostLearns$) and the interaction of $PostLearns$ and each teacher's salary change dosage ($PostLearns * SalaryChange$). To adjust for differences in the cost of living in teachers' salary changes, we use the American Community Survey Wage Index for Teachers (ACS-CWIFT)[8].

[8] The ACS-CWIFT was developed by the National Center for Education Statistics to facilitate comparisons across geographic areas by capturing data from the American Community Survey about wage and salary differences, for

Figure 3 shows the distribution of teachers' salary changes (i.e., our dosage variable) before and after adjusting for the cost of living using the ACS-CWIFT index. While most teachers received a minimum salary increase of $2,000, we observe considerable variation in the size of salary increases teachers experienced. For our analysis, we center these salary changes at $2,000 so our estimates represent the effect of salary changes above the minimum salary raise in the Arkansas LEARNS Act. On average, teachers received an increase of $6,000, which translates to a $7,000 increase after adjusting for the cost of living.

Figure 3. Distribution of Teachers' Salary Changes as a Result of the LEARNS Act- Before and After Cost-of-Living Adjustments

Our analysis also controls for teacher demographic information in X_i, including education degree (master's degree with bachelor's degree as the reference category), race/ethnicity (Black, Hispanic, Asian, and other race, with white teacher as the reference category), and gender (male with female as the reference category). We also include controls for districts' characteristics (X_k)

college graduates, in a school district area.
https://nces.ed.gov/programs/edge/docs/EDGE_ACS_CWIFT_FILEDOC.pdf

including urbanicity level (rural, suburb, and town, with city as the reference category), enrollment, students' racial composition (i.e. the percentage of students who are identified as white), percentage of children aged 5-17 that live in poverty, and region (Northeast, Northwest, Southeast, and Southwest, with Central as the reference category) (γ_R)[9].

A key threat to the internal validity of an interrupted time series design is the possibility that other things might be occurring at the time of the policy change. This is a potential issue in this case, as the reform happened as the Arkansas teacher workforce was recovering from the COVID-19 pandemic. To assess to what extent this is an issue, we perform our analysis using different potential years of data as comparison groups in our analysis including all years pre-LEARNS as a comparison (2016-17 to 2022-23); only pre-LEARNS pandemic years as a comparison (2020-21 to 2022-23); and only one-year pre-LEARNS (2022-23) as a comparison.

We also study the heterogeneous effects of different levels of teacher experience. In this case, we follow Sun et al. (2024) and create the following experience groups: early career teacher (less than 3 years of experience), junior career (4 to 7 years of experience), mid-career1 (8 to 11 years of experience), mid-career2 (12 to 15 years of experience), late-career1 (16 to 19 years of experience), late-career2 (20 to 22 years of experience), and late-career3 (more than 23 years of experience). We then estimate separate models like in (1) above for each of these groups separately[10].

In our final analysis, we use binary logit models focusing on new teachers (i.e., those with 0 years of experience) and those teachers who moved outside their district and study whether teachers are locating in geographic shortage areas at higher rates post-LEARNS. We define geographic shortage areas as districts whose average percentage of teachers who are not licensed to teach more than half of their classes, as described in Figure 1 above, is in the top quartile between 2021-22 and 2023-24. This represents more than 27% of teachers in our sample.

[9] We also run models that control for Education Service Cooperatives (co-ops) fixed effects instead of regional effects and found similar results but some of the multinomial models had issues of convergence due to the high number of dummy variables included. Established by the State Board of Education, the Co-ops in Arkansas are intermediate service units in the state's elementary and secondary education system. Each of Arkansas's 16 co-ops are comprised of geographically and demographically similar member districts and, so, constitute a plausible local teacher labor market.

[10] We also run models for teachers' at or above early retirement age and full retirement age, respectively. We did not observe however, any differential patters for these groups. Results available from the authors upon request.

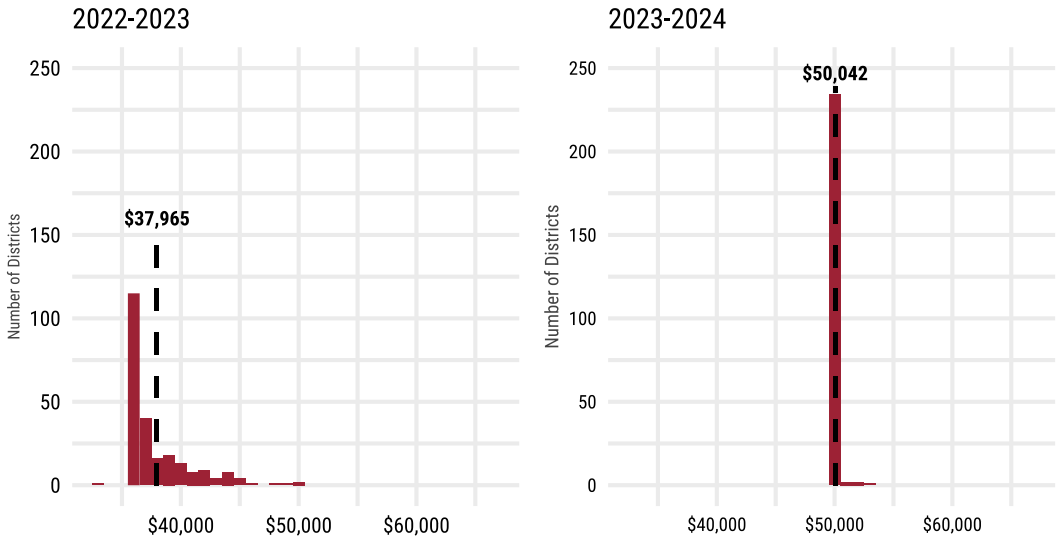
5. Results

5.1 How have Arkansas school districts adjusted their teacher compensation policies? (Research Question 1)

We first examine entry-level salaries for beginning teachers holding a bachelor's degree before and after the introduction of the LEARNS Act. Results for teachers holding a master's degree can be found in the Appendix. As we can see in the left panel of Figure 4, before the reform in the 2022-23 school year, entry-level teacher salaries in Arkansas were significantly lower than the new minimum salary of $50,000 in almost all districts in the state. The average entry-level teacher salary for those holding a bachelor's degree was about $38,000, with 39% of districts (94 out of 241) paying the previously mandated minimum salary of $36,000.

As can be seen in the right panel of Figure 4, the LEARNS Act elevated beginning teacher salaries to the new minimum of $50,000, eliminating much of the variation in starting teacher salaries across districts. The average entry-level teacher salary for those holding a bachelor's degree became about $50,000, with 97% of districts (231 out of 239) paying this minimum and only 8 districts paying an entry-level salary above this amount.

Figure 4 - Distribution of Entry-Level Teacher Salaries - Bachelor's Degree

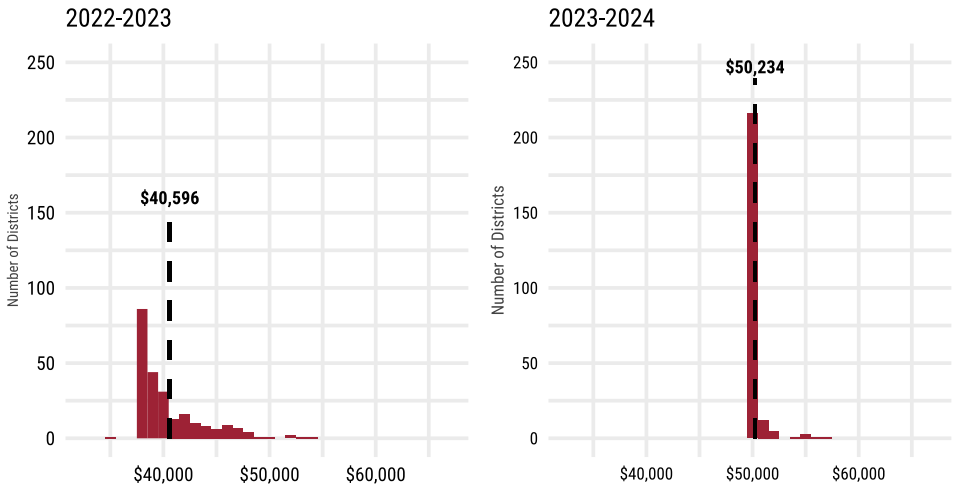


Figures 5, 6, and 7 show the distribution of teacher's salaries across districts, for those holding a bachelor's degree and with 5, 10, and 15 years of teaching experience, respectively. Pre-LEARNS during the 2022-23 school year, average teacher salaries for those holding a bachelor's degree remained below the new minimum of $50,000 at about $41,000, $43,000, and

$46,000, for those with 5, 10, and 15 years of experience, respectively. Less than 7% (5 out of 241 for 5 years of experience and 16 out of 241 for 10 years of experience) of school districts, during the 2022-23 school year, paid salaries equal to or above $50,000 for those teachers with a bachelor's degree and up to 10 years of experience. The proportion of districts paying at or above the new $50,000 minimum salary increased only to 15% (37 out of 241) for those teachers holding just a bachelor's degree and with 15 years of experience during the 2022-23 school year.

Looking at the school year 2023-24, the first year of implementation of the LEARNS Act, on average, teachers' salaries for those holding a bachelor's degree remained around the new minimum at about $50,000 for those with 5 years of experience, and at about $51,000 for those with 10 to 15 years of experience. Most school districts continued to pay the new minimum salary of $50,000 to teachers holding a bachelor's degree even as experience increased. 86% of districts paid this minimum for teachers with 5 years of experience, 76% for teachers with 10 years of experience, and 65% for teachers with 15 years of experience.

Figure 5 - Distribution of Teacher Salaries - Bachelor's Degree & 5 Years of Experience



In general, after analyzing the collected school districts' salary schedules, we identified three patterns of adjustments in response to the LEARNS Act[11]:

- Districts whose salaries were all lower than the new minimum of $50,000 for all steps during the 2022-23 school year transitioned to flat salary schedules in 2023-24 that pay the minimum of $50,000 regardless of teachers' years of experience, and in some cases,

[11] Interactive visualizations including complete salary schedules by education service cooperative can be found here: https://oep.uark.edu/teacher-salaries-under-the-arkansas-learns-act/.

education credentials. 55% of districts fall into this category when considering schedules for teachers holding a bachelor's degree.

- Districts with pre-LEARNS salary schedules that had some steps with salaries below $50,000 and others above adjusted by increasing pay to $50,000 for the cases paying below the minimum and providing a $2,000 raise for those cases paying above. 36% of districts are in this case when considering schedules for teachers holding a bachelor's degree.
- Districts whose salary schedule was almost entirely above the new minimum of $50,000 adjusted after the LEARNS Act by keeping their existing schedules but increasing salaries by $2,000 for all their teachers. 9% of districts are in this case when considering schedules for teachers holding a bachelor's degree.

Figure 6 -Distribution of Teacher Salaries - BA & 10 Years of Experience

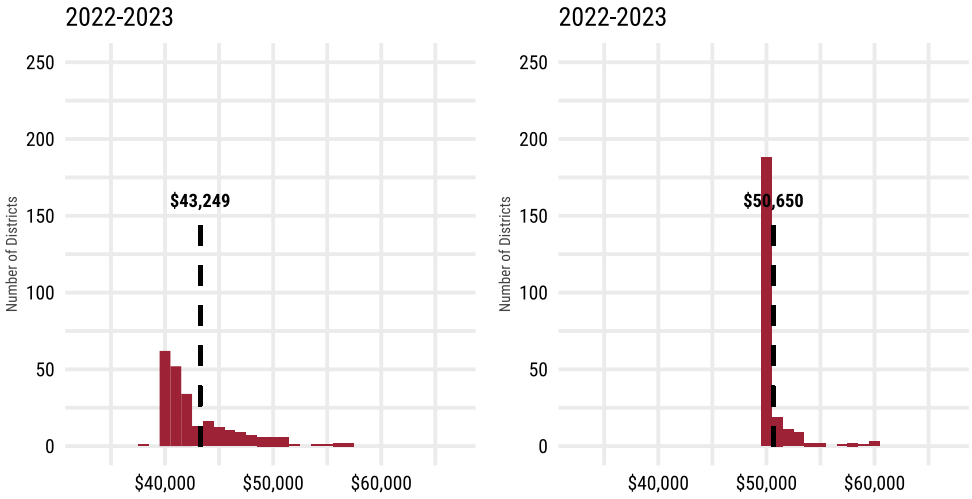
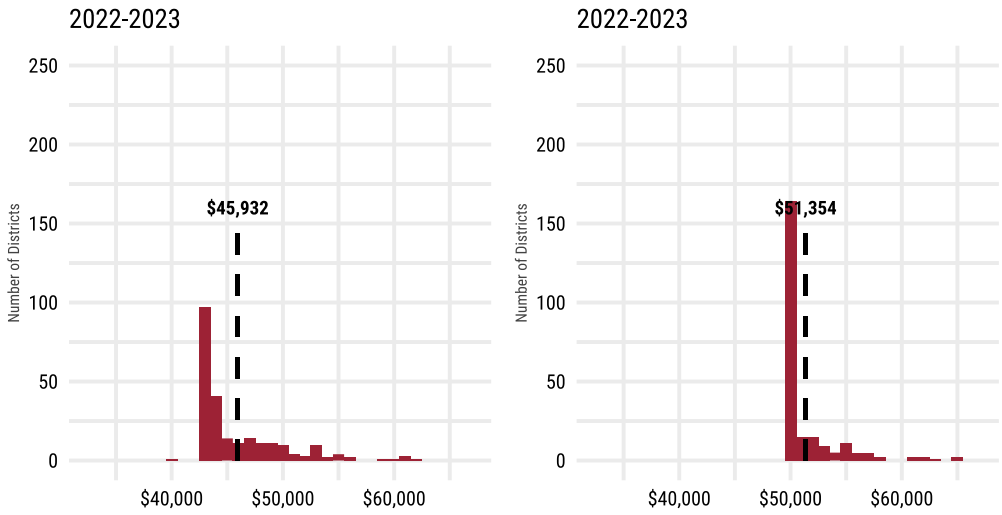


Figure 7 - Distribution of Teacher Salaries - BA & 15 Years of Experience



We next explore how teacher salaries' competitiveness changed across and within regions of the state. Figures 8 and 9 show teachers' salaries for those holding a bachelor's degree pre-LEARNS (2022-23) and in the first year of implementation (2023-24) for new teachers and those with 5, 10, and 15 years of experience. Pre-LEARNS, Northwest Arkansas, and Central Arkansas had school districts offering the largest starting salaries for beginning teachers holding a bachelor's degree. These districts' salary advantage continued as teachers gained experience.

However, as a result of the salary schedule adjustments to satisfy the LEARNS Act, teachers' salaries for new teachers were more equally distributed across regions of the state in 2023-24, with minimal variation across districts. However, experienced teachers still experience more differentiation across districts. Although pay differences for experienced teachers shrank under LEARNS, it remains advantageous to work in Northwest Arkansas and Central Arkansas districts, which continue to offer higher salaries to their experienced teachers.

Figure 8 - Teacher Salaries for BA in the 2022-2023 School Year, by Years of Experience & District

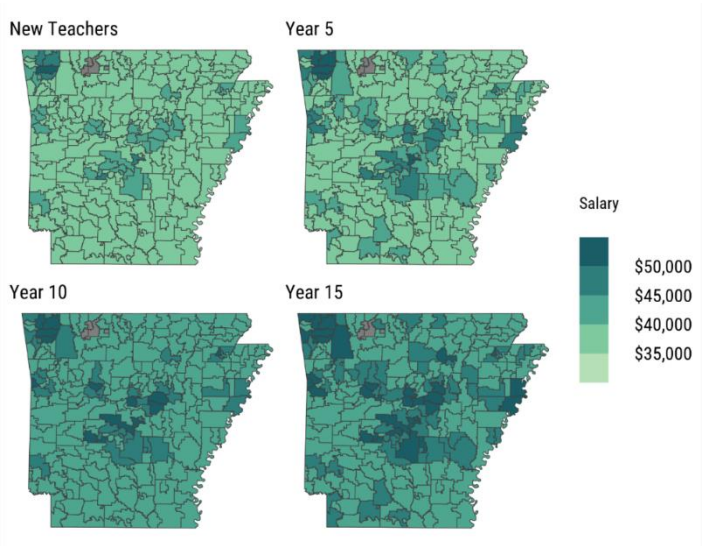
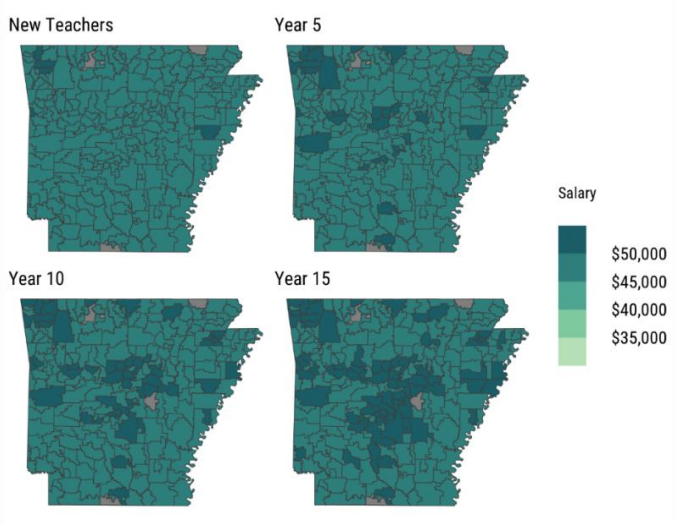


Figure 9 - Teacher Salaries for BA in the 2023-2024 School Year, by Years of Experience & District



5.2 What was the relationship between teacher salaries and district/student characteristics before the LEARNS Act and how has this relationship changed? (Research Question 2)

We first study the distribution of salary changes in the first year of implementation of the LEARNS Act. For this aim, we calculated each district's salary differences between 2023-24 and

2022-23 for teachers holding a bachelor's degree with different levels of experience. We then use a regression model to study the relationship between the differences in salaries and different district characteristics. The results are presented in Table 1 below.

On average, raising starting salaries for beginning teachers to the new minimum required about $8,486 additional dollars per teacher (i.e., the constant in the first column). Starting salary increases were even larger in rural districts and those serving a higher percentage of children living in poverty. An increase of 10 percentage points in the proportion of children living in poverty in the district is associated with an average increase in starting salaries of about $962, while rural districts increased starting salaries by about $2,350 more than urban districts. However, the differences between rural and urban districts and districts with different levels of child poverty decrease for teachers with more experience. Overall, these results suggest that salary increases were substantially larger in rural, higher-poverty districts, and teachers with lower levels of experience.

We further study how the LEARNS Act might have affected school district competitiveness by using regression models to compare the relationship between salaries and district characteristics one year before LEARNS and in the first year of implementation. The panels of Table 2 provide a side-by-side comparison of the estimated relationships for different experience levels. In each panel, the first column shows the relationships pre-LEARNS in 2022-23 and the second column shows post-LEARNS in 2023-24.

Panel A provides the results for beginning teachers. As we can see in column (1), beginning teachers' pre-LEARNS starting salaries were on average about $2,400 lower in rural school districts than in urban districts. Pre-LEARNS we did not observe a statistically significant difference in starting salaries for beginning teachers in suburban areas while beginning teacher salaries in town schools were about $1,725 lower compared to urban schools. We also do not observe a significant association between starting teacher salaries and the demographic composition of the district's student body. However, we do observe a significant association with the percentage of school-age children living in poverty in the district. An increase of 10 percentage points in the proportion of children living in poverty in the district is associated with about $958 lower starting salaries for teachers holding a bachelor's degree.

Panel A, column (2), shows the results for beginning teachers after the introduction of the LEARNS Act in the 2023-24 school year. As we can see, the changes implemented as a result of LEARNS reduced differences in starting teacher salaries between rural and urban school districts. Comparing columns (1) and (2) we see that the difference between urban and rural districts decreased from $2,400 lower salaries in rural areas to just $48 less. The salary changes also eliminated the relationship with the percentage of school-age children living in poverty in the district. For beginning teachers, the new legislation made it more attractive to start a teaching career in rural areas and districts with higher poverty.

Interestingly, starting salaries in suburban districts are now lower than in urban districts after the introduction of the LEARNS Act, but the difference is only about $232. We also observe a reduction in the relationship between district size and teacher salaries, with larger districts offering higher wages. However, that relationship was already small pre-LEARNS, after comparing districts in the same urbanicity areas and serving similar populations, so the practical impact of this change is small. Prior to LEARNS, an increase of 100 students enrolled in the district was associated with a $50 increase in teacher starting salaries, keeping the rest of the district characteristics comparable, and that was reduced to $6 post-LEARNS.

Columns (3) to (8) show the results for teachers holding a bachelor's degree with 5, 10, and 15 years of experience. Looking at the second column in each panel we see that as teachers gain experience, the difference in salaries for school districts serving a higher proportion of children in poverty re-emerges, although the difference is smaller than it was before LEARNS. Looking at Panel D, columns (7) and (8), which show results for teachers with 15 years of experience, before LEARNS a 10 percentage point increase in the level of district childhood poverty was associated with a salary reduction of about $1,200, and after LEARNS that difference is $520.

Concerning the comparison between rural, towns, and more urban districts, we observe that the Arkansas LEARNS Act considerably reduced the salary disadvantage in rural and town districts, but the differences increase as teachers gain experience, although the differences are smaller than they pre-LEARNS at every experience level. Looking at Panel D, column (8), teachers with 15 years of experience who hold a bachelor's degree earn about $1,695 less post-

LEARNS if they teach in a rural district than if they teach in an urban area, which is about 53% of the pre-LEARNS difference. Those teaching in a town earn about $1,805 less.

5.3 How have new salary schedules impacted teacher retention and mobility patterns, particularly in geographic shortage areas? (Research Question 3)

We next study how the new salary schedules might have affected patterns of teacher retention and mobility using the interrupted times series approach with a dosage effect described in equation (1) above. Table 3 presents the estimated coefficients as average marginal effects for the results of multinomial logit models for teachers' labor transitions when using three different sets of years as a comparison: **All Years** pre-LEARNS as controls (2016-17 to 2022-23); only pre-LEARNS **Pandemic Years** as controls (2020-21 to 2022-23); only one-year pre-LEARNS as control (**2022-23**).

Table 1: Differences in salaries (2023-24 vs. 2022-23) and districts' characteristics, for teachers holding a bachelor's degree with different experience levels

	Beginning Teacher	5 Years of Experience	10 Years of Experience	15 Years of Experience
Rural District	2,345.544***	2,718.317***	2,572.301***	1,480.152*
	(741.233)	(818.233)	(863.616)	(852.585)
Suburban District	-345.824	-328.136	-241.675	-454.630
	(746.792)	(824.369)	(870.087)	(858.974)
Town District	1,641.780**	1,917.451**	1,841.179**	923.945
	(706.978)	(780.420)	(823.964)	(813.439)
District Enrollment	-0.442***	-0.353***	-0.247***	-0.169**
	(0.060)	(0.066)	(0.069)	(0.069)
% White Students	589.011	728.284	1,001.287	844.881
	(571.383)	(630.738)	(665.712)	(657.209)
% Children in Poverty	9,622.742***	10,486.090***	9,881.494***	6,722.050***
	(2,084.088)	(2,300.585)	(2,429.989)	(2,398.952)
Constant	8,485.659***	5,289.698***	2,894.143**	2,525.873**
	(1,079.792)	(1,191.962)	(1,258.665)	(1,242.589)
Number of Districts	230	230	229	229

Note: Table 1 presents estimated coefficients from linear regression models and standard errors in parenthesis.
*** refers to p-value < 0.01; ** refers to p-value < 0.05; * refers to p-value < 0.10.

Table 2: Teachers' salaries and district characteristics for teachers holding a bachelor's degree with different experience levels, 2022-23 & 2023-24

Panel A: Beginning Teacher

	2022-23	2023-24
	(1)	(2)
Rural District	-2,398.334***	-47.925
	(740.263)	(95.102)
Suburban District	118.100	-231.503**
	(745.952)	(95.812)
Town District	-1,724.880**	-86.332
	(706.179)	(90.698)
District Enrollment	0.498***	0.055***
	(0.059)	(0.008)
% White Students	-502.473	72.168
	(564.415)	(73.226)
% Children in Poverty	-9,575.542***	-12.329
	(2,060.384)	(267.338)
Constant	41,428.466***	49,941.598***
	(1,071.358)	(138.531)
Number of Districts	232	231

Panel B: 5 Years of Experience

	2022-23	2023-24
	(3)	(4)
Rural District	-2,859.456***	-136.448
	(774.803)	(261.802)
Suburban District	-200.242	-532.630**
	(780.758)	(263.755)
Town District	-2,202.940***	-289.696
	(739.129)	(249.678)
District Enrollment	0.569***	0.216***
	(0.062)	(0.021)
% White Students	-466.292	251.982
	(590.750)	(201.580)
% Children in Poverty	-10,369.745***	69.890
	(2,156.521)	(735.939)
Constant	44,468.796***	49,781.221***
	(1,121.347)	(381.354)
Number of Districts	232	231

Panel C: 10 Years of Experience

	2022-23	2023-24
	(5)	(6)
Rural District	-3,169.975***	-583.630
	(855.569)	(444.958)
Suburban District	-449.048	-686.463
	(862.144)	(448.275)
Town District	-2,566.679***	-747.849*
	(816.177)	(424.485)
District Enrollment	0.655***	0.409***
	(0.069)	(0.036)
% White Students	-510.736	488.267
	(652.330)	(342.600)
% Children in Poverty	-11,179.436***	-1,264.264
	(2,381.319)	(1,251.730)
Constant	47,425.302***	50,308.672***
	(1,238.238)	(648.453)
Number of Districts	232	230

Panel D: 15 Years of Experience

	2022-23	2023-24
	(7)	(8)
Rural District	-3,192.799***	-1,694.528***
	(965.227)	(639.741)
Suburban District	-545.586	-993.086
	(972.645)	(644.511)
Town District	-2,701.149***	-1,805.012***
	(920.785)	(610.307)
District Enrollment	0.771***	0.602***
	(0.077)	(0.051)
% White Students	-628.575	213.835
	(735.939)	(492.576)
% Children in Poverty	-11,976.536***	-5,201.487***
	(2,686.531)	(1,799.684)
Constant	50,160.891***	52,668.157***
	(1,396.942)	(932.318)
Number of Districts	232	230

Note: Table 2 presents estimated coefficients from linear regression models and standard errors in parenthesis. *** refers to p-value < 0.01; ** refers to p-value < 0.05; * refers to p-value < 0.10.

** refers to p-value < 0.01; ** refers to p-value < 0.05; * refers to p-value < 0.10.

Table 3: AR LEARNS salary changes effects on teachers' job transitions-Multinomial Logit Average Marginal Effect Estimates

		2023-24 vs. All Years	2023-24 vs. Pandemic Years	2023-24 vs. 2022-23
Exiter	Post LEARNS	-0.014***	-0.015***	-0.034***
		(0.004)	(0.004)	(0.005)
	Adjusted Salary Change ($1,000)	0.003***	0.003***	0.002***
		(0.001)	(0.001)	(0.001)
Switcher	Post LEARNS	0.010***	0.011***	0.012***
		(0.001)	(0.002)	(0.002)
	Adjusted Salary Change ($1,000)	-0.001***	-0.001***	-0.002***
		(0.0002)	(0.0003)	(0.0004)
Mover Outside District	Post LEARNS	0.011***	0.009**	-0.002
		(0.003)	(0.003)	(0.004)
	Adjusted Salary Change ($1,000)	-0.001**	-0.001**	-0.001
		(0.0004)	(0.0004)	(0.001)
Mover Inside District	Post LEARNS	-0.007*	-0.012***	0.023***
		(0.003)	(0.004)	(0.007)
	Adjusted Salary Change ($1,000)	0.0004	0.001	0.0003
		(0.001)	(0.001)	(0.001)
Number of Observations		156,093	56,968	28,338

Note: Table 3 models also include controls for teachers' gender, ethnicity, total years of experience, districts' urbanicity level, childhood poverty in the district, enrollment, districts' student body composition, and region fixed effects. Standard errors are presented in parentheses.
*** refers to p-value < 0.01; ** refers to p-value < 0.05; * refers to p-value < 0.10.

As Table 3 shows, post-LEARNS we observe a statistically significant decline in the probability of teachers exiting the Arkansas Education workforce of between 1.4 to 3.4 percentage points, compared to the probability of staying in the same school, depending on the comparison years used in the analysis. However, looking at the coefficient of the dosage effect (i.e., Adjusted Salary Change), we observe that, after LEARNS, teachers' exits are more likely in districts that provided larger salary increases. Every $1,000 increase in adjusted salaries above the minimum of $2,000 is associated with a small but statistically significant increase in the probability of exiting the teaching profession of between 0.2 to 0.3 percentage points. As we described above, districts whose teachers experienced higher salary increases tended to be in more rural areas and served a higher proportion of children in poverty. Although we control for different district characteristics, these districts with larger salary increases and thus higher

dosage may share unobservable characteristics that make them have higher rates of teachers exiting the profession, despite the salary increases.

Looking at the probability of teachers switching out of the classroom to non-instructional roles in education, we observe that these transitions are more likely in the first year of implementation of the LEARNS Act, even when compared to the higher switching rates in recent years. Teachers were about one percentage point more likely to transition out of the classroom for other non-instructional positions, relative to staying in the same school, post LEARNS.

Interestingly, the increase in salaries post-LEARNS might have helped reduce such transitions out of the classroom. Teachers were between 0.1 to 0.2 percentage points less likely to transition out of the classroom per $1,000 increase in their adjusted wages, above the minimum $2,000 increase. The average teacher in our sample received an adjusted salary increase of $5,000 above the minimum, representing about a 0.5 to 1 percentage point reduction in the probability of transitioning to non-instructional roles, which would halve or fully eliminate the estimated post-LEARNS switching increase. Finally, we do not find consistent significant impacts of the new salary legislation on teachers' movements across schools within the district or across districts.

Table 4 uses all years as a comparison group and presents results by teacher experience level. Similar results are obtained when using only pre-pandemic or one-year pre-LEARNS as a comparison[12]. In this table, we observe how the reported effects above on the probability of switching to non-instructional roles appear concentrated among mid and late-career teachers. These teachers appear to be about 1.3 to 1.6 percentage points more likely to transition out of the classroom to non-instructional roles post-pandemic, but each $1,000 increase in adjusted salary reduces the probability of such transition by between 0.2 and 0.5 percentage points. This table also shows that early career teachers, with less than 3 years of experience, had a 2.4 percentage points higher probability of moving out of the district post-LEARNS, but every $1,000 increase in adjusted salaries, above the $2,000 minimum increase, reduces this probability by 0.2 percentage points.

[12] Results available from the authors upon request.

Table 4: AR LEARNS salary changes effects on teachers' job transitions by teacher's experience-Multinomial Logit Average Marginal Effect Estimates

		Early Career	Junior Career	Mid Career 1	Mid Career 2	Late Career 1	Late Career 2	Late Career 3
		Less than 3 years	*4 to 7 years*	*8 to 11 years*	*12 to 15 years*	*16 to 19 years*	*20 to 22*	*More than 23*
Exiter	Post LEARNS	0.013	0.009	0.007	0.009	**-0.026****	-0.005	-0.005
		(0.009)	(0.008)	(0.008)	(0.009)	**(0.011)**	(0.016)	(0.021)
	Adj. Salary Change ($1,000)	-0.001	0.001	-0.0004	-0.001	**0.007****	-0.001	-0.005
		(0.001)	(0.001)	(0.002)	(0.002)	**(0.003)**	(0.001)	(0.015)
Switcher	Post LEARNS	0.004	0.004	**0.01****	**0.016*****	**0.013*****	**0.013*****	**0.011****
		(0.003)	(0.004)	**(0.004)**	**(0.004)**	**(0.004)**	**(0.005)**	(0.004)
	Adj. Salary Change ($1,000)	-0.0003	-0.001	**-0.002****	-0.001	**-0.005***	0.001	-0.004
		(0.0003)	(0.0006)	**(0.001)**	(0.001)	**(0.002)**	(0.002)	(0.004)
Mover Outside District	Post LEARNS	**0.024****	0.014*	0.007	0.007	0.016***	-0.006	-0.003
		(0.009)	(0.007)	(0.007)	(0.006)	(0.005)	(0.009)	(0.005)
	Adj. Salary Change ($1,000)	**-0.002****	0.000	-0.001	-0.001	-0.002	0.004	0.002
		(0.0009)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)	(0.002)
Mover Inside District	Post LEARNS	-0.004	-0.008	-0.008	-0.014	-0.006	-0.008	0.005
		(0.008)	(0.008)	(0.008)	(0.009)	(0.010)	(0.014)	(0.010)
	Adj. Salary Change ($1,000)	0.0004	0.0001	0.001	0.002	-0.002	0.008	-0.003
		(0.0008)	(0.001)	(0.002)	(0.002)	(0.004)	(0.007)	(0.008)
N. Obs		46,086	26,213	20,039	16,597	14,100	8,761	24,297

Note: Table 4 models also include controls for teachers' gender, ethnicity, total years of experience, districts' urbanicity level, childhood poverty in the district, enrollment, districts' student body composition, and region fixed effects. Standard errors are presented in parentheses.
*** refers to p-value < 0.01; ** refers to p-value < 0.05; * refers to p-value < 0.10.

Next, we use a logit model to study whether the LEARNS Act is descriptively related to new teachers' probability of locating in a geographic shortage area. Results are presented in Table 5 below. Looking at the results we observe that after LEARNS, especially compared with pandemic years, the probability of new teachers locating in geographic shortage areas increased by about 2.2 to 2.6 percentage points. However, if we compare with all pre-pandemic years the increase is only 1.2 percentage points and not statistically significant.

Table 5: AR LEARNS salary changes effects on the probability of new teachers locating in geographic shortage areas- Logit Average Marginal Effect Estimates

	All Years	Pandemic Years	2022-23 and 2023-24
Post LEARNS	0.012	0.022**	0.026*
	(0.010)	(0.010)	(0.014)
N. Obs	21,063	9,743	3,968

Note: Table 5 models also include controls for teachers' gender, ethnicity, and level of education. Standard errors are presented in parentheses.
*** refers to p-value < 0.01; ** refers to p-value < 0.05; * refers to p-value < 0.10.

Finally, we use a logit model to study whether the LEARNS Act is descriptively related to teachers' probability of locating in a geographic shortage area. Table 6 shows the average marginal effects using different pre-LEARNS years as a comparison. Overall, we find that moves to geographic shortage areas are about 3 percentage points less likely post-LEARNS compared with all pre-LEARNS years. However, when we compare with only pandemic years or just 2022-23, we do not find statistically significant differences in the patterns of mobility towards geographical shortage areas.

Table 6: AR LEARNS salary changes effects on the probability of moving out of district to a shortage area-Logit Average Marginal Effect Estimates

	All Years	Pandemic Years	2022-23 and 2023-24
Post LEARNS	-0.031**	-0.018	-0.007
	(0.015)	(0.015)	(0.017)
N. Obs	7,232	2,891	1,689

Note: Table 6 models also include controls for teachers' gender, ethnicity, total years of experience, districts' urbanicity level, childhood poverty in the district, enrollment, districts' student body composition, and region fixed effects.
Standard errors are presented in parentheses.
*** refers to p-value < 0.01; ** refers to p-value < 0.05; * refers to p-value < 0.10.

6. Discussion and Conclusions

The LEARNS Act has substantially altered Arkansas teacher compensation, and our analysis of its impact in the first year of its implementation yields a few key takeaways. First, increasing the minimum teacher salary resulted in a significant across-the-board raise for teachers in many districts. Before LEARNS, starting teacher salaries in almost all school districts were below the new minimum salary of $50,000. Starting teacher salaries under LEARNS are now more equally distributed, with minimal variation across districts. Since the state is funding the required increase, this also represents a meaningful increase in state education funding for many rural and higher-poverty districts.

Second, the law has promoted more pay equity for teachers working in more rural and higher-poverty districts. Before LEARNS, beginning teachers working in rural districts could expect to earn about $2,400 less per year than if they had worked in an urban district. Similarly, beginning teachers who worked in higher-poverty districts would, on average, earn less than teachers working with more advantaged student populations. Our analysis shows how the introduction of the LEARNS Act reduced the negative and significant association between starting teacher salaries and higher rates of district poverty. However, although post-LEARNS pay differences are smaller for all experience levels, more cross-district pay differentiation reappears as teachers gain experience, and it remains advantageous to work in more urban districts that continue to offer higher salaries to their experienced teachers. As experience is found to be a predictor of teacher quality (Wiswall, 2013; Papay and Kraft, 2015), this could continue to impact the equitable distribution of quality teachers across the state, which we plan to study in future work.

Finally, although we hypothesize that LEARNS will impact teacher recruitment, retention, and turnover, these effects have not yet fully materialized in the first year of implementation of the new legislation. Although we observe a reduction in the probability of traditional public-school teachers exiting the education workforce in the first post-LEARNS year, teachers' exits are more likely in those districts that provided higher salary increases for their teachers (i.e. more rural and higher poverty districts). We also fail to find a statistically

significant increase in new or existing teachers' movements toward shortage area districts in this first year of implementation of the reform.

The new salary schedules under the LEARNS Act, however, appear to have reduced the probability of teachers switching into non-instructional roles, especially for those mid and late-career teachers when these transitions are more common. This could be a positive result as Camp et al. (2023) showed that teachers transitioning to these non-instructional positions during the pandemic were on average of higher quality, as measured by their value-added, and there are concerns about the future of some of these positions that might have been funded through the Federal Elementary and Secondary School Emergency Relief Fund (ESSER).

Although LEARNS made positive improvements to teacher salaries, the immediate effects on teacher retention have been limited. It is possible, however, that we will observe more positive effects in the future as districts and teachers adapt to the new legislation. In a recent survey of superintendents and principals across the state, most administrators expressed confidence that the changes made to teacher salaries this past year will enhance their ability to attract and retain teachers (Zamarro et al., 2024). It is also possible that the new legislation will have a larger impact on new teachers entering the profession, potentially affecting their recruitment into rural and higher-poverty districts. In this respect, our descriptive analysis suggests increased new teacher placement in geographic areas of shortage, when compared with other pandemic years. This is something that we plan to continue monitoring in the future.

However, it is also possible that the changes are not enough to address the state's teacher staffing challenges. So far, districts have adapted to the new legislation by slightly changing but keeping rigid salary schedules based on teachers' years of experience and education. Adopting more innovative compensation strategies and other incentive programs might be needed to observe larger effects on teacher recruitment and labor transitions. At the same time, the state might need to continue to expand pathways and on-ramps into the teaching profession to expand the supply of teachers who can fill hard-to-staff positions.

References

Allegretto, S. A. and Mishel, L. (2020). Teacher Pay Penalty Dips but Persists in 2019: Public School Teachers Earn about 20% Less in Weekly Wages than Nonteacher College Graduates. Washington, DC: Economic Policy Institute.

Bastian, K. C., & Fuller, S. C. (2024). Educator Attrition in North Carolina Public Schools: Updates Through September 2023 [Brief]. University of North Carolina. https://epic.unc.edu/wp-content/uploads/sites/1268/2024/01/epic_insight_educator_attrition_through_sept_2023.pdf

Biasi, B. (2021). The Labor Market for Teachers under Different Pay Schemes. American Economic Journal: Economic Policy, 13(3), 63–102. https://doi.org/10.1257/pol.20200295

Camp, A., Zamarro, G., and McGee, J. (2023). Teacher turnover during the COVID-19 pandemic. (EdWorkingPaper: 23-757). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/akme-z405

Hanushek, E. A., Kain, J. F., and Rivkin, S. G. (2004). Why public schools lose teachers. Journal of Human Resources, 39 (2), 326–354.

Hendricks, M. D. (2014). Does it pay to pay teachers more? Evidence from Texas, Journal of Public Economics, 109, 50-63.

Horng, E. L. (2009). Teacher tradeoffs: Disentangling teachers' preferences for working conditions and student demographics. American Educational Research Journal, 46(3), 690-717.

Kraft, M. A., and Lyon, M. A. (2024). The rise and fall of the teaching profession: Prestige, interest, preparation, and satisfaction over the last half century. EdWorkingPaper 22-679. Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/7b1a-vk92

Loeb, S., Darling-Hammond, L., and Luczak, J. (2005). How Teaching Conditions Predict Teacher Turnover in California Schools. Peabody Journal of Education, 80(3), 44–70.

Papay, J. P., and Kraft, M.A. (2015). Productivity returns to experience in the teacher labor market: Methodological challenges and new evidence on long-term career improvement. Journal of Public Economics, 130, 105-119.

Pham, L. D., Nguyen, T. D., & Springer, M. G. (2021). Teacher Merit Pay: A Meta-Analysis. American Educational Research Journal, 58(3), 527–566.

Richwine, J. and Biggs, A. G. (2011). Assessing the Compensation of Public-School Teachers. Washington, DC: Heritage Foundation, Center for Data Analysis.

Stanford, L. (2023). Teachers in 6 States Will Get Raises. More Could Join Them. EducationWeek, June 22, 2023. Retrieved from https://www.edweek.org/teaching-learning/teachers-in-6-states-will-get-raises-more-could-join-them/2023/06

Sun, M., Candelaria, C. A., Knight, D., LeClair, Z., Kabourek, S. E., and Chang, K. (2024). The Effects and Local Implementation of School Finance Reforms on Teacher Salary, Hiring, and Turnover. Educational Evaluation and Policy Analysis.

Taylor, L. L. (2008). Comparing Teacher Salaries: Insights from the U.S. Census. Economics of Education Review, 27(1), 48-57.

West, K. L. (2014). New Measures of Teachers' Work Hours and Implications for Wage Comparisons. Education Finance and Policy, 9(3), 231-263.

Wiswall, M. (2013). The Dynamics of Teacher Quality. Journal of Public Economics, 100, 61-78.

Zamarro, G., Camp, A., McGee, J., and Vernon, M. (2024). Administrators' Views of Teacher Salary Changes Under the Arkansas LEARNS Act. EDRE Research Brief 2024-01. Retrieved from https://edre.uark.edu/_resources/pdf/edre-rb-2024-01.pdf.

Appendix: Teacher Salary schedules for those holding a Master's degree

Figure A.1 - Distribution of Entry-Level Teacher Salaries - Master's Degree

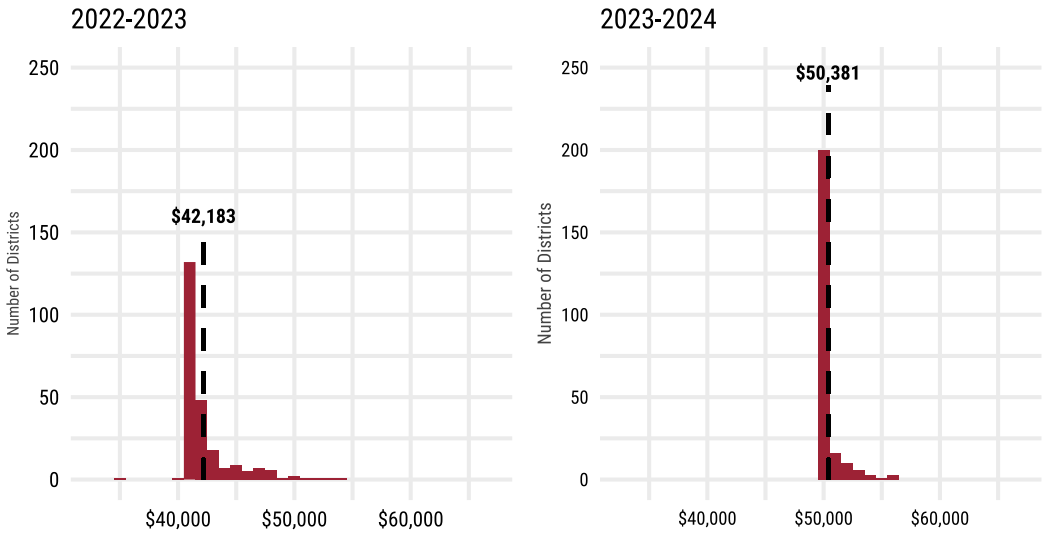


Figure A. 2 - Distribution of Teacher Salaries - Master's Degree & 5 Years of Experience

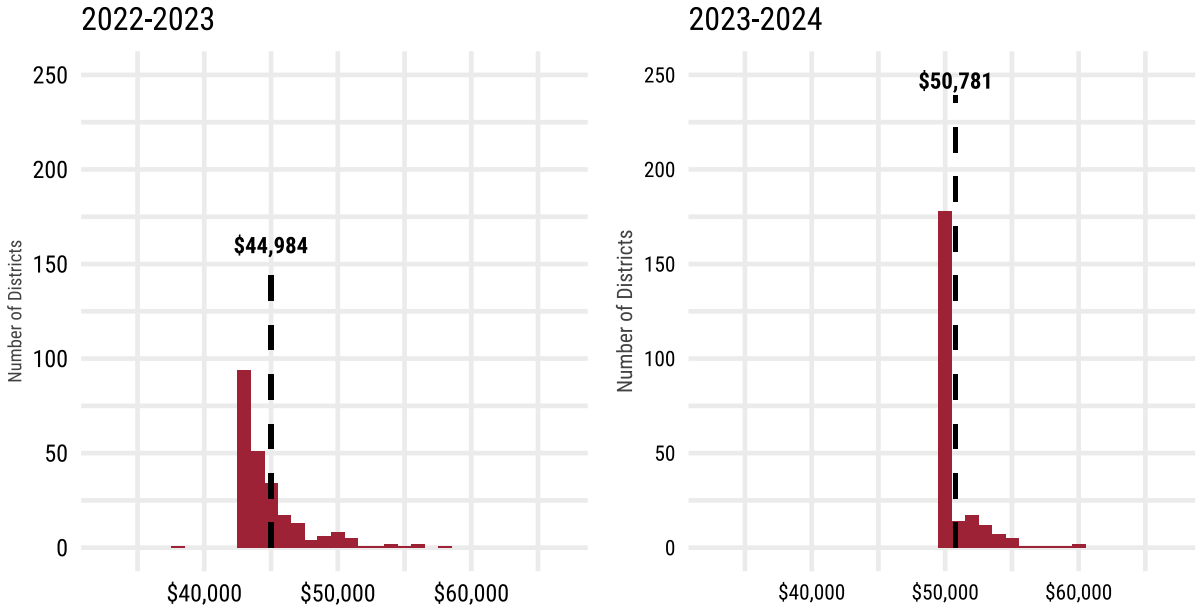


Figure A.3 -Distribution of Teacher Salaries – Master's Degree & 10 Years of Experience

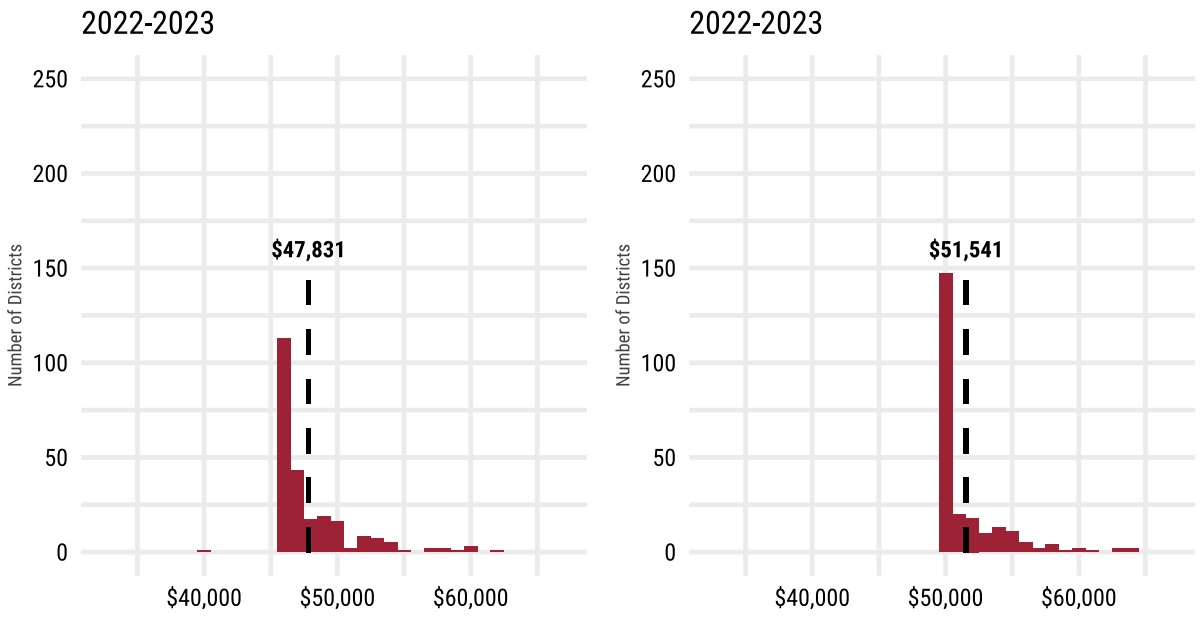


Figure A.4 -Distribution of Teacher Salaries – Master's Degree & 15 Years of Experience

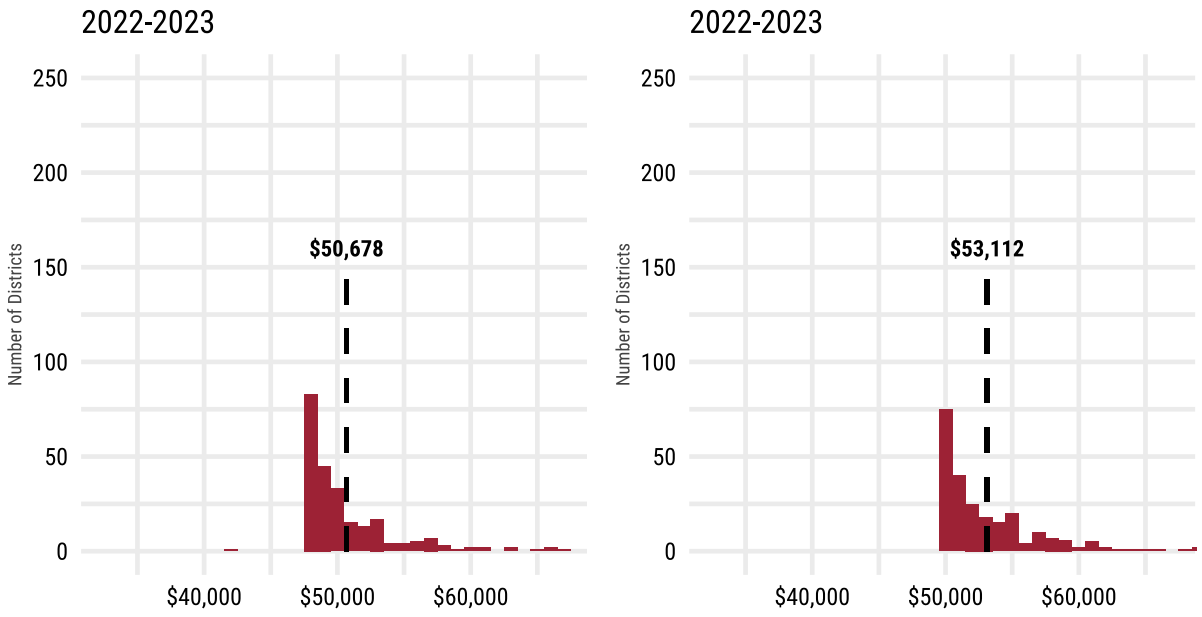


Figure A.5 - Teacher Salaries for MA in the 2022-2023 School Year, by Years of Experience & District

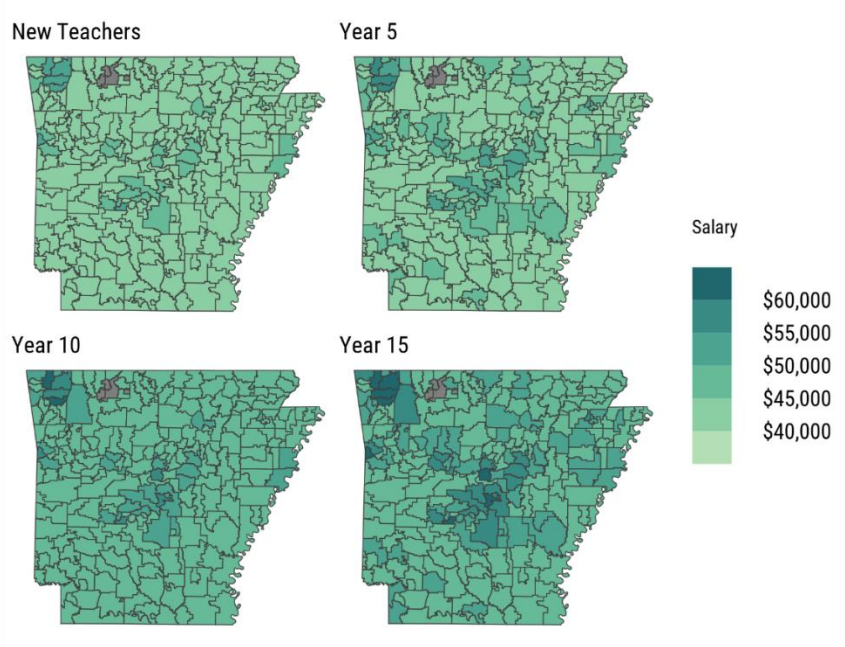


Figure A.6 - Teacher Salaries for MA in the 2023-2024 School Year, by Years of Experience & District