**Unequal Pay for Equal Work?**
**Unpacking the Gender Gap in Principal Compensation**

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We investigate the male–female gap in principal compensation in state and national data: detailed longitudinal personnel records from Missouri and repeated cross-sections from the nationally representative Schools and Staffing Survey (SASS). In both data sets, we estimate substantively important compensation gaps for school leaders. In Missouri, female principals make approximately $1,450 less annually than their male colleagues with similar characteristics, including experience level and degree attainment, leading the same school in different years. Gaps are present in both base salary and extra duty salary, and are only partially explained by career paths or workplace sorting. SASS analyses show that women make about $1,000 less than men nationally, on average, a gap that even grows larger once accounting for individual and workplace characteristics, teacher-supplied effectiveness ratings, and reported hours worked. The presence of these residual gaps after accounting for many supply-side explanations may signal gender discrimination in school principal compensation.

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## 1. Introduction

Wage gaps between men and women in the American workforce are well-documented. Among all full-time workers, women made about 83 cents per dollar of weekly male earnings as recently as 2014 (Blau & Kahn, 2017). Researchers have established multiple reasons for this disparity. Historically, sex differences in human capital investments like educational attainment and accumulated years of experience have been big contributors, though those gaps have disappeared in recent years (Goldin, 2014), suggesting subtler mechanisms explain present-day wage differences. For example, men tend to sort into higher paying, "male-dominated" professions (Babcock, Recalde, Vesterlund, & Weingart, 2017; Blau & Kahn, 2007) and workplaces (Cohen, 2013). Women are penalized for making work choices that prioritize the time flexibility associated with responsibilities for caring for dependents and other household work (Goldin, 2014), and men are much more likely than women to work in more lucrative management positions (Haveman & Beresford, 2012). Yet even when limiting analysis to samples of employees in the same occupation and accounting for individual and workplace characteristics, researchers typically still estimate wage differences in the range of 10 percent (see Blau & Kahn, 2017). These differences often are interpreted as evidence of gender-based discrimination or other mechanisms, such as gender differences in negotiation over compensation (e.g., Babcock & Laschever, 2003), that produce unequal pay for equal work.

Our study similarly investigates male–female compensation gaps among workers in the same occupation in a data-rich context that permits measurement of many potential explanations for such differences. We explore gender-based compensation gaps in the education sector—specifically among school principals, for whom such gaps have been studied less extensively than for teachers. Research on *teacher* compensation has documented inequality in pay between men and women (e.g., Baugh & Stone, 1982; Player, 2009; Taylor, 2008), which scholars have attributed to unofficial wage premiums offered to attract male applicants (Chambers, 1985), clustering of teachers into higher- versus lower-paying districts or job types (Marchitello, 2018), and sorting by gender into subjects and school levels that are differently compensated (Sadler & Carter, 2019). These wage differentials persist despite standardization in compensation associated with widespread unionization among teachers and existence of teacher salary schedules in the vast majority of districts (Grissom & Strunk, 2012; Cowen & Strunk, 2015).

If such wage differentials exist in teaching, there are even stronger reasons to suspect that they exist for school leaders. Almost all principals are former teachers, and their patterns of sorting across districts and school levels by gender, for example, are likely to be similar. Moreover, principals are less likely to be unionized, and salary schedules are used less often for leadership positions, potentially making pay less standardized across schools and creating opportunities for district leaders to exercise discretion in setting compensation, or to negotiate pay with individual school leaders, which may lead systematically to different outcomes for men and women. The presence of such gaps may help explain why—despite increases in the last three decades (Grissom, Egalite, & Lindsay, 2021)—women remain vastly underrepresented in leadership relative to proportion of women in teaching (Riehl & Byrd, 1997; Marchitello, 2018). Salary is a key factor in attracting and retaining principals (Pijanowski & Brady, 2009), and under-rewarding women for work relative to men may reduce women's (including future women's) motivation to pursue or remain in leadership (Blau & Winkler, 2018).

The few published studies exploring pay differentials for men and women in the principalship arrive at mixed conclusions about whether such gaps exist, particularly once contextual factors are taken into account, with some studies concluding that substantively important gaps exist (e.g., Pounder, 1988) and others concluding that they do not (Stone, 1985; Young, Reimer, & Young, 2010). This mixed set of conclusions may result from the non-representative, cross-sectional samples of principals examined in these studies and from differences in other factors considered in their models.

We aim to provide a more comprehensive analysis of gender wage gaps in school leadership than available in prior studies. We examine these gaps in two data sets. First, we make use of a longitudinal administrative data set from Missouri spanning 1991 to 2016. Administrative data have an advantage of not relying on the self-reports of salary used in other studies of principal pay gaps (e.g., Young, Reimer, & Young, 2010), important given studies showing that misreporting of salaries is influenced by both satisfaction with wages (Prati, 2017) and gendered social norms (Murray-Close & Heggeness, 2018). Because the Missouri data are longitudinal, they permit in-depth investigation of changes in salary gaps as administrators move through their careers, facilitating additional insights into the dynamics of administrator wage gaps. We answer three research questions. First, does a salary gap exist, on average, between female and male principals? Second, how has this gap changed over time? Third, to what degree is the gap explained by the characteristics of female and male principals, such as experience and education, and the characteristics of the schools and districts that employ them? That is, when comparing otherwise similar principals in similar school environments, and potentially even in the same school district, do we find that a salary gap between women and men remains? And where a gap appears, to what extent can it be explained by job mobility and other labor supply-side factors that prior research suggests may be important drivers?

To extend and gauge the generalizability of these state-level findings, we supplement our answers to these questions with additional analysis of principal salaries from four waves of the nationally representative Schools and Staffing Survey (SASS), which span the period from 1999-–2000 to 2011–12, and one wave of the National Teacher and Principal Survey (NTPS), conducted in 2015-16. SASS/NTPS includes a principal questionnaire that asks principals in sampled schools to report their annual salary before taxes and deductions. It also provides rich information about the schools and districts in which principals work, which we can use to probe some explanations for gender wage gaps that we cannot address with the administrative data.

## 2. Principal Compensation in Context

Trends in the broader labor market show that while the gender pay gap among full-time workers has decreased over time, progress slowed in the 1990s. Calculations from the Panel Study of Income Dynamics (PSID) show that women made significant gains in relative wages in the 1980s, rising from a female/male hourly pay ratio of 63% in 1979 to 75% in to 1989 (Blau & Kahn, 2006). Data from the Current Population Survey shows the female-to-male ratio in median annual salaries changed from 60% in 1980 to 80% in 2015 (Hegewisch & DuMonthier, 2016). This gap closure is due in part to women increasing their educational attainment—in fact surpassing men—and narrowing experience gaps from 7 to 1.4 years between 1981 and 2011 (Blau & Winkler, 2018). However, Blau and Kahn's (2017) analysis of 2010 PSID data finds that experience differences still explain 14% of the gender wage differential. In addition, it finds that 38% of the differential remains unexplained by worker qualifications and other observable labor supply-side factors; such unexplained variation may indicate discrimination.

The structure of wages in education differs from other industries in ways that may mean that pay differences by gender are less likely than elsewhere in the labor market. For example, the temporal inflexibility of work in education (i.e., school hours are fixed) differentiates it from other professions, potentially leveling the playing field by mitigating the costs of flexibility that often negatively affect women's pay (Goldin, 2014). More relevant, a primary difference in the education sector is that teachers are usually paid according to a salary schedule. Indeed, salary schedules were widely adopted for teachers in the mid-20$^{th}$ century to combat economic and social pressures that had led White male teachers to out-earn their female colleagues (Hansen & Quintero, 2017; Kelley & Odden, 1995). Eighty-nine percent of districts nationwide use a set schedule for paying teachers according to their years of experience and level of education (Hansen & Quintero, 2017). The rigidity in teacher pay created by salary schedules ostensibly leaves little room for gender differences in base pay for teachers in the same district and job category, though differences may exist between elementary and secondary teachers, for example, or in pay for extra duties outside the salary schedule (Baugh & Stone, 1982).

Principals, however, are much less likely to be paid according to a salary schedule. Calculations from the 2011-12 Schools and Staffing Survey show that just 47% of districts employ a salary schedule for administrators (National Center for Education Statistics, n.d.). The less common use of salary schedules presumably creates opportunities for more district discretion in setting principal pay, which may make gender gaps in compensation more likely.

## 3. Explanations for Gender Pay Gaps

In the literature on gender and labor markets, there are two prevailing groups of explanations for why gender pay gaps exist. The first might be classified as *labor supply-side explanations*, such as differences in men's and women's qualifications, choices over the number and flexibility of hours worked, and differences in job mobility and career paths. In contrast, *labor demand-side explanations* focus primarily on labor market discrimination: employers valuing the work of women less than that of comparable men. We explore such explanations in the context of school leadership.

### 3.1. Human Capital Differences

A traditional explanation for male–female earnings differences is that men and women make different choices about their own human capital investments, resulting in education and experience differences that lead to pay differences (Becker, 1993). In education, traditional salary schedules explicitly reflect a human capital theory perspective, rewarding individuals' investments in education and experience by making pay contingent on these two factors.

Across the labor force, educational differences between men and women hold less explanatory power as gender differences in educational attainment close, though differences may still be present in specific occupations, and in fact men remain more likely to enroll in professional graduate programs and complete graduate coursework (Baum & Steele, 2017). If male principals are more likely than female principals to seek educational specialist or doctoral degrees, they will see higher pay in districts that give incentives to higher degrees. Similarly, districts likely reward principals who have more years in public schools, or more years in school leadership, which may lead to higher average pay for men. Women are more likely to see breaks in experience from stepping out of the labor force for childrearing, for example (Bianchi, 2011). Also, marked increases in women in school leadership have occurred just in the last two decades, meaning that, on average, men tend to have more administrative experience than women (7.0 years as a principal vs. 6.2 years, as of 2015-16, according to calculations from the NTPS).

### 3.2. Workplace Sorting

Women may also be paid less because men and women sort into workplaces that differ in average pay. Numerous studies in labor economics have shown that firms that pay higher wages tend to hire fewer women (e.g., Bayard, Hellerstein, Neumark, & Troske, 2003; Blau, 1977). Employers are more likely to make high-status jobs available to men (Fernandez & Mors, 2008). Women are more likely to seek workplaces with characteristics associated with lower pay, such as greater job flexibility (Card, Cardoso, & Kline, 2016).

These studies suggest the importance of including school and district characteristics in an investigation of principal pay. Men may be more likely to work in higher-status districts or schools with, for example, lower concentrations of student poverty; these employers may also have greater access to financial resources and thus may pay leaders higher salaries. Also, given evidence that pay is lower where female workers are more represented (Cohen, 2013), the high numbers of female educators in elementary schools—where female principals also are more likely to work (e.g., Young, Reimer, & Young, 2010)—suggests the importance of accounting for school level (see also Marchitello, 2018).

**3.3. Hours Worked**

Differences in hours worked—including both how many and when—may help to explain salary differences between men and women. Among American full-time workers, men report working 0.5 more paid hours per day than women (U.S. Bureau of Labor Statistics, 2018). Men are more likely to choose time-intensive occupations, which strongly explains the hours–wages relationship, rather than men simply choosing to work more hours within an occupation (Denning et al., 2019). If male principals work longer hours, perhaps because they choose leadership jobs that require longer hours, school districts may compensate them more for this greater time investment. Leading a high school, for example, may require longer hours because principals are expected to be present for athletics and other afterschool activities.

Timing of work hours may also matter. Moreover, men tend to choose fixed or undesirable hours (e.g., long evening hours) for higher pay, while women tend to choose temporal flexibility for lower pay, choices that are a main driver of gender pay gaps among similarly skilled workers (Goldin, 2014). Studies of professions such as bus and train operators suggest that earnings gaps can emerge from women's choices to work fewer overtime and weekend hours (Bolotnyy & Emanuel, 2018). If male principals exercise greater time flexibility and thus can take on additional duties outside the regular school day, districts may compensate them, including through supplements to their base salaries.

**3.4. Career Paths and Mobility**

In the broader labor market, pay differences by gender start early in workers' careers (Corbett & Hill, 2012) and grow over time (see Goldin, Kerr, Olivetti, & Barth, 2017). These differences can arise from job mobility. Men move between workplaces more often than women (Barth et al., 2017), given them more opportunities to seek or negotiate higher salaries (Artz et al., 2018; Card et al., 2018; see also Kronberg, 2018). Men's mobility decisions appear more sensitive to pay (Webber, 2016) and are more likely to sort into higher-paying workplaces (Card, Cardoso, & Kline, 2015). Barth et al. (2017) find that movement differences between men and women explain 27% of the earnings gap.

For principals, changing school districts may similarly offer opportunities to seek or negotiate higher compensation where they start on the salary schedule in ways that advantage men (Tran & Buckman, 2017). This observation suggests the importance of considering both the frequency of moves of men and women and patterns in compensation that follow such moves.

**3.5. Discrimination**

Scholars have concluded that as much as 40% of pay differences between male and female workers within occupations may be explained by labor market discrimination (Blau & Winkler, 2018). Discrimination is difficult to observe directly; instead, evidence of discrimination often comes by process of elimination when gaps remain after accounting for plausible labor supply-side factors.

Labor market discrimination can manifest through various mechanisms. One is taste-based discrimination, or preference for one gender in a given work role; employers may view some work as falling outside the socially appropriate role for women (Becker, 1957), or may value women's contributions less in the workplace, offering male workers a pay premium as a result. To this point, scholars have long noted biases against women accessing school leadership positions because they are stereotyped as having fewer of the "masculine" characteristics traditionally associated with leadership and face sexism that constrains their opportunities (e.g., Mahitivanichcha & Rorrer, 2006; Rusch & Marshall, 2006; Sanchez & Thornton, 2010). These barriers may also be reflected in pay, if school district leaders make decisions about what kinds of behaviors should be compensated based on sexist beliefs. Another is statistical discrimination, which may occur if district leaders observe that female principals are, on average, less effective or less likely to invest long hours, so they offer them lower wages.

Discrimination may intersect with other mechanisms, such as sorting across workplaces. Where women are more concentrated in an occupation, such as in elementary education, salaries are lower (e.g., Levanon, England, & Allison, 2009). Sociologists argue that society devalues work labeled as "women's work," such as care work and working with young children, with employers paying lower wages in response to this devaluation (England, Herbert, Kilbourne, Reid, & Megdal, 1994).

Organizational conditions may moderate discrimination. Greater representation of women in an organization's upper leadership may reduce male–female compensation gaps, potentially because male leaders are more likely to hold discriminatory views that favor male employees. For example, Rabovsky and Lee (2017) find that salary gaps between male and female assistant professors were smaller at private universities with female presidents.

Our analysis of compensation gaps brings new evidence to a small, mixed research base. A few existing studies show evidence consistent with the existence of such gaps. For example, Pounder (1988) finds gender differences in pay in a sample of 108 elementary principals from 11 districts in the Midwest, though the study did not have data on factors such as the size of the principal's school that might be expected to affect compensation. More recently, in cross-sectional data from Pennsylvania, a working paper by Sadler and Carter (2018) identifies pay disparities between male and female principals even after accounting for education, experience, district context, and school level. Other studies have concluded that similarly situated men and women are paid similarly. Stone's (1985) analysis of principal and vice principal compensation in Oregon finds no significant differences in the 1970s and early 1980s. Similarly, Young et al.'s (2010) study of middle school principals' salaries in California uncovers no evidence of pay differences for men and women, and an Oaxaca decomposition analysis concludes that there is no evidence of sex discrimination in this population. Our analysis draws on richer data than those employed in prior studies, considers a broader set of explanations for pay gaps, and also provides the first nationally representative look at gender differences in principal compensation. The next section describes these data sources.

## 4. Data and Methods

We use two primary sources of data for this study: longitudinal administrative data on school principals from the state of Missouri, and nationally representative data from multiple waves of SASS and the NTPS. Our main analysis uses the Missouri data; we describe those data and the methods we used to analyze those data below. We then describe the SASS/NTPS data and the supplemental analyses we conducted using those data.

### 4.1. Predicting Principals' Salaries in Missouri Administrative Data

We analyze longitudinal administrative data from Missouri spanning the 1990-91 to 2015-16 school years. These data were obtained from a records request to the Missouri Department of Elementary and Secondary Education (DESE). For each educator working in a public school in the state in each of those years, the data set includes detailed information on position, background characteristics, and salary. We use position information to identify the principal of each school each year. We also use position information to identify roles principals held (e.g., teacher, assistant principal) prior to becoming a principal.

Background characteristics for each principal include gender, race/ethnicity, years of experience in the public schools, and highest degree (i.e., Master's, educational specialist, or doctoral degree attainment). As shown in Table 1, 52% of principals in the average year in Missouri are female. The average principal has 18 years of experience as an educator in public schools. Twenty-eight percent hold educational specialist degrees, and 11% hold doctorates. The data do not record the number of years worked as a principal, though for principals entering after the 1991-92 school year, we can observe this value. We top-code principal experience at eight years; approximately a quarter of the principal observations for which we can observe experience fall into this category, with another quarter falling into their first or second year in the role.

Salary data include base salary, extra duty salary (e.g., for coaching responsibilities), and total salary for each year. As in most states, decisions about principal compensation are made by school districts, who can choose to follow (or not) a local salary schedule for school leaders. We adjust salary numbers by the consumer price index (CPI), provided by the U.S. Bureau of Labor Statistics, each year to account for inflation; all numbers are reported in 2016 dollars. The average principal salary is $84,716. We restrict our sample to principals whose salaries are within four standard deviations of the mean, which excludes implausibly low values.

School-level characteristics are obtained from the Common Core of Data (CCD) as compiled by the National Center for Education Statistics (NCES). This information includes total school enrollment as well as the proportion of students identifying as Black, Hispanic, or white, and those qualifying for free or reduced-price lunch (FRPL); school level (elementary, middle, high school, or other); and locale type (urban, suburban, or rural). Average school math and reading achievement scores from the state's testing program for the years 1999 to 2016 are also gathered from files provided by DESE. We standardize school average scale scores by year. Summary statistics for school characteristics are shown in Table 1.

We model the natural logarithm of principal salaries as a function of principal and school characteristics, plus year and school or district fixed effects, as shown in in equation 1.

$$\ln(salary)_{isdt} = \alpha + \psi female_i + \boldsymbol{\beta X_{isdt}} + \boldsymbol{\theta S_{sdt}} + \gamma_t + \delta_d + \varepsilon_{isdt} \quad (1)$$

Here, *salary* is the CPI-adjusted salary for principal *i* in school *s* in district *d* at time *t*; *female* is an indicator for whether the principal is identified as female; $\boldsymbol{X}$ is a vector of principal characteristics, such as race/ethnicity, highest degree, and experience level; and $\boldsymbol{S}$ is a vector of school characteristics. We include a year fixed effect ($\gamma$) in all models. We also include a district fixed effect, $\delta$, to account for unobserved district heterogeneity in compensation policies; we replace this term with a school fixed effect in some models. All regression models are restricted to 1999 to 2016, the years for which all covariates are available. We estimate all models by ordinary least squares with standard errors clustered at the district level.

### 4.2. Predicting Principals' Salaries Using the Schools and Staffing Survey

The Schools and Staffing Survey (SASS), administered by the National Center for Education Statistics, contains information from surveys of a nationally representative sample of public school principals and schools approximately every four years. We use data from the 1999-00, 2003-04, 2007-08, and 2011-12 waves, as well as the 2015-16 National Teacher and Principal Survey, the redesigned SASS. For simplicity, we refer to all surveys as "SASS" in the remainder of this article. In each wave, schools are sampled independently, meaning that, unlike the Missouri administrative data, SASS data are repeated cross-sections rather than longitudinal (for detail on the SASS sampling strategy, see Tourkin et al., 2010). From the principal survey, we gathered information on principals' personal characteristics, including whether the principal identified as female, whether the principal identified as Black or Hispanic, and their reported years of experience as a principal, years of teaching experience, and highest educational degree earned. School information included total student enrollment; the percentage of students identified as Black, Hispanic, and FRPL-eligible; school level; and locale type.

SASS does not include a direct measure of principal effectiveness. Instead, we constructed a measure from the accompanying teacher survey to capture aspects of principal performance like clear communication and staff support (see Appendix Table A1). A similar approach has been used in previous research (see Grissom, 2011); for this study, we included only items that were administered in all waves of the survey, resulting in a four-item scale. In each year, factor analysis identified one latent factor, and Cronbach's alpha suggests high levels of reliability (all $\alpha \geq .83$; see Appendix Table A1).

For supplemental analyses conducted with the 2011-12 data, we also make use of self-reported weekly hours worked and whether the principal had previous experience as a department head, curriculum specialist or coordinator, or assistant principal or program director. We also include whether the school was a charter school, the presence of a bargaining agreement between the district and a principal's union, and whether the district employed a salary schedule for principals. Many of these characteristics were not available in other waves. Summary statistics for the SASS sample can be found in Table 2.

We perform similar analyses using the SASS data to those conducted using the Missouri data. For most analyses, we pool principals from the five waves and estimate a version of equation 1 that includes a year fixed effect. We also include district fixed effects in some models. School fixed effects are not feasible given the SASS sampling strategy.

**5. Describing Gender Gaps in Principal Salaries in Missouri**

Our main analysis capitalizes on longitudinal administrative data from Missouri to investigate whether a gender pay gap exists between male and female principals and assess supply- and demand-side explanations for any observed gaps. We begin with descriptive patterns in principal salary by gender over time in Missouri.

Figure 1 shows mean (CPI-adjusted) principal salary for women and men over each year of our data. For both men and women, average salary generally has been increasing over time. Men's salaries are higher than women's in nearly all years. The large gap of about $4,000 in 1991 narrowed and then closed by 2005, to just under $300. Women actually slightly out-earned men each year between 2006 and 2009, but the gap favoring men re-emerged in 2011, after the

Great Recession, at almost $1,500, and it subsequently grew to about $3,000 each year from 2013 to 2016. Over this full time frame, the average difference in total pay favored men by about $150 per year. This difference is not particularly informative, however, because it fails to account for differences in the qualifications and workplaces of men and women.

## 6. Investigating Explanations for the Gender Pay Gap

### 6.1. Differences in Human Capital Accumulation and Where Principals Work

Research in other professions suggests that differences in human capital accumulation help explain gender pay gaps (Becker, 1993). Table 1, however, suggests that observable human capital differences between male and female principals in Missouri (since 1999) are small. Women are, in fact, more likely than men to hold higher degrees. Men and women have similar years of overall public school experience and similar profiles of years in the principalship, though men are somewhat more among the longest-serving principals—that is, those with more than eight years in the role. Table 1 shows, however, that there are large differences in the schools female principals lead. These schools are smaller, lower-achieving, more likely to be elementary schools and in urban areas.

Table 3 assesses how human capital and other differences in male and female principals inform pay differences, modeling total salary as a function of principal gender and year fixed effects (column 1), then successively adding human capital measures, school characteristics, and other covariates in subsequent columns. Column 1 shows a baseline gap between men and women of 1.4% on average. Column 2 adds race/ethnicity, plus three measures of human capital accumulation: degree attainment, total years of experience as an educator, and years of experience as a principal. Accounting for these differences in Table 3, column 2, makes the gap between men and women grow *larger*—in fact, it more than doubles, to a 3.4% differential.

Adding school characteristics (column 3) and district fixed effects (column 4) reduces the estimated gap, however, suggesting that some of the gap is explained by sorting of men and women into schools with different characteristics (which are themselves associated with pay) and, to a lesser extent, across higher- and lower-paying districts.

Yet even in column 5, which shows results of a model that includes school fixed effects, the estimated gap is substantial, favoring men by 1.7%. In other words, compared to observably similar principals in the same school in other years, a female principal makes $1,460 less than a male principal.

Figure 2 shows the prediction for men's and women's salaries from a model similar to that in column 5, over time.[1] As with the raw differences shown in Figure 1, gaps narrowed from a high of about $3,000 in 1999 (the first year of the data set for which all covariates are available) to essentially $0 in 2009. However, the gaps subsequently grew again, reaching about $1,000 by 2016, the final year of the data set.

Next, we turn attention to how gender pay gaps change throughout principals' careers. A preliminary question here is whether these gaps are present when men and women enter the principalship or whether they emerge later in the career. Figure 3 shows estimates for men's and women's compensation in their first year as a principal, holding other factors constant in a model as in Table 3, column 5 (see also Appendix Table A2). The gaps are large. In 1999, male first-year teachers were paid more than $3,340 more than their female colleagues, a gap that slowly decreased to just over $2,400 by 2006. The gap narrowed dramatically in 2007, to about $1,450, a difference that has remained generally stable since. Figure 4 shows estimated gaps across principals' time in the position, based on a model including an interaction between gender and

[1] Patterns for a version of the figure based on a district fixed effects model are very similar to those shown in Figure 2.

years of principal experience. On average, women are paid $1,090 less in the year of hire, a difference that remains throughout the first four years of the principalship, narrowing to $835 when principals reach their fifth year on the job, before shrinking to only $112 at those with eight or more years of experience.

To further examine how human capital investments might be reflected in salaries, we also look specifically at principals who have earned advanced degrees (e.g., education specialist, doctorate). Results show significant gaps amongst this subgroup of 2% when comparing observationally similar principals in the same school, suggesting women are undercompensated for educational attainment (see Appendix Table A3). Together, results from Table 3 and Figures 1 through 4 show that a gender pay gap appears from the very beginning of the principalship and is evident throughout principals' careers regardless of individual educational attainment.

Another observation from Table 3 concerns the hypothesis regarding sex segregation across workplaces. Women make up 68% of principals at the elementary level, but only 40% at the middle school level and 20% at the high school level. Previous research on sex segregation suggests that women are paid less in workplaces dominated by women (Bayard et al., 2003; Cohen, 2013), and indeed, when comparing schools within the same district, elementary principals make 4% less, on average, than middle school principals and 7.6% less than high school principals (column 4). These percentages equate to $3,315 and $6,450. Moreover, these gaps grow even larger if principal gender is excluded from the model (not shown), consistent with the hypothesis that a portion of the average difference between elementary and secondary principal salaries is attributable to the higher likelihood that women occupy elementary leadership roles.[2] Nevertheless, female–male gaps are large even after accounting for school level.

### 6.2. Extra Duty Pay

Next, we consider differential time investments or requirements as an explanation for pay gaps. If men work longer or less desirable hours, either by choice or because they are assigned additional responsibilities that require greater time, higher compensation may result. Although we do not have access to a direct measure of time investments in the Missouri data, we can distinguish base salary (i.e., principals' contract salary) from "extra duty" salary (i.e., wages for additional work beyond those base contracted hours). We ask whether additional compensation for men is primarily associated with greater extra duty pay.

Table 4 shows the results of separate models of base salary (left panel) and extra duty salary (right panel). Across models, salaries of both types show estimated gender gaps. In the base salary model with only year fixed effects (column 1), women earned 1% less, or about $900 less than men, on average. Accounting for individual and contextual characteristics makes the estimated gap much larger. Even with school fixed effects (column 5), the estimated gap is 2%, or $1,335 per year.

Men also receive more extra duty pay, though in absolute terms, the gaps are much smaller. In the model with only year fixed effects (column 6), the estimated gap is 15%, or about $650 per year. The estimated gap falls with district fixed effects and especially with school fixed effects; men and women are statistically indistinguishable in the most saturated specification, though the point estimate suggests men may still see a small advantage (column 10). Still,

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[2] In a model excluding principal gender, middle school principals are predicted to earn approximately $3,850 more than elementary principals, and high school principals are predicted to earn approximately $6,200 more than elementary principals.

although men earn higher pay linked to extra duties, the much more substantial driver of the male–female principal pay gap in absolute terms is the higher base salaries men receive.

### 6.3. Career Paths and Mobility

Differences in career trajectories may also be a source of principal salary differences between males and females. We next focus on differences in prior salary and prior position coming into the principalship as well as the relationship between mobility and salary.

Figure 3 showed that men earn more that women even at entry into the principalship. This finding raises the question of whether these first-year gaps reflect gaps in what men and women were paid in the position they held prior to becoming a principal. For example, districts may simply offer new principals a percentage raise over what they were making in their prior job. If men systematically come from higher-paying roles—which may occur if men are more likely to have been assistant principals, while women come to the principalship more often directly from the classroom, for instance—pay gaps between men and women may arise from these differential trajectories.

In Appendix Tables A4 and A5, we examine the determinants of the pay of teachers and assistant principals, respectively, who later go on to become principals. We model these effects on three salary outcome measures: base salary, extra duty pay, and total salary. Appendix Table A4 shows that female teachers see very similar base salaries to male teachers (column 1), and in fact may make marginally more money once district and school are taken into account (columns 2 and 3). These coefficients are small, however, which makes sense given the widespread use of uniform salary schedules for teachers that leave little room for gender-based discretion in setting base pay. However, we see pronounced differences in extra duty salary that are present even with school fixed effects (column 6). We estimate that male teachers with similar experience and education levels who later become principals earn, on average, \$2,870 more in extra duty pay than their female colleagues in the same school. Moreover, these differences translate into gaps in total salary (columns 7–9), which we estimate to be a 3.5% differential or approximately \$1,660 within the same school once all sources of salary are considered together.

The patterns look somewhat different for assistant principals who later become principals. Appendix Table A5 shows that, across models male APs out-earn female APs in base salary, with column 3 estimating a difference of about 1%, or \$730, though this difference is somewhat imprecisely estimated. Our preferred estimate of total salary differences (column 9) shows that male APs earn, on average, 1.3%, or \$1,023, more than observably similar female APs working in the same school.

Thus, along both of the most common pathways into the principalship, it appears that women are likely to enter a new principal role making less than men in their prior job. If this prior salary is a baseline for new principal salary negotiations, it might explain why male principals are paid more. To test this proposition, we include the natural log of prior salary and an indicator for whether the prior position was an AP role in the base, extra duty, and total salary models. Results are shown in Table 5. Prior salary does predict later salary, with a 10% increase in prior salary translating into approximately a 1% increase in total principal salary, according to column 9. Coming into the principalship from an AP position is not associated with significantly higher pay, conditional on prior salary.

Importantly, estimated gender gaps also shrink relative to those shown in Tables 3 and 4. Based on a comparison of the school fixed effects models for total salary in Tables 3 and 5, including prior salary and a proxy for pathway into the role reduces the estimated gender gap in total salary from 1.7% to 1.4%, a reduction driven by a reduction in the base salary gap.[3] Combined with the results in Appendix Tables A4 and A5, this finding suggests that gaps women experience in pay in roles prior to entering the principalship partially explain the gap they see in salary as a principal.

Next, we turn to how differences in mobility after they enter the principalship may drive the gender pay gap. We consider whether differences in how men and women move, particularly across districts, may affect pay gaps, under the assumption that moves to new jobs typically are associated with pay increases.

For simplicity, we restrict our sample to principals in either their first or second principal position, which include 93% of principals in the data set. We compare salaries before and after a move. The outcome of interest is total salary. We first conduct a descriptive analysis of the unadjusted change in salary associated with movement across schools and districts by gender (not tabulated). Moving is associated with a higher salary, especially for women. Amongst this subgroup, non-movers have an average salary increase of just under $1,800 per year, while movers gain just over $4,300 in the year of the move, suggesting an average “movement premium” of about $2,500. These differences vary by the type of move, however, with within-district moves associated with a gain of only about $3,300, compared to a $6,400 increase for principals who change districts. In all types of moves, women make more (about $500 on average; $350 more for within-district moves and $1,000 more for cross-district moves).[4]

[3] This latter conclusion is based on a comparison of Table 4, column 5 with Table 5, column 3.
[4] We note that both men and women who move tend to stay within the same district locale type (i.e., urban, suburban, or rural setting), with women holding more principalships in urban areas than rural. While most elementary school principals’ first positions were also in elementary schools, this pattern holds more for female principals. Middle school principals were often high school principals in their first positions, and high school principals were often previously middle school principals, a pattern driven by male principals.

These raw differences between movers and non-movers do not take into account principal, school, or district characteristics. Estimates in Table 6 do. Within this group of first- or second-job principals, women are paid 3.5%, or $2,980, less when accounting for individual characteristics (see column 1). Column 2 shows that principals make more after a move than they would have if they had stayed in the same school, particularly two or more years afterward; this pattern generally holds for both within- and cross-district moves (columns 5 and 8). However, when we include an interaction between years after a move and gender, we find no clear evidence of a differential gain for men and women from a move, particularly once we account for differences in the schools in which the principals work, regardless of the type of move (see columns 4, 7, and 10). Also, accounting for these characteristics generally makes the coefficients on the *move* variables indistinguishable from zero. In other words, it appears that the pay increases principals receive from moves are primarily explained by differences in the school contexts in which they work before and after moving.

To summarize, we analyze several potential explanations for gender pay gaps among principals in Missouri and find that gaps between men and women remain even after taking into account principals' qualifications, job characteristics, and career paths. Remaining gaps are attributable to something unmeasured, potentially including gender-based discrimination. Our analysis cannot rule out that Missouri school districts are paying men and women unequally for equal work.

Studies suggest that managers may produce more positive job outcomes for employees with whom they share gender (e.g., Grissom, Nicholson-Crotty, & Keiser, 2012). If districts are implementing pay structures or processes that discriminate against female principals, we might expect that the presence of a female superintendent is associated with less discriminatory behavior. In Table 7, we test whether the pay gap between men and women closes under female superintendents. Columns 1–3 suggest that having a female superintendent is associated with a reduction in the wage penalty for female principals.[5] However, this relationship disappears when district fixed effects are included (column 4), suggesting that the association is explained by district-specific factors (e.g., a local propensity both to hire a female superintendent and pay women more). Columns 4 and 5 show that female principals are paid less even after adjusting for the gender of the superintendent (see also Figure 5). In models not shown, we narrow the comparison just to men and women in their year of hire to test the hypothesis that superintendent gender may matter for setting initial pay. We again find no evidence of an interaction between principal and superintendent gender in any of these models.

## 7. Gender Gaps in Principal Salaries Nationally

### 7.1. Qualifications, School Context, and Teachers' Assessment of Performance

Despite the strengths of the Missouri data set—including objectively reported salary information, the ability to consider longitudinal trends, and the capacity to examine patterns in salary over individuals' careers—we cannot know if our findings generalize beyond the state. To address this concern, we conduct parallel analyses (to the extent feasible) using data from the Schools and Staffing Survey. We first describe the results from all five years of the survey before turning to supplemental analyses conducted with the 2012 survey wave only.

Findings from analysis of the repeated cross-sections of SASS data generally are consistent with results from Missouri. Figure 6 shows large gaps in average salary across five cross-sections of SASS data. In 1999-00, men earned an average of $940 more than women per

[5] The coefficient on the interaction in column 3 is statistically significant at the .10 level ($p = .07$).

year (in 2016 dollars). This gap grew in subsequent years, with a gap of $1,070 in 2003-04, $1,340 in 2007-08, $2,160 in 2011-12, and $3,030 in 2015-16.

Table 8 reports models of principal salaries pooled across the five waves, with models controlling for individual characteristics (column 2) and school characteristics (column 3), adding principal performance as measured by teacher ratings (column 4), and including district fixed effects (column 5). The results show that, on average, women make 1%, or $1,000, less than men per year, a statistically and substantively significant difference, before accounting for covariates. Inclusion of individual characteristics increases the gap to a difference of about $1,250, and it increases again with the inclusion of school and district characteristics, to almost 1.5%, or $1,440 (see Figure 7 for a plot of predicted salaries for men and women from this model over time). Note here that, as in the Missouri analysis, middle and high school principals earn more than principals in elementary schools where women are better represented, but accounting for school level does not explain male-female gaps. Column 4 shows that a one-point difference in teacher ratings of principal performance is associated with about a 1% difference in salary, suggesting that better-performing principals receiving higher pay; still, substantively and statistically significant gender gaps remain.

Column 5, which includes district fixed effects, shows that the predicted gap is much smaller when comparing principals within the same district, at less than 0.4% ($350) per year. However, given SASS sampling procedures, within-district comparisons should be interpreted with some caution, as they are typically based on a small number of schools within any one district.

### 7.2. Prior Roles, Hours Worked, and Presence of Union Agreement or Salary Schedule (2012 Only)

We next conduct supplemental analyses using only the 2012 wave of survey data, which includes a set of additional variables potentially affecting salary and wage gaps that are not included across all waves. In particular, the 2012 data contain information on additional roles principals may have held in the past (e.g., department head, curriculum coordinator) as well as self-reported estimates of weekly hours worked. In addition, the fact that accounting for districts changes the estimated gap coefficients suggests that something about district governance structures may matter for how men and women are compensated. Two good candidates are the presence of a principal's union agreement and whether the district employs a salary schedule for principals. Indicators for both are available in the 2012 SASS data.

Results for the 2012 models are shown in Table 9. On average, in 2012 female principals were paid about 1.8%, or $1,640, less than male principals (column 1). The gap is similar when controlling for principal race/ethnicity, total teaching and principal experience, and education (column 2). Respondents who indicated whether they had prior experience as a department head, curriculum specialist/coordinator, or assistant principal are paid differently, with former department heads making less and specialists and APs making more; including indicators for these prior leadership experiences results in a higher estimate of the gender gap: 2.2%, or about $2,040 (column 3). We then include school-level characteristics (column 4); again, school level and locale are significant contributors to salary, and the inclusion of these variables produces a gender gap estimate of about 2.5%, or $2,280.

Next, we examine whether hours worked help explain pay gaps by gender, including self-reported weekly hours worked as an additional individual characteristic in column 5. Indeed, reporting working more hours is associated with an increase in salary, with each weekly hour associated with an 0.01% increase in annual salary. However, women report working almost an hour and a half more per week than men, so work hours cannot explain the gap, and in fact, accounting for differences in reported hours marginally increases the estimated gap.[6]

We include indicators for the presence of a principal's union/collective bargaining agreement and whether the district employs a principal salary schedule these organizational characteristics in columns 6 and 7, respectively. The presence of a union agreement is associated with substantially higher salaries: 14% annually. Accounting for the presence of such an agreement shrinks the estimated gender gap to 1.6%. A salary schedule for principals is also associated with higher pay, though to a lesser degree (2.5%). Accounting for the presence of a salary schedule shrinks the estimated gender gap to 2.2%. When both are included together (column 8), the gender gap is 1.6%, the same as the gap when accounting for union agreement only; the salary schedule coefficient becomes statistically indistinguishable from zero.[7] (For completeness, we also show a model with district fixed effects (column 9); the estimated gap of 1% provides further suggestive evidence that these and other district-level factors account substantially for gender salary gaps, though again, given SASS sampling procedures, these within-district comparisons should be interpreted with caution.)

## 8. Discussion and Conclusions

As female representation in the principalship increases, the question of how women are compensated gains salience. Presumably, pay differentials by gender can stall progress in

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[6] We also tested for an interaction between reported weekly hours worked and gender. We removed respondents who reported extremely low or high values (either fewer than 40 hours or more than 100 hours per week), leaving us with a sample of N=6,920 principals. Each additional hour of work was associated with an additional $230 in earnings in this sample. When including an interaction between hours worked and gender, each additional hour of work was associated with an additional $220 for men and $235 for women.

[7] We also investigated whether gender gaps were different in districts that did and did not have principal salary schedules in models similar to Table 9, column 7. We did not find much evidence of an interaction. The estimated gender gap in districts with salary schedules was 2.2%, compared to 1.9% in districts without.

women's representation in leadership if lower compensation discourages women's aspirations to or retention in these roles. We find that a gender pay gap exists among principals in the state of Missouri and nationally. This gap is not just a function of differences in principal qualifications or the characteristics in the schools in which they work, nor of performance differences (as proxied by school achievement in Missouri or teacher reports of principal effectiveness in SASS) or effort (as proxied by principal reports of hours worked in SASS). Even accounting for such factors, the estimated gap is substantively important. For instance, in Missouri, the average principal stays in the position for six years; over that tenure, the average man earns approximately $8,600 more than his observably similar female colleague would be predicted to earn in the same school.

Analysis of Missouri data suggests that base salary differences between men and women in similar principal positions are evident in the first year they are hired and are in part a function of higher salaries men earned in roles prior to being hired into the principalship, both as teachers and as assistant principals. This finding suggests that lower pay for female principals in part reflects pay disadvantages for women elsewhere in the hierarchy of educational roles. Indeed, when we estimate models of teacher and assistant principal pay among all educators holding these roles in Missouri (not just those who go on to become principals), in a school fixed effects model akin to the one in Table 3, column 5, we find that female teachers are paid substantially less than similar male teachers (nearly $1,800), a difference driven almost completely by differences in extra duty salary (not tabulated). Female assistant principals earn nearly $900 less, and less in both base and extra duty salary. These results suggest the need for a more complete investigation of pay differences by gender throughout the educational system.

We also assess whether career mobility differences for men and women contribute to pay gaps. Principals generally earn more following moves, especially moves to other districts, but we do not find much evidence that men and women benefit differentially from moving, and gaps persist even among movers.

Overall, we interpret these patterns as consistent with, though not conclusive evidence of, gender discrimination in wage-setting; women appear to be paid unequally for equal work. Research using data that can capture other potential work differences between men and women (e.g., time use data, measures of principal skills or job outputs) would be useful for further assessing this conjecture.

The gender pay gaps we find among school principals, though substantively important, are smaller than gaps calculated for other professions (see Goldin 2014). For context, we use the Current Population Survey (2019) to identify professions where mean annual salary is similar to school principals. The category of educational and childcare administrators, which contains K-12 principals, had a mean annual salary of $98,270 in 2019. This average salary was similar to that of engineers ($100,770); medical scientists ($100,430); computer systems analysts ($96,160), and college professors of subjects such as architecture ($98,980). Yet only medical scientists demonstrate a raw gender gap in median weekly earnings that is similar in magnitude to what we found for principals (3.2%). The others are all substantially larger: 13% for engineers, 18.4% for computer systems analysts, and 18.7% for this category of college professors.

Beyond fairness, research suggests that inequitable compensation can have policy consequences. Higher salaries help attract and retain educators (Hendricks, 2014). Paying women less has the potential to discourage women from entering leadership or to push them out. Lower salaries may especially be a problem for women leading high-needs schools with more challenging working conditions, where leadership shortages are already acute (Pijanowski & Brady, 2009). Moreover, underrepresentation of women in leadership can hurt school performance, particularly if—as research has demonstrated in other sectors (Flabbi et al., 2016)—female leaders tend to increase productivity in female-dominated workplaces.

Although we have the advantage of access to state and national data, our study is limited by the data elements contained in those two data sources. Additional information could allow for exploration of other potential drivers of gaps. An example of incidence of childbearing, which depresses wages for women (Budig, 2014). We might also investigate the role of pay-for-performance plans. Our SASS analysis makes use of only a rough proxy for principal effectiveness, and the Missouri analysis includes no direct measure of principal performance. Although this analysis and evidence from other states that women in fact receive higher practice ratings form their supervisors than do men (Grissom, Blissett, & Mitani, 2017) suggest that we do not to be concerned about compensated performance differentials that drive gaps, information about pay-for-performance plans and their implementation would allow for research into how such programs may differentially affect men's and women's salaries.

Further analysis could explore the role of funding formulas, principal candidate negotiation behaviors, and how district leaders, such as superintendents and school board members, help set principal pay. Discretion in compensation appears important. Our analysis of the SASS data suggested that gaps are present even in school districts with principal salary schedules. This observation presents a puzzle, since presumably districts do not set different salary values for men and women. Do districts exercise discretion even when schedules ostensibly restrict it? To investigate, we conducted an exploratory analysis of recent principal salary schedules we were able to obtain from three of the largest school districts in Missouri: St.

Louis, Kansas City, and Columbia. We matched prescribed salaries according to each schedule with actual principal pay according to Missouri salary files. In two of the districts, we found that men and women appeared to be paid according to the prescribed schedules, which were based on combinations of school level, enrollment, and administrative experience. In the third district, however, we found evidence of sizable divergence from the schedule by gender. In that district, it appeared that male principals were "moved up" three steps on the pay schedule, on average, when compared to women leading schools at the same level with similar enrollments. Although merely suggestive, this analysis suggests that further probing the exercise of discretion in the salary setting process would be a fruitful activity for future research.

Discretion likely also is relevant to how extra duty pay is allocated. Future work might investigate how extra-pay decisions are made to better understand how those processes direct higher pay to men. For what activities are additional compensation allocated? What is the selection process? How do relationships between principals and other leaders inform extra duty pay considerations?

Finally, research might explore regional differences in compensation differentials in depth. Other researchers have found evidence that sexism is greater in some regions than others (Charles et al., 2018) in ways that may affect labor market outcomes. Such regional differences may help to explain why pay gaps appear to be higher in our Missouri sample than the national SASS sample. Estimating pay gaps by region for both principals and teachers may help link this research to broader trends in the labor market for educated workers.

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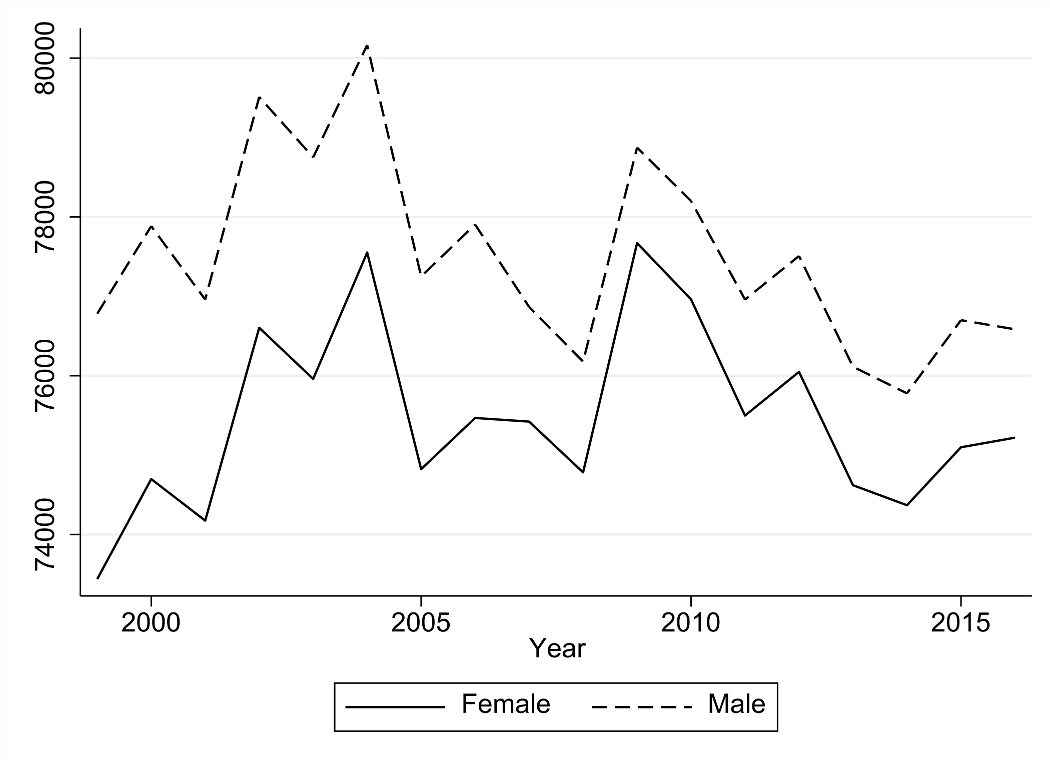
Figure 1: Raw gaps in total pay between female and male principals in Missouri from 1991 to 2016


SOURCE: Missouri Department of Education, 1991-2016.

Figure 2: Predicted wage gaps in total pay between female and male principals in Missouri from 1999 to 2016

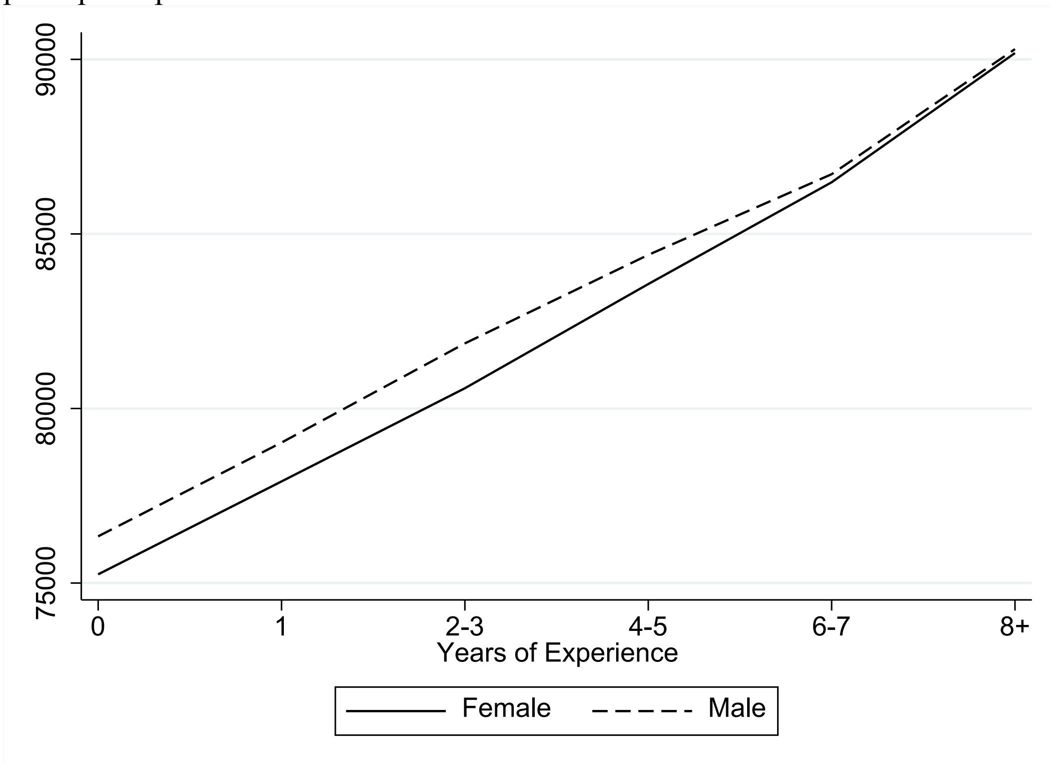

SOURCE: Missouri Department of Education, 1999-2016.

Figure 3: Predicted wage gaps in total pay between female and male first-year principals in Missouri from 1999 to 2016




SOURCE: Missouri Department of Education, 1999-2016.

Figure 4. Predicted wage gaps in total pay between female and male principals in Missouri by principal experience

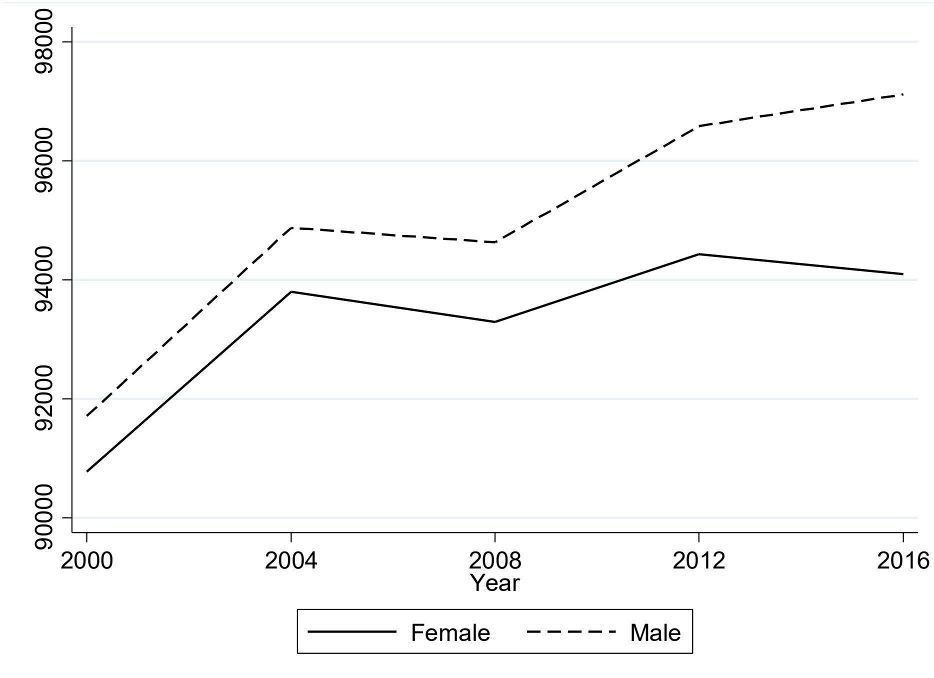



SOURCE: Missouri Department of Education, 1999-2016.

Figure 5: Predicted salaries for male and female principals and assistant principals by superintendent gender

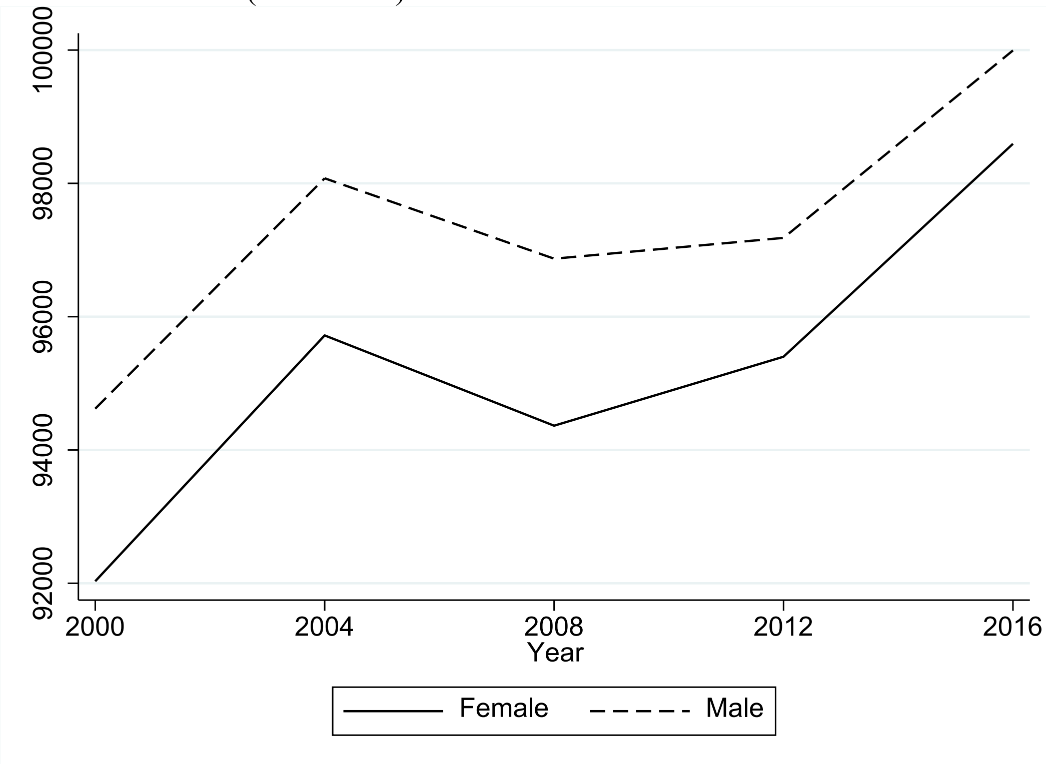

SOURCE: Missouri Department of Education, 1999-2016.

Figure 6. Raw wage gaps between female and male principals, national SASS sample, over five cross-sections (2000-2016)




SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey, 2000-2016.

Figure 7. Predicted wage gaps between female and male principals, national SASS sample, over five cross-sections (2000-2016).




SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey, 2000-2016.

**Figure Notes**

All figures presented in 2016 US dollars.

Figures 2, 3, and 4: Predicted gaps are based on the model as described in Table 3, model 5, including school-level fixed effects.

Table 1: Missouri principal demographics, all years

| | All Principals n=36,194 | | Female n=18,389 | | Male n=17,802 | | |
|---|---|---|---|---|---|---|---|
| | Mean (SD) | Range | Mean (SD) | Range | Mean (SD) | Range | Sig. |
| Total salary (2016 dollars) | 86117 (20985) | (14521, 168192) | 85614 (20797) | (16444, 163303) | 86636 (21166) | (14521, 168192) | *** |
| Principal is female | 0.51 (0.50) | | | | | | |
| Principal is Black | 0.10 (0.30) | | 0.13 (0.34) | | 0.06 (0.23) | | *** |
| Principal is Hispanic | 0.00 (0.06) | | 0.00 (0.06) | | 0.00 (0.06) | | |
| Education Specialist degree | 0.29 (0.45) | | 0.29 (0.45) | | 0.28 (0.45) | | |
| Doctoral degree | 0.11 (0.31) | | 0.13 (0.33) | | 0.10 (0.31) | | *** |
| Years of public school experience | 18.11 (8.31) | (0, 61) | 18.52 (8.24) | (0, 61) | 17.69 (8.36) | (0, 50) | |
| Years of principal experience | | | | | | | |
| 0 years | 0.13 (0.34) | | 0.14 (0.34) | | 0.13 (0.34) | | |
| 1 year | 0.12 (0.33) | | 0.12 (0.33) | | 0.12 (0.33) | | |
| 2-3 years | 0.21 (0.40) | | 0.21 (0.41) | | 0.20 (0.40) | | * |
| 4-5 years | 0.16 (0.36) | | 0.16 (0.37) | | 0.15 (0.36) | | *** |
| 6-7 years | 0.12 (0.32) | | 0.12 (0.32) | | 0.11 (0.32) | | |
| 8 or more years | 0.27 (0.44) | | 0.25 (0.43) | | 0.28 (0.45) | | *** |
| School enrollment | 447 (342) | (0, 2882) | 411 (278) | (0, 2655) | 484 (395) | (0, 2882) | *** |
| Proportion of Black students | 0.17 (0.28) | (0.00, 1.00) | 0.20 (0.31) | (0.00, 1.00) | 0.13 (0.24) | (0.00, 1.00) | *** |
| Proportion of Hispanic students | 0.03 (0.07) | (0.00, 0.98) | 0.04 (0.07) | (0.00, 0.98) | 0.03 (0.06) | (0.00, 0.95) | *** |
| Proportion of students receiving free/reduced price lunch | 0.46 (0.23) | (0.00, 1.00) | 0.49 (0.24) | (0.00, 1.00) | 0.43 (0.22) | (0.00, 1.00) | *** |
| Average math achievement | 0.04 (0.93) | (-7.04, 5.44) | -0.02 (0.99) | (-7.04, 4.77) | 0.11 (0.85) | (-6.93, 5.44) | *** |
| Average reading achievement | 0.04 (0.92) | (-8.32, 4.54) | -0.01 (1.00) | (-7.98, 4.88) | 0.09 (0.83) | (-8.32, 4.54) | *** |
| Elementary school | 0.55 (0.50) | | 0.73 (0.44) | | 0.36 (0.48) | | *** |
| Middle school | 0.18 (0.38) | | 0.14 (0.35) | | 0.22 (0.42) | | *** |
| High school | 0.24 (0.43) | | 0.09 (0.29) | | 0.38 (0.49) | | *** |
| Other school | 0.03 (0.18) | | 0.03 (0.18) | | 0.04 (0.19) | | * |
| Urban location | 0.18 (0.38) | | 0.23 (0.42) | | 0.13 (0.33) | | *** |
| Suburban location | 0.26 (0.44) | | 0.28 (0.45) | | 0.24 (0.43) | | *** |
| Town or rural location | 0.56 (0.50) | | 0.48 (0.50) | | 0.63 (0.48) | | *** |

Note: Statistically significant differences between women and men principals are noted *** $p<.001$, ** $p<.01$, and * $p<.05$. Ranges are omitted for dichotomous variables.
SOURCE: Missouri Department of Education, 1999-2016.

Table 2. Pooled principal demographics, SASS Survey

| | All Principals N=37,350 | | Female N=15,430 | | Male N=21,920 | | |
|---|---|---|---|---|---|---|---|
| | Mean (SD) | Range | Mean (SD) | Range | Mean (SD) | Range | Sig. |
| Reported salary (2016 dollars) | 95373.77 (22784.90) | (20000, 260400) | 94956.43 (22605.09) | (22050, 260400) | 95784.25 (22953.60) | (20000, 250000) | *** |
| Principal is female | 0.50 (0.50) | | | | | | |
| Principal is Black | 0.11 (0.32) | | 0.14 (0.35) | | 0.08 (0.28) | | *** |
| Principal is Hispanic | 0.06 (0.25) | | 0.07 (0.26) | | 0.06 (0.23) | | *** |
| Education Specialist degree | 0.29 (0.45) | | 0.31 (0.46) | | 0.27 (0.44) | | *** |
| Doctoral degree | 0.09 (0.29) | | 0.10 (0.31) | | 0.08 (0.28) | | *** |
| Years of principal experience | 7.57 (6.86) | (0, 67) | 6.54 (5.75) | (0, 40) | 8.58 (7.67) | (0, 67) | *** |
| Years of teaching experience | 12.34 (6.69) | (0, 48) | 13.59 (6.78) | (0, 43) | 11.12 (6.37) | (0, 48) | *** |
| Previous department head [c e] | 0.38 (0.48) | | 0.38 (0.48) | | 0.38 (0.48) | | |
| Previous curriculum specialist or coordinator [c e] | 0.25 (0.43) | | 0.34 (0.47) | | 0.16 (0.37) | | *** |
| Previous assistant principal or program director [c] | 0.72 (0.45) | | 0.71 (0.45) | | 0.72 (0.45) | | |
| Weekly hours worked [a] | 58.53 (12.59) | (0, 168) | 59.26 (12.98) | (0, 168) | 57.77 (12.13) | (0, 160) | *** |
| School enrollment | 542.42 (442.08) | (1, 14749) | 512.08 (382.61) | (2, 14749) | 572.22 (491.75) | (1, 9341) | *** |
| Proportion of Black students | 0.15 (0.24) | (0, 1) | 0.18 (0.26) | (0, 1) | 0.13 (0.22) | (0, 1) | *** |
| Proportion of Hispanic students | 0.17 (0.25) | (0, 1) | 0.20 (0.27) | (0, 1) | 0.15 (0.23) | (0, 1) | *** |
| Proportion of students receiving free/reduced price lunch | 0.49 (0.30) | (0, 1) | 0.52 (0.31) | (0, 1) | 0.46 (0.30) | (0, 1) | *** |
| Teacher satisfaction with principal | -0.05 (0.62) | (-1, 3) | -0.07 (0.63) | (-1, 3) | -0.03 (0.61) | (-1, 3) | *** |
| Elementary school | 0.57 (0.50) | | 0.71 (0.45) | | 0.43 (0.50) | | *** |
| Middle school | 0.15 (0.36) | | 0.12 (0.32) | | 0.18 (0.39) | | *** |
| High school | 0.21 (0.40) | | 0.11 (0.32) | | 0.30 (0.46) | | *** |
| Other school | 0.07 (0.26) | | 0.06 (0.23) | | 0.09 (0.28) | | *** |
| Charter school [a] | 0.05 (0.21) | | 0.05 (0.22) | | 0.04 (0.20) | | *** |
| Urban location | 0.25 (0.43) | | 0.30 (0.46) | | 0.20 (0.40) | | *** |
| Suburban location | 0.39 (0.49) | | 0.40 (0.49) | | 0.39 (0.49) | | ** |
| Town or rural location | 0.34 (0.47) | | 0.28 (0.45) | | 0.39 (0.49) | | *** |
| Principal union agreement [a b] | 0.35 (0.48) | | 0.35 (0.48) | | 0.34 (0.47) | | |
| Principal salary schedule [a b e] | 0.71 (0.45) | | 0.76 (0.43) | | 0.67 (0.47) | | *** |

Note: Statistically significant differences between women and men principals are noted *** $p$<.001, ** $p$<.01, and * $p$<.05. Ranges are omitted for dichotomous variables. Some items were not included on surveys in all waves; omitted years are noted [a] 2000, [b] 2004, [c] 2008, [d] 2012, [e] 2016.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey, 2000-2012, and National Teacher and Principal Survey, 2016.

Table 3: Regression models of total salary differences for Missouri principals

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Female | -0.014 | -0.034*** | -0.023*** | -0.020*** | -0.017*** |
| | (0.009) | (0.008) | (0.004) | (0.002) | (0.003) |
| Black | | 0.157*** | -0.006 | -0.001 | -0.002 |
| | | (0.021) | (0.009) | (0.005) | (0.010) |
| Hispanic | | 0.162*** | 0.027 | 0.014 | -0.003 |
| | | (0.031) | (0.023) | (0.016) | (0.016) |
| Ed Specialist degree | | 0.011 | 0.012* | 0.013*** | 0.010** |
| | | (0.014) | (0.005) | (0.003) | (0.003) |
| Doctoral degree | | 0.224*** | 0.068*** | 0.048*** | 0.044*** |
| | | (0.016) | (0.007) | (0.004) | (0.005) |
| Total years of experience | | 0.005*** | 0.004*** | 0.003*** | 0.003*** |
| | | (0.001) | (0.000) | (0.000) | (0.000) |
| 1 year of principal | | 0.028*** | 0.031*** | 0.029*** | 0.029*** |
| experience | | (0.002) | (0.002) | (0.002) | (0.002) |
| 2-3 years of principal | | 0.059*** | 0.061*** | 0.057*** | 0.057*** |
| experience | | (0.004) | (0.003) | (0.002) | (0.002) |
| 4-5 years of principal | | 0.088*** | 0.086*** | 0.082*** | 0.081*** |
| experience | | (0.005) | (0.004) | (0.003) | (0.003) |
| 6-7 years of principal | | 0.110*** | 0.107*** | 0.102*** | 0.102*** |
| experience | | (0.007) | (0.004) | (0.004) | (0.004) |
| 8 or more years of principal | | 0.122*** | 0.131*** | 0.128*** | 0.129*** |
| experience | | (0.010) | (0.005) | (0.004) | (0.004) |
| Total school enrollment | | | 0.000*** | 0.000*** | 0.000* |
| | | | (0.000) | (0.000) | (0.000) |
| Proportion Black enrollment | | | 0.244*** | 0.039*** | 0.044 |
| | | | (0.033) | (0.011) | (0.044) |
| Proportion Hispanic | | | 0.261*** | 0.027 | 0.063 |
| enrollment | | | (0.066) | (0.025) | (0.065) |
| Proportion FRPL enrollment | | | -0.182*** | -0.023* | -0.018 |
| | | | (0.030) | (0.010) | (0.015) |
| Average math achievement | | | 0.007* | 0.001 | 0.004* |
| | | | (0.004) | (0.002) | (0.002) |
| Average reading | | | 0.013*** | 0.005** | 0.005** |
| achievement | | | (0.004) | (0.002) | (0.002) |
| Middle school | | | 0.043*** | 0.040*** | |
| | | | (0.005) | (0.004) | |
| High school | | | -0.007 | 0.076*** | |
| | | | (0.008) | (0.004) | |
| Other school | | | -0.012 | 0.057*** | |
| | | | (0.014) | (0.009) | |
| Suburban | | | 0.091*** | -0.008 | |
| | | | (0.021) | (0.009) | |
| Town or rural | | | -0.135*** | -0.026*** | |
| | | | (0.020) | (0.004) | |
| Constant | 11.309*** | 11.089*** | 11.126*** | 11.128*** | 11.144*** |
| | (0.015) | (0.016) | (0.024) | (0.011) | (0.016) |
| N | 36,194 | 36,181 | 29,261 | 29,261 | 29,264 |
| School fixed effects | N | N | N | N | Y |
| District fixed effects | N | N | N | Y | N |

Notes. Coefficients are presented with standard errors in parentheses. All models include year fixed effects.
*** $p<.001$, ** $p<.01$, and * $p<.05$.
SOURCE: Missouri Department of Education, 1999-2016.

Table 4: Regression models of base and extra duty salary differences for Missouri principals

| | Base Salary | | | | | Extra Duty Salary | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Female | -0.010 | -0.031*** | -0.021*** | -0.019*** | -0.016*** | -0.147* | -0.160** | -0.176** | -0.121* | -0.056 |
| | (0.009) | (0.008) | (0.004) | (0.002) | (0.003) | (0.063) | (0.056) | (0.059) | (0.056) | (0.085) |
| Ed Specialist degree | | 0.015 | 0.017** | 0.017*** | 0.012** | | 0.060 | 0.033 | 0.048 | 0.043 |
| | | (0.014) | (0.006) | (0.004) | (0.004) | | (0.066) | (0.061) | (0.053) | (0.062) |
| Doctoral degree | | 0.229*** | 0.068*** | 0.047*** | 0.043*** | | 0.186 | 0.107 | 0.253*** | 0.128 |
| | | (0.016) | (0.007) | (0.005) | (0.005) | | (0.131) | (0.072) | (0.071) | (0.109) |
| Total years of | | 0.005*** | 0.003*** | 0.003*** | 0.003*** | | 0.008 | 0.006 | 0.003 | 0.002 |
| experience | | (0.001) | (0.000) | (0.000) | (0.000) | | (0.005) | (0.005) | (0.004) | (0.005) |
| 1 year of principal | | 0.028*** | 0.031*** | 0.030*** | 0.030*** | | 0.020 | 0.017 | -0.031 | -0.021 |
| experience | | (0.003) | (0.002) | (0.002) | (0.002) | | (0.043) | (0.050) | (0.048) | (0.051) |
| 2-3 years of principal | | 0.059*** | 0.061*** | 0.057*** | 0.057*** | | 0.050 | 0.057 | -0.020 | 0.015 |
| experience | | (0.004) | (0.003) | (0.002) | (0.002) | | (0.051) | (0.056) | (0.056) | (0.059) |
| 4-5 years of principal | | 0.090*** | 0.088*** | 0.083*** | 0.083*** | | 0.038 | 0.029 | -0.005 | 0.006 |
| experience | | (0.005) | (0.004) | (0.003) | (0.003) | | (0.072) | (0.075) | (0.065) | (0.069) |
| 6-7 years of principal | | 0.111*** | 0.109*** | 0.103*** | 0.104*** | | 0.001 | 0.017 | -0.023 | 0.003 |
| experience | | (0.007) | (0.005) | (0.004) | (0.004) | | (0.075) | (0.078) | (0.068) | (0.081) |
| 8 or more years of | | 0.123*** | 0.134*** | 0.130*** | 0.132*** | | 0.046 | 0.069 | 0.061 | 0.106 |
| principal experience | | (0.010) | (0.006) | (0.004) | (0.005) | | (0.082) | (0.084) | (0.076) | (0.093) |
| Constant | 11.297*** | 11.076*** | 11.119*** | 11.120*** | 11.141*** | 7.873*** | 7.677*** | 7.494*** | 7.869*** | 7.680*** |
| | (0.015) | (0.016) | (0.023) | (0.011) | (0.015) | (0.099) | (0.113) | (0.403) | (0.154) | (0.299) |
| N | 36,194 | 36,181 | 29,261 | 29,261 | 29,264 | 4,196 | 4,195 | 3,497 | 3,497 | 3,497 |
| School characteristics | N | N | Y | Y | Y | N | N | Y | Y | Y |
| School fixed effects | N | N | N | N | Y | N | N | N | N | Y |
| District fixed effects | N | N | N | Y | N | N | N | N | Y | N |

Notes. Coefficients are presented with standard errors in parentheses. All models include year fixed effects. Models 2–5 and 7–10 also include principal race and ethnicity. Time-invariant school characteristics are omitted from models 5 and 10.

*** *p*<.001, ** *p*<.01, and * *p*<.05.

SOURCE: Missouri Department of Education, 1999-2016.

Table 5: Regression models of salary differences for Missouri principals, including prior salary and prior position

| | Base Salary | | | Extra Duty Salary | | | Total Salary | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Female | -0.008 | -0.014*** | -0.012*** | -0.185** | -0.192** | -0.117 | -0.011** | -0.016*** | -0.014*** |
| | (0.004) | (0.003) | (0.003) | (0.068) | (0.063) | (0.103) | (0.004) | (0.003) | (0.003) |
| ln(Prior salary) | 0.255*** | 0.109*** | 0.108*** | 0.708*** | 0.222 | 0.493 | 0.262*** | 0.116*** | 0.114*** |
| | (0.016) | (0.007) | (0.009) | (0.156) | (0.161) | (0.259) | (0.016) | (0.007) | (0.009) |
| Prior position was | 0.009 | 0.004 | 0.002 | -0.041 | -0.027 | -0.176 | 0.009 | 0.004 | 0.000 |
| Asst. Principal | (0.006) | (0.004) | (0.004) | (0.083) | (0.066) | (0.109) | (0.005) | (0.003) | (0.004) |
| Ed Specialist degree | 0.011* | 0.012** | 0.011** | 0.005 | 0.041 | 0.036 | 0.006 | 0.008** | 0.008* |
| | (0.005) | (0.004) | (0.004) | (0.066) | (0.055) | (0.072) | (0.004) | (0.003) | (0.003) |
| Doctoral degree | 0.040*** | 0.035*** | 0.033*** | 0.059 | 0.242** | 0.103 | 0.039*** | 0.035*** | 0.033*** |
| | (0.008) | (0.004) | (0.004) | (0.089) | (0.085) | (0.108) | (0.007) | (0.004) | (0.004) |
| Total years of experience | -0.000 | 0.002*** | 0.001*** | -0.002 | 0.004 | -0.003 | 0.000 | 0.002*** | 0.002*** |
| | (0.000) | (0.000) | (0.000) | (0.006) | (0.005) | (0.008) | (0.000) | (0.000) | (0.000) |
| 1 year of principal | 0.038*** | 0.033*** | 0.033*** | 0.031 | -0.036 | -0.009 | 0.038*** | 0.033*** | 0.033*** |
| experience | (0.002) | (0.002) | (0.002) | (0.050) | (0.050) | (0.053) | (0.002) | (0.002) | (0.002) |
| 2-3 years of principal | 0.078*** | 0.066*** | 0.065*** | 0.069 | -0.026 | 0.040 | 0.078*** | 0.066*** | 0.065*** |
| experience | (0.003) | (0.003) | (0.002) | (0.057) | (0.058) | (0.061) | (0.003) | (0.002) | (0.002) |
| 4-5 years of principal | 0.120*** | 0.100*** | 0.098*** | 0.058 | -0.020 | 0.058 | 0.118*** | 0.099*** | 0.097*** |
| experience | (0.004) | (0.003) | (0.003) | (0.078) | (0.068) | (0.077) | (0.004) | (0.003) | (0.003) |
| 6-7 years of principal | 0.155*** | 0.127*** | 0.126*** | 0.072 | -0.059 | 0.052 | 0.153*** | 0.126*** | 0.125*** |
| experience | (0.006) | (0.004) | (0.004) | (0.086) | (0.074) | (0.097) | (0.005) | (0.003) | (0.004) |
| 8 or more years of principal | 0.210*** | 0.167*** | 0.164*** | 0.194 | 0.046 | 0.159 | 0.207*** | 0.167*** | 0.163*** |
| experience | (0.008) | (0.005) | (0.006) | (0.106) | (0.094) | (0.125) | (0.008) | (0.005) | (0.005) |
| Constant | 10.909*** | 11.028*** | 11.044*** | 7.054*** | 7.601*** | 7.389*** | 10.910*** | 11.032*** | 11.042*** |
| | (0.024) | (0.015) | (0.017) | (0.423) | (0.215) | (0.371) | (0.023) | (0.014) | (0.016) |
| N | 24,383 | 24,383 | 24,386 | 2,949 | 2,949 | 2,949 | 24,383 | 24,383 | 24,386 |
| School characteristics | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| School fixed effects | N | N | Y | N | N | Y | N | N | Y |
| District fixed effects | N | Y | N | N | Y | N | N | Y | N |

Note. Coefficients are presented with standard errors in parentheses. All models include year fixed effects. All models include principal race and ethnicity. Time-invariant school characteristics are omitted from models 3, 6, and 9.
*** $p<.001$, ** $p<.01$, and * $p<.05$.
SOURCE: Missouri Department of Education, 1999-2016.

Table 6: Salaries for Missouri principals in their first or second principal position, by mobility

| | | Any Move | | | Within-District Move | | | Cross-District Move | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Female | -0.035*** | -0.035*** | -0.036*** | -0.027*** | -0.036*** | -0.037*** | -0.027*** | -0.037*** | -0.038*** | -0.028*** |
| | (0.008) | (0.008) | (0.008) | (0.005) | (0.008) | (0.008) | (0.005) | (0.008) | (0.008) | (0.005) |
| 1 year post move | | 0.009 | -0.004 | -0.015** | -0.002 | -0.018 | -0.021** | 0.030** | 0.018 | -0.005 |
| | | (0.010) | (0.010) | (0.007) | (0.014) | (0.013) | (0.009) | (0.013) | (0.013) | (0.009) |
| 2 years post move | | 0.024** | 0.024** | -0.003 | 0.022* | 0.021* | -0.008 | 0.030** | 0.028* | 0.003 |
| | | (0.009) | (0.010) | (0.007) | (0.012) | (0.013) | (0.009) | (0.014) | (0.015) | (0.009) |
| 3 years post move | | 0.036*** | 0.034*** | -0.009 | 0.040*** | 0.044*** | -0.009 | 0.032** | 0.024 | -0.008 |
| | | (0.010) | (0.011) | (0.008) | (0.011) | (0.013) | (0.011) | (0.015) | (0.018) | (0.011) |
| 4+ years post move | | 0.046*** | 0.046*** | -0.002 | 0.042*** | 0.039** | -0.007 | 0.058*** | 0.060*** | 0.004 |
| | | (0.012) | (0.014) | (0.009) | (0.014) | (0.016) | (0.011) | (0.015) | (0.021) | (0.011) |
| Female x 1 year post move | | | 0.025** | 0.014 | | 0.029* | 0.022** | | 0.025 | 0.002 |
| | | | (0.013) | (0.009) | | (0.017) | (0.010) | | (0.020) | (0.013) |
| Female x 2 years post move | | | 0.001 | 0.002 | | 0.001 | 0.009 | | 0.004 | -0.009 |
| | | | (0.013) | (0.009) | | (0.015) | (0.011) | | (0.021) | (0.013) |
| Female x 3 years post move | | | 0.004 | 0.010 | | -0.006 | 0.009 | | 0.016 | 0.012 |
| | | | (0.014) | (0.010) | | (0.015) | (0.014) | | (0.024) | (0.014) |
| Female x 4+ years post move | | | 0.001 | 0.016 | | 0.005 | 0.017 | | -0.003 | 0.016 |
| | | | (0.016) | (0.010) | | (0.021) | (0.013) | | (0.027) | (0.015) |
| Total years of experience | 0.006*** | 0.006*** | 0.006*** | 0.004*** | 0.006*** | 0.006*** | 0.004*** | 0.006*** | 0.006*** | 0.004*** |
| | (0.001) | (0.001) | (0.001) | (0.000) | (0.001) | (0.001) | (0.000) | (0.001) | (0.001) | (0.000) |
| 1 year of principal experience | 0.027*** | 0.027*** | 0.027*** | 0.031*** | 0.027*** | 0.027*** | 0.031*** | 0.028*** | 0.028*** | 0.032*** |
| | (0.002) | (0.003) | (0.003) | (0.002) | (0.003) | (0.003) | (0.002) | (0.003) | (0.003) | (0.002) |
| 2-3 years of principal experience | 0.060*** | 0.057*** | 0.057*** | 0.062*** | 0.057*** | 0.057*** | 0.062*** | 0.057*** | 0.057*** | 0.063*** |
| | (0.004) | (0.005) | (0.005) | (0.003) | (0.005) | (0.005) | (0.003) | (0.004) | (0.004) | (0.003) |
| 4-5 years of principal experience | 0.091*** | 0.083*** | 0.083*** | 0.088*** | 0.082*** | 0.082*** | 0.088*** | 0.080*** | 0.080*** | 0.088*** |
| | (0.006) | (0.007) | (0.007) | (0.004) | (0.007) | (0.007) | (0.004) | (0.006) | (0.006) | (0.004) |
| 6-7 years of principal experience | 0.113*** | 0.102*** | 0.102*** | 0.108*** | 0.100*** | 0.100*** | 0.109*** | 0.098*** | 0.098*** | 0.108*** |
| | (0.008) | (0.009) | (0.009) | (0.005) | (0.009) | (0.009) | (0.005) | (0.009) | (0.009) | (0.006) |
| 8 or more years of principal experience | 0.121*** | 0.106*** | 0.106*** | 0.128*** | 0.102*** | 0.102*** | 0.127*** | 0.098*** | 0.098*** | 0.124*** |
| | (0.011) | (0.012) | (0.012) | (0.007) | (0.012) | (0.012) | (0.007) | (0.011) | (0.011) | (0.007) |
| Constant | 11.083*** | 11.083*** | 11.084*** | 11.130*** | 11.083*** | 11.084*** | 11.126*** | 11.075*** | 11.076*** | 11.133*** |
| | (0.016) | (0.016) | (0.016) | (0.024) | (0.017) | (0.016) | (0.025) | (0.016) | (0.016) | (0.025) |
| N | 33,428 | 33,428 | 33,428 | 27,037 | 30,962 | 30,962 | 24,999 | 29,470 | 29,470 | 23,845 |
| School characteristics | No | No | No | Yes | No | No | Yes | No | No | Yes |

Notes. Coefficients are presented with standard errors in parentheses. In each model, the dependent variable (DV) is coded as 0 for stayers. In columns 1 through 4, the DV is coded as 1 for all movers. In columns 5 through 7, the DV is coded as 1 for within-district movers and missing for cross-district movers. In columns 8 through 10, the DV is coded as 1 for cross-district movers and missing for within-district movers. All models include year fixed effects.
*** $p$<.001, ** $p$<.01, and * $p$<.05.
SOURCE: Missouri Department of Education, 1999-2016.

Table 7: Regression models of salary with gender of superintendent

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Female | -0.015 | -0.032*** | -0.024*** | -0.021*** | -0.017*** |
| | (0.009) | (0.008) | (0.004) | (0.002) | (0.003) |
| Female superintendent | -0.014 | -0.008 | -0.002 | -0.004 | -0.002 |
| | (0.027) | (0.023) | (0.009) | (0.005) | (0.005) |
| Female x female superintendent | 0.033* | 0.022 | 0.016 | 0.004 | -0.001 |
| | (0.015) | (0.014) | (0.009) | (0.006) | (0.006) |
| Black | | 0.151*** | -0.007 | -0.002 | -0.004 |
| | | (0.022) | (0.009) | (0.005) | (0.010) |
| Hispanic | | 0.159*** | 0.016 | 0.013 | -0.006 |
| | | (0.029) | (0.023) | (0.018) | (0.017) |
| Ed Specialist degree | | 0.008 | 0.011* | 0.013*** | 0.009** |
| | | (0.014) | (0.005) | (0.003) | (0.003) |
| Doctoral degree | | 0.223*** | 0.068*** | 0.048*** | 0.044*** |
| | | (0.017) | (0.007) | (0.004) | (0.005) |
| Total years of experience | | 0.005*** | 0.003*** | 0.003*** | 0.003*** |
| | | (0.001) | (0.000) | (0.000) | (0.000) |
| 1 year of principal experience | | 0.027*** | 0.029*** | 0.028*** | 0.028*** |
| | | (0.002) | (0.002) | (0.002) | (0.002) |
| 2-3 years of principal experience | | 0.057*** | 0.059*** | 0.055*** | 0.056*** |
| | | (0.004) | (0.003) | (0.002) | (0.002) |
| 4-5 years of principal experience | | 0.086*** | 0.084*** | 0.080*** | 0.079*** |
| | | (0.005) | (0.004) | (0.003) | (0.003) |
| 6-7 years of principal experience | | 0.109*** | 0.107*** | 0.101*** | 0.101*** |
| | | (0.007) | (0.004) | (0.004) | (0.004) |
| 8 or more years of principal experience | | 0.123*** | 0.131*** | 0.127*** | 0.127*** |
| | | (0.009) | (0.005) | (0.004) | (0.005) |
| Total school enrollment | | | 0.000*** | 0.000*** | 0.000* |
| | | | (0.000) | (0.000) | (0.000) |
| Proportion Black enrollment | | | 0.244*** | 0.039*** | 0.033 |
| | | | (0.034) | (0.011) | (0.044) |
| Proportion Hispanic enrollment | | | 0.248*** | 0.034 | 0.094 |
| | | | (0.064) | (0.025) | (0.067) |
| Proportion FRPL enrollment | | | -0.188*** | -0.025* | -0.022 |
| | | | (0.030) | (0.010) | (0.014) |
| Average math achievement | | | 0.007 | 0.001 | 0.004* |
| | | | (0.004) | (0.002) | (0.002) |
| Average reading achievement | | | 0.013** | 0.005** | 0.005** |
| | | | (0.004) | (0.002) | (0.002) |
| Middle school | | | 0.042*** | 0.040*** | |
| | | | (0.005) | (0.004) | |
| High school | | | -0.010 | 0.076*** | |
| | | | (0.008) | (0.004) | |
| Other school | | | -0.012 | 0.059*** | |
| | | | (0.014) | (0.009) | |
| Suburban | | | 0.090*** | -0.008 | |
| | | | (0.022) | (0.009) | |
| Town or rural | | | -0.133*** | -0.025*** | |
| | | | (0.020) | (0.004) | |
| Constant | 11.310*** | 11.100*** | 11.137*** | 11.132*** | 11.150*** |
| | (0.014) | (0.015) | (0.024) | (0.011) | (0.016) |
| N | 34,793 | 34,781 | 28,240 | 28,240 | 28,243 |
| School fixed effects | N | N | N | N | Y |
| District fixed effects | N | N | N | Y | N |

Notes. Coefficients are presented with standard errors in parentheses. All models include year fixed effects.
*** $p$<.001, ** $p$<.01, and * $p$<.05. SOURCE: Missouri Department of Education, 1999-2016.

Table 8. Regression models of salary differences for national sample of principals (SASS)

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Female | -0.0104** | -0.0130*** | -0.0150*** | -0.0144*** | -0.0036 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Black | | 0.0296*** | 0.0155* | 0.0181** | 0.0094 |
| | | (0.01) | (0.01) | (0.01) | (0.01) |
| Hispanic | | 0.0747*** | 0.0087 | -0.0031 | -0.0041 |
| | | (0.01) | (0.01) | (0.01) | (0.01) |
| Total principal experience | | 0.0052*** | 0.0052*** | 0.0052*** | 0.0053*** |
| | | (0.00) | (0.00) | (0.00) | (0.00) |
| Total teacher experience | | 0.0018*** | 0.0021*** | 0.0020*** | 0.0014*** |
| | | (0.00) | (0.00) | (0.00) | (0.00) |
| Ed Specialist degree | | 0.0600*** | 0.0595*** | 0.0606*** | 0.0516*** |
| | | (0.00) | (0.00) | (0.00) | (0.00) |
| Doctoral degree | | 0.1350*** | 0.0944*** | 0.0962*** | 0.0944*** |
| | | (0.01) | (0.01) | (0.01) | (0.01) |
| Total school enrollment | | | 0.0001*** | 0.0001*** | 0.0001*** |
| | | | (0.00) | (0.00) | (0.00) |
| Proportion Black enrollment | | | 0.0148 | 0.0154 | 0.1082*** |
| | | | (0.01) | (0.01) | (0.01) |
| Proportion Hispanic enrollment | | | 0.1065*** | 0.1154*** | 0.1557*** |
| | | | (0.01) | (0.01) | (0.01) |
| Proportion FRPL enrollment | | | -0.1169*** | -0.1188*** | -0.1467*** |
| | | | (0.01) | (0.01) | (0.01) |
| Elementary school | | | 0.0342*** | 0.0321*** | 0.0484*** |
| | | | (0.01) | (0.01) | (0.01) |
| Middle school | | | 0.0519*** | 0.0506*** | 0.0736*** |
| | | | (0.01) | (0.01) | (0.01) |
| High school | | | 0.0731*** | 0.0698*** | 0.0731*** |
| | | | (0.01) | (0.01) | (0.01) |
| Urban | | | 0.1691*** | 0.1677*** | |
| | | | (0.01) | (0.01) | |
| Suburban | | | 0.1728*** | 0.1717*** | |
| | | | (0.00) | (0.00) | |
| Principal effectiveness (teacher rated) | | | | 0.0099*** | 0.0016 |
| | | | | (0.00) | (0.00) |
| Constant | 11.4184*** | 11.3083*** | 11.1303*** | 11.1334*** | 11.2191*** |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| N | 35,570 | 35,570 | 34,250 | 32,910 | 32,910 |
| District fixed effects | N | N | N | N | Y |

Notes. Coefficients are presented with standard errors in parentheses. All models include year fixed effects.
*** *p*<.001, ** *p*<.01, and * *p*<.05.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey, 2000-2012, and National Teacher and Principal Survey, 2016.

Table 9. Regression models of salary differences among principals in 2012 in national sample (SASS), including prior position, weekly hours, and principal union and salary schedule participation

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| Female | -0.0175 | -0.0182* | -0.0224** | -0.0246** | -0.0264*** | -0.0155* | -0.0222** | -0.0157* | -0.0094 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Black | | 0.0277 | 0.0143 | 0.0109 | 0.0098 | 0.0046 | 0.0176 | 0.0063 | -0.0180 |
| | | (0.02) | (0.02) | (0.02) | (0.02) | (0.01) | (0.02) | (0.01) | (0.02) |
| Hispanic | | 0.0689*** | 0.0445* | -0.0004 | 0.0001 | -0.0079 | -0.0113 | -0.0104 | -0.0264 |
| | | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| Total principal experience | | 0.0054*** | 0.0066*** | 0.0056*** | 0.0058*** | 0.0057*** | 0.0057*** | 0.0057*** | 0.0064*** |
| | | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Total teacher experience | | 0.0005 | 0.0008 | 0.0011 | 0.0011 | 0.0013* | 0.0011 | 0.0012 | 0.0016* |
| | | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Ed Specialist degree | | 0.0648*** | 0.0632*** | 0.0583*** | 0.0565*** | 0.0460*** | 0.0542*** | 0.0433*** | 0.0147 |
| | | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Doctoral degree | | 0.1539*** | 0.1367*** | 0.1018*** | 0.1003*** | 0.0920*** | 0.0996*** | 0.0912*** | 0.0406 |
| | | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.02) |
| Former department head | | | -0.0387*** | -0.0295*** | -0.0296*** | -0.0262*** | -0.0246** | -0.0230** | -0.0069 |
| | | | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Former curriculum specialist/ coordinator | | | 0.0461*** | 0.0384*** | 0.0374*** | 0.0304** | 0.0354** | 0.0311** | -0.0059 |
| | | | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Former assistant principal | | | 0.1222*** | 0.0437*** | 0.0427*** | 0.0439*** | 0.0310*** | 0.0393*** | 0.0260 |
| | | | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Total school enrollment | | | | 0.0001*** | 0.0001*** | 0.0001*** | 0.0001*** | 0.0001*** | 0.0001** |
| | | | | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Proportion Black enrollment | | | | 0.0189 | 0.0171 | 0.0298 | -0.0165 | 0.0139 | 0.0025 |
| | | | | (0.03) | (0.02) | (0.02) | (0.02) | (0.02) | (0.04) |
| Proportion Hispanic enrollment | | | | 0.1005*** | 0.1003*** | 0.1156*** | 0.0867*** | 0.1091*** | 0.0084 |
| | | | | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) | (0.05) |
| Proportion FRPL enrollment | | | | -0.1569*** | -0.1572*** | -0.1534*** | -0.1592*** | -0.1454*** | -0.0321 |
| | | | | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.03) |
| Elementary school | | | | 0.0289 | 0.0286 | 0.0212 | 0.0154 | 0.0130 | -0.0173 |
| | | | | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.04) |
| Middle school | | | | 0.0472** | 0.0467** | 0.0484** | 0.0425* | 0.0443* | 0.0189 |
| | | | | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.04) |
| High school | | | | 0.0874*** | 0.0849*** | 0.0747*** | 0.0773*** | 0.0693*** | 0.0636 |
| | | | | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.04) |
| Charter school | | | | -0.0914*** | -0.0929*** | -0.0670** | -0.0647* | -0.0826** | |
| | | | | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) | |
| Urban | | | | 0.1561*** | 0.1555*** | 0.1078*** | 0.1450*** | 0.1101*** | |
| | | | | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | |
| Suburban | | | | 0.1716*** | 0.1721*** | 0.1356*** | 0.1652*** | 0.1352*** | |
| | | | | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | |
| Principal effectiveness (teacher rated) | | | | 0.0086 | 0.0082 | 0.0083 | 0.0118* | 0.0062 | -0.0016 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Weekly hours worked | | | | | 0.0011*** | 0.0012*** | 0.0011*** | 0.0011*** | 0.0003 |
| | | | | | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Principal union agreement | | | | | | 0.1415*** | | 0.1438*** | |
| | | | | | | (0.01) | | (0.02) | |
| Principal salary schedule | | | | | | | 0.0250* | -0.0015 | |
| | | | | | | | (0.01) | (0.01) | |
| Constant | 11.4410*** | 11.3573*** | 11.2659*** | 11.2224*** | 11.1619*** | 11.1154*** | 11.1737*** | 11.1364*** | 11.3151*** |
| | (0.01) | (0.01) | (0.02) | (0.02) | (0.03) | (0.03) | (0.03) | (0.03) | (0.05) |
| N | 7220 | 7220 | 7220 | 6590 | 6590 | 5900 | 5430 | 5430 | 5430 |
| District fixed effects | N | N | N | N | N | N | N | N | Y |

Notes. Coefficients are presented with standard errors in parentheses. All models include year fixed effects.
*** *p*<.001, ** *p*<.01, and * *p*<.05.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey, 2012.

## Appendix

Appendix Table A1. Factor Loadings for Principal Effectiveness Factor, SASS

| | 2000 | 2004 | 2008 | 2012 | 2016 |
|---|---|---|---|---|---|
| The school administration's behavior toward the staff is supportive and encouraging. | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 |
| My principal enforces school rules for student conduct and backs me up when I need it. | 0.71 | 0.73 | 0.75 | 0.76 | 0.77 |
| The principal knows what kind of school he/she wants and has communicated it to the staff. | 0.73 | 0.75 | 0.75 | 0.76 | 0.76 |
| In this school, staff members are recognized for a job well done. | 0.69 | 0.69 | 0.69 | 0.71 | 0.73 |
| Eigenvalue | 2.08 | 2.13 | 2.14 | 2.22 | 2.28 |
| Cronbach's α | 0.83 | 0.83 | 0.84 | 0.85 | 0.85 |

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey, 2000-2012, and National Teacher and Principal Survey, 2016.

Appendix Table A2. Estimated wage gaps for first-year Missouri principals

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Female | -0.006 | -0.035*** | -0.028*** | -0.024*** | -0.021** |
| | (0.009) | (0.009) | (0.006) | (0.005) | (0.007) |
| Black | | 0.183*** | -0.001 | -0.008 | -0.007 |
| | | (0.022) | (0.010) | (0.007) | (0.013) |
| Hispanic | | 0.181*** | 0.052 | 0.031 | 0.026 |
| | | (0.030) | (0.036) | (0.031) | (0.058) |
| Education Specialist degree | | 0.049*** | 0.027** | 0.029*** | 0.025* |
| | | (0.015) | (0.008) | (0.007) | (0.012) |
| Doctoral degree | | 0.235*** | 0.101*** | 0.073*** | 0.076*** |
| | | (0.017) | (0.013) | (0.011) | (0.019) |
| Years of experience | | 0.007*** | 0.004*** | 0.004*** | 0.004*** |
| | | (0.001) | (0.000) | (0.001) | (0.001) |
| School total enrollment | | | 0.000*** | 0.000*** | 0.000 |
| | | | (0.000) | (0.000) | (0.000) |
| School proportion Black | | | 0.211*** | 0.017 | -0.079 |
| students | | | (0.032) | (0.025) | (0.105) |
| School proportion Hispanic | | | 0.198** | -0.047 | -0.045 |
| students | | | (0.065) | (0.044) | (0.144) |
| School proportion of students | | | -0.177*** | -0.046 | 0.008 |
| qualifying for FRPL | | | (0.029) | (0.024) | (0.034) |
| Average math achievement | | | 0.005 | 0.004 | 0.003 |
| | | | (0.006) | (0.004) | (0.008) |
| Average reading achievement | | | 0.002 | -0.007 | -0.009 |
| | | | (0.006) | (0.005) | (0.007) |
| Middle school | | | 0.054*** | 0.048*** | |
| | | | (0.008) | (0.007) | |
| High school | | | -0.005 | 0.077*** | |
| | | | (0.010) | (0.008) | |
| Other school | | | -0.027 | 0.031 | |
| | | | (0.016) | (0.017) | |
| Suburban | | | 0.104*** | -0.001 | |
| | | | (0.023) | (0.026) | |
| Town/Rural | | | -0.125*** | -0.027 | |
| | | | (0.025) | (0.022) | |
| Constant | 11.191*** | 11.073*** | 11.103*** | 11.118*** | 11.139*** |
| | (0.020) | (0.020) | (0.030) | (0.026) | (0.034) |
| Observations | 4854 | 4848 | 3881 | 3881 | 3881 |
| School fixed effects | N | N | N | N | Y |
| District fixed effects | N | N | N | Y | N |

Notes. Coefficients are presented with standard errors in parentheses. All models include year fixed effects.

*** *p*<.001, ** *p*<.01, and * *p*<.05.

SOURCE: Missouri Department of Education, 1999-2016.

Appendix Table A3. Estimated wage gaps for Missouri principals with Education Specialist and/or Doctoral degrees

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Female | -0.035*** | -0.047*** | -0.026*** | -0.022*** | -0.020*** |
| | (0.010) | (0.009) | (0.005) | (0.003) | (0.005) |
| Black | | 0.147*** | -0.007 | 0.001 | 0.007 |
| | | (0.027) | (0.015) | (0.009) | (0.018) |
| Hispanic | | 0.195*** | 0.017 | -0.011 | -0.035* |
| | | (0.028) | (0.033) | (0.018) | (0.016) |
| Principal experience | | 0.015*** | 0.022*** | 0.022*** | 0.022*** |
| | | (0.003) | (0.002) | (0.001) | (0.001) |
| Years of experience | | 0.005*** | 0.003*** | 0.003*** | 0.003*** |
| | | (0.001) | (0.000) | (0.000) | (0.000) |
| School total enrollment | | | 0.000*** | 0.000*** | 0.000*** |
| | | | (0.000) | (0.000) | (0.000) |
| School proportion Black | | | 0.288*** | 0.060** | 0.048 |
| students | | | (0.040) | (0.018) | (0.070) |
| School proportion Hispanic | | | 0.289*** | 0.071* | 0.067 |
| students | | | (0.067) | (0.034) | (0.109) |
| School proportion FRPL | | | -0.213*** | -0.012 | -0.002 |
| students | | | (0.037) | (0.014) | (0.019) |
| Average math achievement | | | 0.007 | 0.001 | 0.004 |
| | | | (0.005) | (0.003) | (0.003) |
| Average reading | | | 0.016** | 0.007* | 0.006 |
| achievement | | | (0.006) | (0.003) | (0.003) |
| Middle school | | | 0.039*** | 0.048*** | |
| | | | (0.008) | (0.007) | |
| High school | | | -0.010 | 0.084*** | |
| | | | (0.010) | (0.007) | |
| Other school | | | -0.008 | 0.079*** | |
| | | | (0.021) | (0.012) | |
| Suburban | | | 0.067** | -0.005 | |
| | | | (0.022) | (0.012) | |
| Town/Rural | | | -0.132*** | -0.022** | |
| | | | (0.019) | (0.007) | |
| Constant | 11.365*** | 11.183*** | 11.181*** | 11.150*** | 11.165*** |
| | (0.015) | (0.019) | (0.025) | (0.017) | (0.026) |
| Observations | 14539 | 14538 | 11511 | 11511 | 11512 |
| District fixed effects | N | N | N | Y | N |
| School fixed effects | N | N | N | N | Y |

Notes. Coefficients are presented with standard errors in parentheses. All models include year fixed effects.

*** $p<.001$, ** $p<.01$, and * $p<.05$.

SOURCE: Missouri Department of Education, 1999-2016.

Appendix Table A4: Regression models of salary differences for Missouri teachers who become principals.

| | Base Salary | | | Extra Duty Salary | | | Total Salary | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Female | -0.002 | 0.006* | 0.006 | -0.785*** | -0.713*** | -0.735*** | -0.043*** | -0.033*** | -0.035*** |
| | (0.004) | (0.003) | (0.003) | (0.050) | (0.049) | (0.059) | (0.004) | (0.004) | (0.005) |
| Black | -0.003 | -0.011 | -0.011 | -0.044 | 0.038 | 0.006 | -0.003 | -0.008 | -0.009 |
| | (0.010) | (0.009) | (0.009) | (0.184) | (0.166) | (0.136) | (0.009) | (0.010) | (0.010) |
| Hispanic | -0.010 | -0.027 | -0.024 | -0.246 | -0.108 | 0.007 | -0.040 | -0.042* | -0.040 |
| | (0.022) | (0.014) | (0.028) | (0.375) | (0.307) | (0.265) | (0.029) | (0.021) | (0.037) |
| Years of experience | 0.013*** | 0.014*** | 0.014*** | 0.005 | 0.005 | 0.006 | 0.015*** | 0.016*** | 0.016*** |
| | (0.000) | (0.000) | (0.000) | (0.003) | (0.004) | (0.005) | (0.000) | (0.000) | (0.001) |
| Master’s degree | 0.116*** | 0.102*** | 0.094*** | -0.058 | -0.018 | -0.020 | 0.117*** | 0.104*** | 0.097*** |
| | (0.005) | (0.004) | (0.004) | (0.041) | (0.042) | (0.044) | (0.005) | (0.005) | (0.005) |
| Ed Specialist degree | 0.141*** | 0.121*** | 0.114*** | -0.172 | -0.129 | -0.251* | 0.122*** | 0.107*** | 0.099*** |
| | (0.012) | (0.009) | (0.010) | (0.114) | (0.098) | (0.121) | (0.014) | (0.012) | (0.013) |
| Doctoral degree | 0.213*** | 0.199*** | 0.183*** | -0.062 | 0.009 | -0.206 | 0.185*** | 0.183*** | 0.169*** |
| | (0.041) | (0.033) | (0.035) | (0.378) | (0.369) | (0.291) | (0.040) | (0.034) | (0.037) |
| Total school | 0.000*** | -0.000 | 0.000 | 0.000*** | 0.000*** | -0.000 | 0.000*** | -0.000 | -0.000 |
| enrollment | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Proportion Black | 0.286*** | 0.043 | 0.238*** | 0.002 | 0.694 | 0.560 | 0.228*** | 0.055 | 0.229*** |
| enrollment | (0.025) | (0.026) | (0.053) | (0.172) | (0.370) | (0.685) | (0.024) | (0.030) | (0.055) |
| Proportion Hispanic | 0.280*** | 0.047 | 0.258*** | 0.987* | -0.284 | -1.228 | 0.291*** | 0.086 | 0.291*** |
| enrollment | (0.058) | (0.060) | (0.068) | (0.409) | (0.442) | (1.092) | (0.064) | (0.065) | (0.083) |
| Proportion FRPL | -0.145*** | -0.006 | 0.005 | 0.066 | -0.000 | -0.003 | -0.123*** | -0.015 | 0.001 |
| enrollment | (0.023) | (0.015) | (0.014) | (0.156) | (0.158) | (0.184) | (0.022) | (0.017) | (0.015) |
| Average math | 0.003 | 0.000 | -0.001 | -0.003 | -0.008 | -0.012 | 0.002 | 0.000 | -0.003 |
| achievement | (0.003) | (0.002) | (0.003) | (0.030) | (0.024) | (0.027) | (0.003) | (0.002) | (0.003) |
| Average reading | 0.013*** | 0.007*** | 0.008** | 0.040 | 0.047 | 0.000 | 0.014*** | 0.009*** | 0.006* |
| achievement | (0.003) | (0.002) | (0.003) | (0.030) | (0.027) | (0.026) | (0.003) | (0.002) | (0.003) |
| Middle school | 0.003 | 0.001 | | 0.265*** | 0.258*** | | 0.026*** | 0.018*** | |
| | (0.005) | (0.003) | | (0.069) | (0.074) | | (0.006) | (0.004) | |
| High school | -0.063*** | 0.008 | | 0.422*** | 0.426*** | | 0.008 | 0.064*** | |
| | (0.007) | (0.004) | | (0.072) | (0.070) | | (0.007) | (0.006) | |
| Other school | -0.043** | 0.026* | | 0.232* | 0.577*** | | 0.007 | 0.065*** | |
| | (0.016) | (0.011) | | (0.111) | (0.121) | | (0.014) | (0.012) | |
| Suburban | 0.040** | -0.040 | | -0.039 | -0.081 | | 0.050*** | -0.049 | |
| | (0.014) | (0.030) | | (0.123) | (0.400) | | (0.014) | (0.036) | |
| Town or rural | -0.078*** | -0.027 | | -0.037 | -0.023 | | -0.053*** | -0.039 | |
| | (0.015) | (0.029) | | (0.124) | (0.392) | | (0.014) | (0.034) | |
| Constant | 10.484*** | 10.481*** | 10.415*** | 7.941*** | 7.847*** | 8.310*** | 10.540*** | 10.561*** | 10.514*** |
| | (0.018) | (0.027) | (0.018) | (0.152) | (0.378) | (0.120) | (0.017) | (0.031) | (0.020) |
| N | 20,005 | 20,005 | 20,006 | 9,222 | 9,222 | 9,222 | 20,006 | 20,006 | 20,007 |
| School fixed effects | N | N | Y | N | N | Y | N | N | Y |
| District fixed effects | N | Y | N | N | Y | N | N | Y | N |

Note. Coefficients are presented with standard errors in parentheses. All models include year fixed effects.
*** *p*<.001, ** *p*<.01, and * *p*<.05. SOURCE: Missouri Department of Education, 1999-2016.

Appendix Table A5: Regression models of salary differences for Missouri assistant principals who become principals.

| | Base Salary | | | Extra Duty Salary | | | Total Salary | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Female | -0.010 | -0.011 | -0.009 | -0.241** | -0.077 | 0.047 | -0.017** | -0.017*** | -0.013** |
| | (0.006) | (0.006) | (0.005) | (0.086) | (0.089) | (0.104) | (0.005) | (0.004) | (0.004) |
| Black | 0.009 | 0.003 | 0.003 | -0.178 | -0.376* | -0.211 | 0.002 | 0.001 | 0.003 |
| | (0.012) | (0.007) | (0.010) | (0.166) | (0.186) | (0.428) | (0.011) | (0.007) | (0.010) |
| Hispanic | -0.009 | 0.025 | 0.002 | | | | -0.030 | 0.001 | 0.000 |
| | (0.043) | (0.035) | (0.038) | | | | (0.039) | (0.025) | (0.037) |
| Master’s degree | 0.058*** | 0.038*** | 0.032*** | 0.014 | 0.022 | -0.158 | 0.059*** | 0.036*** | 0.027** |
| | (0.012) | (0.011) | (0.010) | (0.171) | (0.148) | (0.144) | (0.011) | (0.010) | (0.010) |
| Ed Specialist degree | 0.061** | 0.067*** | 0.055*** | 0.082 | 0.051 | -0.191 | 0.056** | 0.051*** | 0.043*** |
| | (0.019) | (0.015) | (0.012) | (0.230) | (0.201) | (0.213) | (0.017) | (0.013) | (0.012) |
| Doctoral degree | 0.141*** | 0.109*** | 0.085*** | 0.343 | 0.350 | 0.111 | 0.137*** | 0.103*** | 0.080*** |
| | (0.018) | (0.016) | (0.015) | (0.313) | (0.206) | (0.236) | (0.017) | (0.014) | (0.014) |
| Total years of experience | 0.004*** | 0.005*** | 0.005*** | 0.017* | 0.007 | 0.005 | 0.004*** | 0.005*** | 0.005*** |
| | (0.001) | (0.000) | (0.000) | (0.007) | (0.007) | (0.010) | (0.000) | (0.000) | (0.000) |
| 1 year of AP experience | 0.049*** | 0.041*** | 0.037*** | -0.037 | -0.027 | 0.001 | 0.047*** | 0.040*** | 0.035*** |
| | (0.005) | (0.005) | (0.004) | (0.087) | (0.076) | (0.082) | (0.005) | (0.004) | (0.004) |
| 2-3 years of AP experience | 0.087*** | 0.074*** | 0.066*** | -0.052 | -0.082 | -0.050 | 0.084*** | 0.072*** | 0.065*** |
| | (0.008) | (0.007) | (0.006) | (0.122) | (0.095) | (0.078) | (0.007) | (0.006) | (0.005) |
| 4-5 years of AP experience | 0.121*** | 0.104*** | 0.090*** | -0.151 | -0.037 | 0.015 | 0.118*** | 0.103*** | 0.091*** |
| | (0.009) | (0.008) | (0.007) | (0.155) | (0.130) | (0.115) | (0.008) | (0.007) | (0.006) |
| 6-7 years of AP experience | 0.156*** | 0.132*** | 0.113*** | -0.259 | -0.093 | 0.117 | 0.150*** | 0.130*** | 0.115*** |
| | (0.011) | (0.008) | (0.008) | (0.174) | (0.167) | (0.197) | (0.010) | (0.008) | (0.008) |
| 8 or more years of AP | 0.188*** | 0.155*** | 0.134*** | -0.176 | 0.179 | 0.409 | 0.181*** | 0.153*** | 0.136*** |
| experience | (0.010) | (0.009) | (0.010) | (0.197) | (0.221) | (0.313) | (0.010) | (0.009) | (0.010) |
| Total school | 0.000*** | 0.000*** | 0.000** | -0.000 | 0.000 | 0.001 | 0.000*** | 0.000*** | 0.000** |
| enrollment | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Proportion Black | 0.182*** | 0.002 | -0.075 | -0.011 | 0.783 | -1.189 | 0.188*** | 0.013 | -0.014 |
| enrollment | (0.036) | (0.033) | (0.069) | (0.329) | (0.452) | (1.041) | (0.037) | (0.032) | (0.050) |
| Proportion Hispanic | 0.289*** | 0.011 | -0.032 | -0.566 | 1.073 | -1.371 | 0.290** | 0.026 | 0.008 |
| enrollment | (0.075) | (0.038) | (0.078) | (2.442) | (1.440) | (2.056) | (0.087) | (0.039) | (0.062) |
| Proportion FRPL | -0.193*** | -0.007 | -0.046 | -0.329 | -0.141 | 0.100 | -0.201*** | -0.011 | -0.036 |
| enrollment | (0.055) | (0.026) | (0.028) | (0.449) | (0.439) | (0.365) | (0.050) | (0.021) | (0.026) |
| Average math | -0.000 | -0.004 | 0.003 | -0.132 | -0.062 | -0.120 | 0.005 | 0.000 | 0.003 |
| achievement | (0.007) | (0.006) | (0.004) | (0.086) | (0.081) | (0.103) | (0.006) | (0.005) | (0.004) |
| Average reading | -0.002 | -0.001 | -0.006 | 0.098 | 0.086 | 0.031 | -0.004 | -0.003 | -0.006 |
| achievement | (0.007) | (0.006) | (0.005) | (0.118) | (0.097) | (0.147) | (0.007) | (0.006) | (0.005) |
| Middle school | 0.020 | 0.048*** | | -0.283 | -0.224 | | 0.017 | 0.041*** | |
| | (0.015) | (0.012) | | (0.173) | (0.146) | | (0.010) | (0.008) | |
| High school | -0.032 | 0.078*** | | -0.148 | -0.137 | | -0.032 | 0.072*** | |
| | (0.022) | (0.016) | | (0.230) | (0.304) | | (0.017) | (0.013) | |
| Other school | -0.008 | 0.102** | | -0.498 | -0.774* | | -0.026 | 0.074*** | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (0.040) | (0.033) | | (0.353) | (0.350) | | (0.030) | (0.014) | |
| Suburban | 0.113*** | -0.012 | | 0.116 | 1.677*** | | 0.091*** | 0.009 | |
| | (0.029) | (0.033) | | (0.235) | (0.439) | | (0.026) | (0.025) | |
| Town or rural | -0.021 | -0.018 | | 0.011 | 1.260*** | | -0.026 | -0.003 | |
| | (0.029) | (0.032) | | (0.317) | (0.269) | | (0.025) | (0.024) | |
| Constant | 10.942*** | 11.014*** | 11.064*** | 8.533*** | 7.263*** | 8.116*** | 10.988*** | 11.035*** | 11.086*** |
| | (0.047) | (0.037) | (0.030) | (0.524) | (0.517) | (0.292) | (0.037) | (0.029) | (0.026) |
| N | 6,757 | 6,757 | 6,757 | 757 | 757 | 757 | 6,757 | 6,757 | 6,757 |
| School fixed effects | N | N | Y | N | N | Y | N | N | Y |
| District fixed effects | N | Y | N | N | Y | N | N | Y | N |

Note. Coefficients are presented with standard errors in parentheses. All models include year fixed effects.
*** $p<.001$, ** $p<.01$, and * $p<.05$.
SOURCE: Missouri Department of Education, 1999-2016.