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Pension Effect on Out-of-State Teacher Turnover in North Carolina

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**PENSION EFFECT ON OUT-OF-STATE TEACHER TURNOVER IN NORTH
CAROLINA**

BY

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**SUBMITTED TO SCRIPPS COLLEGE IN PARTIAL FULFILLMENT OF THE
DEGREE OF BACHELOR OF ARTS**

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PROFESSOR MENEFEE-LIBEY**

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Table of Contents

ACKNOWLEDGEMENTS	3
INTRODUCTION	4
BACKGROUND	6
PRIOR RESEARCH ON TEACHER PENSIONS AND TURNOVER.....	8
DATA AND SAMPLE.....	11
MODELING	14
FINDINGS.....	16
PENSION BENEFITS	16
VESTING	17
CONTRIBUTION	17
CONCLUSION	17
APPENDIX.....	20
BIBLIOGRAPHY.....	26

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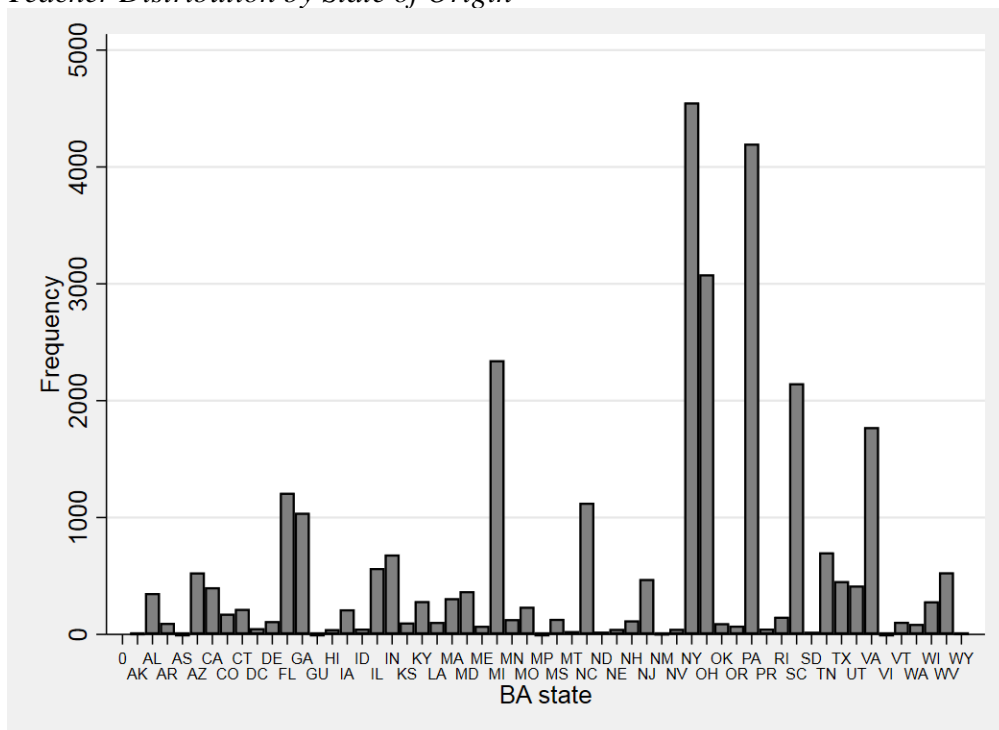
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Introduction

In many states, teacher shortages have led to greater opportunities for teachers to join the workforce without an in-state teaching education. Before the teaching shortage, most teachers were prepared through undergraduate programs in Education that gave teacher certifications upon completion of the program. Most teachers were taught in the state that they planned on teaching in, this allowed for preparation of teachers on specific education standards. Programs, such as Teach for America, have brought many non-traditional teachers into the teaching profession in response to the teacher shortage. Another recently developed type of teacher prep is labeled lateral or alternative entry, which enables to concurrently complete requirements for their teaching certification while teaching in schools. Finally, states have opened their schools to teachers who are licensed and educated in other states. These new teacher certification programs, along with the desperate need for more effective teachers, has brought these lateral/alternative entry programs into greater prevalence among states. States with a greater need for teachers will draw more teachers in from alternative entry pathways as well as other states and states with a surplus of teachers will send their newly graduated teachers out to other states where getting a job is nearly assured because of the teacher drought. Along with uneven teacher supply, there is also the extreme variance in teacher pensions across states and age groups. Teaching is not a highly paid profession, so the allure for many to become a teacher is the pension program. Teacher's pensions cover a percentage of their final salary for the rest of their lives, their Defined Benefit programs give teachers access to better retirement options and an option for retirement at a reasonably young age. This paper will analyze the effect of the pension generosity of an out-of-state teacher's state of origin on their likelihood leave the North Carolina public school system.

Reciprocal teacher certification licensing agreements through national accreditation and certification associations, the National Council for the Accreditation of Teacher Education or National Association of State Directors of Teacher Education and Certification, allow for greater interstate mobility of the teacher’s labor market. The teacher labor market until recently had created a reasonably significant barrier for individuals to move between states, which caused a surplus in some states and a shortage in others. Although opening up the markets to allow for mobility has begun to reduce the teacher shortage in some areas, the new mobility of teachers has also brought to the forefront research on how out-of-state teachers function in their adopted state’s schools.⁸ In studies on teacher effectiveness, it was found that out-of-state teachers are less effective than both alternative entry and in-state teachers (Bastian & Henry, 2015). Furthermore, it was found that out-of-state teachers are also more likely to leave the labor force in their first three years, and the most likely to turnover within their first year of teaching compared to all other types of teachers (Redding & Henry, 2018).

Teacher Distribution by State of Origin



North Carolina is one of many states that face teacher shortages such that 25% of their teaching positions are filled by out-of-state and alternate-entry individuals (Baskin & Henry, 2015). There has been new research on the impacts of out-of-state teachers on effectiveness and turnover, but a lack of research into reasons why out-of-state teachers tend to turnover more frequently than their in-state counterparts. Studies have found that teachers who turnover often return to their states of origin and teach when they return (Boyd et Al., 2005). With this knowledge, we can address the following questions:

- Which states-of-origin see the largest number of turnovers?
- Using a measure for the generosity of pensions on a state by state basis, do states with more generous benefits draw more teachers away from the state where they begin teaching?

Teacher quality and turnover has a major effect on student achievement, both teachers who leave their schools mid-year see negative effects on not only the achievement of the students in that classroom but on the students in classrooms across the school (Redding & Henry, 2018). The pension effects of teachers are particularly important because of the lasting effects of education on the earnings of students. It is critical that the effects of state pension programs on teacher turnover be examined in greater detail to begin to offer better policy proposals to reform the teacher pension program (Backes et al., 2016).

Background

Teacher pension programs are unique: they are one of the last havens for defined benefits plans, which are generally more generous than defined contribution plans. A defined benefit plan

gives a yearly allowance to a teacher that is defined when they sign their contract. For most teacher pension plans the equation for their benefit is

$$B=M*YOS*FAS$$

In the above equation, B represents the total annual benefit, M is the pension multiplier, YOS annotates the years of service, and the FAS is the final average salary. Depending on the state there may also be cost of living adjustments and the plan may be adjusted for inflation.

Within the pension program, there are also vesting years, as more teachers retire, the required vesting period for most states has risen. Vesting periods are the amount of time that a teacher must work before they become eligible to collect pension once they reach the requirements for retirement or early retirement. It takes between 3-10 years for a teacher to become vested; North Carolina has a four-year vesting period, which is short in comparison to most states. Vesting periods do not transfer between states, which incentivizes most teachers to remain in the original state they began teaching in, or to transfer early in their career because the amount of money paid towards pension during the vesting period remains with the departing state's retirement system. The retirement age for teachers varies between states and is generally anywhere between 58-67 depending on years of service. There are plans that offer early retirement in almost every state – excluding Alabama, District of Columbia and, Massachusetts – which gives the teacher the option to retire at an earlier age or lesser amount of service in exchange for a smaller multiplier. Many plans depend on a mix of work and service years to define when a teacher can receive full benefits without a penalty in their multiplier with rules that define the age and years of service necessary for full benefits or with rules such the rule-of-90 in Virginia, Vermont, and Idaho. Other states have similar plans.

The other style of pension plan that is more popular in the private sector is the Defined Contribution plan. Defined Contribution plans link a teacher's benefits directly to their contributions and the contributions of their employer. Some states have begun to offer hybrid Defined Contribution/Defined Benefit plans, but most states remain on strictly Defined Benefit plans.

This paper assumes that a utility maximization theory can be applied to the turnover decision of teachers. This says that teachers will make a rational decision to leave their current position teaching in North Carolina if the decision will lead to greater compensation, including retirement benefits, or long-term utility to the individual. This decision should depend on a weighing of salary, pension benefits, non-monetary benefits (such as health care), and geographical location, that affect the cost of living.

Prior Research on Teacher Pensions and Turnover

In the past several years there has been an increasing amount of research comparing the different qualities of different teacher entry pathways, on the effectiveness of the teachers, their perceived preparedness and their attrition rate. A few articles have examined the impact of out-of-state teachers on their students, but these articles have generally failed to examine the reasons behind the unique effects of out-of-state teachers. Although pension plans vary dramatically between states, they have yet to be a topic of systematic examination but the findings from earlier papers should be able to inform some potential effects of pensions on out-of-state teachers.

First, teachers who are from out-of-state are generally less effective and more likely to turn over within their first five years. Out-of-state teachers feel less prepared than their in-state

counterparts (Hammond, Chung & Frelow, 2002). Certified teachers generally feel a greater sense of obligation to their students. It is unknown how the effects of attending school in the state where one teaches may affect a sense of preparedness, teachers with more experience being a classroom aid in the state of their program generally felt better prepared to (Hammond, Chung & Frelow, 2002). Not only do out-of-state teachers generally feel less prepared, but they are also less effective than both in-state teachers and alternative entry pathways, that do not receive a certification to teach by their first year (Bastian & Henry, 2015). The first three years of teaching show the greatest jumps in teacher effectiveness, but even after five years, out-of-state teachers are less effective than either of their counterparts (Bastian & Henry, 2015, Henry, Bastian & Fortner, 2011). Teachers who score poorly on their evaluations, or are ineffective are also more likely to leave in the middle of the year, much like teachers who feel less of a connection to their students (Redding & Henry, 2018, Hammond, Chung & Frelow, 2002). Within year attrition is a serious issue in schools specifically because it leaves students without a teacher, generally requiring either a short- or long-term substitute teacher which forces students to adapt to new teaching styles and practices as well as brings a teacher from outside the school into a new environment where they have little to no prior relationships with students or teachers. When a teacher leaves mid-year, students generally see a 7.5% standard deviation lower testing score than students whose teacher remains the entire year (Henry & Redding, 2018). Even when teachers leave at the end of the year, the year leading up to their exit the school generally sees a significant decrease in their effectiveness (Redding & Henry, 2018, Henry, Bastian & Fortner, 2011). Although many of these studies have focused on the different effects of in-state and in-school impacts on teacher turnover, they have focused on the push factors, not what might pull the out-of-state teacher to return to their state of origin. This study will focus on the different

features of pension plans that might incentivize a teacher to leave North Carolina in favor of returning to their state of origin.

Teacher attrition tends to affect low-income schools the most because they have much higher rates of new teachers, who are more likely to turnover than their more experienced coworkers. Nevertheless, new teachers make up approximately 25% of the teacher workforce making studies into what causes them to leave critically important to finding solutions to the teacher shortage (Redding & Henry, 2018, Ingersoll & Merrill, 2010, Bastian & Henry, 2015). One of the biggest financial rewards for teachers is their pension program. Although there is some debate about how much a teacher values their pension plan when choosing a position, it does give teachers access to a relatively generous retirement fund (Backs et al., 2016, Podgursky et al., 2018). The pension plans vary from state to state, from what types of pension plans are offered to the vesting period and the transfer options. Teacher benefits have been dropping for newer teachers, who face longer vesting periods and fewer benefits (Podgursky et al., 2018). Pension plans are increasingly underfunded either due to underfunding by the State or overestimating returns from investments (Backs et al., 2016). Funding the plans relies on incoming teachers, half of new teachers will not remain long enough to receive benefits from their pension plans –vesting plans tend to take 1 to 10 years- and even those who remain long enough have most of their pay into their pension program go to older teacher's due to low asset-to-liability ratios (Backs et al., 2016, Podgursky et al., 2018).

Teacher pensions offer a unique ability to predict pension benefits. The researcher has an insight into both the final salary and the years of service that a teacher is likely to complete. While this amount of data is hard to find in other professions, teacher pension benefits can be predicted with a fair amount of accuracy (Ni & Podgursky, 2016). In a study on the effects of

teacher pension changes on teacher turnover, Shawn Ni and Michael Podgursky found that teachers will be less likely to turnover if the pension programs change from a Defined Benefit policy to a Defined Contribution policy. Defined Benefit policies tend to incentivize teachers to drop out after they reach retirement age, the money that they make by continuing to work is worth less than the money they would receive from the pension program (Backes et al., 2016). The defined benefit system means that after retirement age a teacher who continues teaching will be paying more into the retirement system than they would receive if they just received their pension payments. This means that teachers with greater experience are incentivized to retire or lose resources, only a few teachers choose to continue after retirement age. Defined Contribution plans tend to favor a smoother benefit accrual, it also allows teachers to have greater control over their own pension program. Although Ni and Podgursky offer one of the few studies specifically focusing on the effect of pension plans on teacher turnover they focus their study on only one state's pension program and ignore the effects of mobility of the teacher workforce on turnover. As the mobility of the teacher workforce grows, the impacts of various pension benefits, such as the generosity of pensions, the vesting periods, and the access to early retirement, need to be tested as well to judge the impact of specific pension offerings on teacher attrition. With out-of-state teachers having access to greater mobility between states, their response to different pension effects should offer a look into the effectiveness of the incentives that programs have to offer.

Data and Sample

The data set for this study uses out-of-state North Carolina Public School (NCPS) teachers over their first five years of teaching. If the teacher continues teaching at their school,

moves to a different North Carolina school, or leaves North Carolina teaching altogether they are separated into different categories. A total of 30,730 teachers from NCPS are included in this study who are in their first five years of teaching from 2012 to 2016 and are not from North Carolina. About 20% of all NCPS teachers left teaching and only 0.76% of all of these teachers attended school in North Carolina, none have a North Carolina teaching license. Although the study does not include the home-state of each teacher, this study uses the state the teacher received their bachelor's degree is being used as a proxy for the state-of-origin because the state code was reported for 30,499 of these teachers. This assumes that most teachers attend an undergraduate program in their home state. In their first five years of teaching, teachers have been found more likely to leave teaching, so only teachers in their first five years were included.

The pension measurement uses a multiplier, the final salary, and the years of service (YOS) to create a scale for the pension benefits potentially received by each teacher if they returned to their home state. To connect each teacher to their potential benefit, each teacher is matched with their home state, the home state's pension multiplier, and their age is used to calculate the number of years they would work before being eligible for pension benefits, then using these parameters assigning each teacher a potential value for their pension benefits. Along with the generosity measurement for each state, other pension information is included in the regression analysis. This includes the contribution rate of the employee, the length of the vesting period, and the potential for early retirement. Some states had multiple values for the multiplier or the contribution rate, in these cases the highest possible multiplier value and the lowest contribution rate was used. These were used to simulate the best possible benefits that could be awarded to a retiring teacher if they return to their home state. This assumption is based on both

the idea that the individual will attempt to maximize their benefit and to allow the teacher to see the greatest possible impact of pension benefits.

Each teacher is matched with a pension value that would maximize their own personal benefit. For each pension program, there is a steep drop in dollar gain once an individual reaches retirement age, this means that to calculate the maximum benefit awarded to each teacher their earliest possible retirement date must be calculated. Each state has a variety of guidelines that dictate the earliest possible retirement age and years of service, using these guidelines, age brackets were assigned to each teacher to calculate the years of service (YOS) each teacher would serve until they were eligible to retire with full benefits, maximizing their personal benefit from the pension program, see appendix (Table 2). The calculation of YOS by age is then used to calculate the pension benefit each teacher would receive. The calculated benefits then are used in the regression to test if the generosity of the pension plan affects the likelihood that the teacher leaves NCPS.

If teachers are using a long-term, utility maximizing decision-making process they are likely to return to their state-of-origin if that state has a more generous pension. More recent economic theory has suggested that the value of long-term benefits is viewed as discounted, worth less, because of the long-term payoff. If truly rational decision making is playing into the turnover decision-making process, teachers will return to their state-of-origin if their pension generosity is higher and the employee contribution rate is lower than North Carolina's. The vesting period is unlikely to cause a significant effect on the likelihood to turnover due to the fact that young teachers, like most teacher in their first 5 years, will have to work significantly longer than the vesting years to reach retirement age or years of service.

Modeling

This paper uses logistical regression modeling to test the difference between the value of pension benefits and the likelihood to turnover. For this paper, the likelihood that a teacher turns over is treated as equally likely during the first five years, and the pension value is calculated for each teacher each year based on their age at the end of the year. For the purposes of this paper the educator has two options at the end of the year, leave NCPS or continue teaching, the assumed value of leaving teaching in North Carolina is captured by the potential pension values, and the value in staying in the pension they would receive as a North Carolina teacher.

Equation 1 is a reduced form of the equation for the estimation of pension benefit effect.

$$Y_{is} = \beta_0 + \beta_1 B_{is} + \beta_2 V_s + \beta_3 C_s + \beta_4 T_{is} + \beta_5 S_{is} + e_{is}$$

where

Y_{is} is the variable for leaving NCPS teaching, coded 1 for leaving and 0 for staying, for teacher i in state s

B_{is} is the awarded potential pension benefit if the teacher left North Carolina teaching in favor of returning to their home state to teach for teacher i in state s

V_s is the amount of time necessary for teacher i in state s to become vested in the pension program

C_{is} is the required contribution amount from the salary required from teacher i in state s

T_{is} is a vector that represents the individual characteristics for teacher i in state s

S_{is} are the school characteristics for teacher i in state s

e_{is} is the error term specific to teacher i in state s

Teacher Covariates	School Covariates
Only Out-of-State Licensure	Urbanicity
Advanced Teacher Education	School Performance Composite
Years of Teaching Experience	Title One School Indicator
Age	School FRPM Rate
EVAAS Mean Score	School Minority Rate
NCEES Mean Score	Short Term Suspension Rate
Gender	School Violent Acts Rate
Ethnicity	
Race	Per Pupil Expenditure
	School Novice Teacher Rate

The covariates include the individual and school characteristics that influence the likelihood of a teacher turning over. The individual data controls both for differences in educational and personal experiences as well as for the experiences in the classroom, as captured by their Education Value-Added Assessment Score (EVAAS) and North Carolina Educator Effectiveness System(NCEES) scores. The school variables capture common school stressors such as urbanicity of their school, the monetary resources available to the school and the student characteristics for each school.

For teacher covariates, out-of-state licensure only as well as their education ratio both relate to their labor mobility. The out-of-state licensure is a descriptive variable for teachers who may have been educated in North Carolina but received their teacher licensure outside of the state. Teachers with out-of-state licensure have the ability to return to the state that they have licensure and having higher degrees, whether inside or outside the education track, would allow for greater mobility. Teacher EVAAS and NCEES scores are related to teacher effectiveness, these can affect both if teachers feel successful in their job or potentially are fired by their school for low effectiveness (Redding & Henry, 2018, Darling-Hammond, Chung & Frelow, 2002).

Schools characteristics such as the ones listed in the table above are related to the conditions that teachers work in. In schools with low student expenditures and high expulsion rates teachers generally find it harder to work at and try to leave these schools for schools with more support for both students and teachers, or leave the profession all together (Boyd et al., 2005, Donitsa-Schmidt & Zuzovsky, 2016, Lindqvist, Nordänger & Carlsson, 2014).

Findings

The purpose of this study was to determine the effects of pension generosity on the likelihood that a teacher leaves the NCPS system. In reporting the results, the statistical significance ($\alpha < 0.05$) was used to judge the relevant finding in comparison to other variables run while testing (Table 3). The main findings are listed below:

1. The generosity of the potential pension along with the vesting and contribution rates were not found to be statistically significant.

Pension Benefits

The pension variable did not have a statistically significant effect on the turnover likelihood at the $\alpha < 0.05$ but had a P-Value of 0.058 making it very close. This coefficient shows that higher pension benefits in the state-of-origin might actually reduce teacher turnover slightly. This could be because the pension benefit calculations do not take into consideration the cost of living in each district that they return to, meaning some pensions may seem higher in dollar-value but are lower when measured in real terms. This also might be because the pension system is very unclear for both teachers in the system and those who are thinking about moving states. There could also be a greater competition for jobs in states with more generous pensions, making it difficult for teachers to return to their states-of-origin. Finally, there could be a negative relationship simply because pension payouts are not highly valued by teachers when changing

states. The importance that teachers place on pension benefits is hotly contested in education literature, although it is a unique and generous benefit offered to teachers, the long-term payoff is often not at the forefront of teachers' calculations about new jobs (Ni & Podgursky, 2016).

Vesting

The vesting period was not found to have a statistically significant effect ($p=0.273$), which is likely an effect of the age of the teachers. Teachers at the end of their fourth year would be vested in the North Carolina system, but not in most states. For young teachers, the effect of a vesting period would be minimal because it is the number of years that they would work to become eligible for full benefits.

Contribution

Contribution rates have the most impact on day-to-day activities of teachers because they come directly from the teacher's paycheck, even with little concern for the future payout of the pension benefits, the contribution rate was expected to have a negative effect on the likelihood that a teacher turns over.

Conclusion

Policy discussions over teacher turnover have focused on the school and individual characteristics that may lead one to be more likely to turn over but excludes a systematic investigation of interstate push and pull factors for the most part. This paper sought to test the importance of one interstate factor, pension benefits, on interstate movement in an attempt to discern what pension options tend to pull teachers away from 'training ground' states like North Carolina and back towards their home states. This paper discovered that pension generosity, vesting periods and employee contribution rates do not have statistically significant effects. This

has many possible implications for future pension policy discussions. Most significantly, it shows that just increasing the generosity of pensions will not necessarily bring more teachers to states in need, nor keep teachers in North Carolina. The lack of substantial effect of pension options suggests the potential that the pension information available to teachers is lacking in a way that would not allow them to make well-educated choices, which would undermine the basic economic assumptions of utility maximization, explaining why more potential pension benefits would not correlate to more teacher turnover.

It also suggests that there are other driving factors for teachers to leave North Carolina teaching, many of these have been studied and supported such as the resources both in mentorship and monetary resources, there are also personal traits that make one more likely to turn over, such as degrees in subjects other than teacher education or being prepared in programs other than traditional in-state teaching programs. There is also likely to be a personal effect, a desire to return to the home-state where friends and family may be located. Finally, there is the effect of teaching for a couple of years in a state that has a teaching shortage, where finding a job is easier, and returning to the home-state with a few years of experience to apply to job openings. This last effect causes a cyclical issue for both the home-state and the shortage state.

There needs to be a simplification of the pension program for teachers to be able to make informed pension decisions. With a complicated pension system, states also lose the ability to use the pension program to offer more generous plans as a recruitment benefit. The current years of service and age requirements are complicated and often redundant which makes planning for the future almost impossible, as well as often might lead teachers to work past their earliest retirement date, which benefits the pension system and the state's deficit but reduces the benefits to teachers who are still working. Each state should better simplify their Defined Benefit plan or

switch to a Defined Contribution plan, which provides the most clarity because teachers will only receive the amount placed in the pension account by themselves and their employer alone with interest, making the benefit amount clear to both the employer and the employee.

Appendix

Table 1:

	<u>Observations</u>	<u>Mean</u>	<u>Min</u>	<u>Max</u>
Left NC Teaching	30,730	0.2018549	0	1
State of BA	30,499	33.63799	1	56
Generosity of Benefits	30,435	36245.7	2813.22	75001.88
Vesting	30,445	8.062572	3	10
Contribution Rate	30,445	0.0681077	0.01	0.03
Only Out-of-State Licensure	30,730	0.0076147	0	1
Teacher Education	30,730	4.385877	4	7
Years of Teaching Experience	30,730	2.250602	0	5
Age	30,730	31.47322	1	78
EVAAS Mean Score	17,364	-0.044949	-14.80687	16.32
NCEES Mean Score	26,544	3.401842	1	5
Urbanicity	30,730	2.283697	1	4
School Performance Composite	30,485	57.23292	6	100
Title One	30,730	0.4889684	0	1
School FRPM Rate	30,701	56.65837	0	100
School Minority Rate	30,730	55.58452	0	100
Short Term Suspension Rate	30,730	16.25314	0	371
School Violent Acts Rate	30,717	6.68439	0	190
Per Pupil Expenditure	30,730	82.12358	0	422.0884
School Novice Teacher Rate	30,730	0.2639156	0	1
Gender	30,734	0.7946899	0	1
Black	30,734	0.0607145	0	1
Hispanic	30,734	0.0212468	0	1
Asian	30,734	0.009566	0	1
Other Ethnicity/Race	30,734	0.0137633	0	1

Table 2:

<u>State</u>	<u>State Code</u>	<u>Equations</u>
Alabama	AL	YOS=10 if age \geq 52 YOS=10+(52-age) if age < 52
Alaska	AK	--
Arkansas	AR	YOS=5 if age \geq 55 YOS=5+(55-age) if 32 < age < 55 YOS=28 if age \leq 32
American Samoa	AS	--
Arizona	AZ	YOS=1 if age \geq 64 YOS=1+(64-age) if 55 < age \leq 64 YOS=10 if 52 < age \leq 55 YOS=10+(52-age) if 37 < age \leq 52 YOS=25 if 35 < age \leq 37 YOS=25+(35-age) if 30 < age \leq 35 YOS=30 if age \leq 30
California	CA	YOS=5 if age \geq 62 YOS=5+(62-age) if age < 62
Colorado	CO	YOS=35 if age \leq 53 YOS=(88-age) if age > 53
Connecticut	CT	YOS=5 if age \geq 40 YOS=20+(40-age) if 25 < age < 40 YOS=35 if age \leq 25
District of Columbia	DC	YOS=5 if age \geq 57 YOS=5+(57-age) if 40 \leq age < 57 YOS=20+(40-age) if 30 \leq age < 40 YOS=30 if age < 30
Delaware	DE	YOS=10 if age \geq 55 YOS=10+(55-age) if 45 < age \leq 55 YOS=20 if 40 < age \leq 45 YOS=20+(40-age) if 30 < age \leq 40 YOS=30 if age \leq 30
Florida	FL	YOS=8 if age \geq 57 YOS=8+(57-age) if age < 57
Georgia	GA	YOS=10 if age \geq 45 YOS=10+(45-age) if 25 \leq age < 45 YOS=30 if age < 25
Guam	GU	--
Hawaii	HI	YOS=10 if age \geq 55 YOS=10+(55-age) if 35 \leq age < 55 YOS=30 if age < 35
Iowa	IA	YOS=7 if age \geq 58 YOS=7+(58-age) if 40 < age < 58

		$YOS=25+((40-age)/2)$ if age ≤ 40
Idaho	ID	$YOS=5$ if age ≥ 60 $YOS=5+(60-age)$ if $40 < \text{age} < 60$ $YOS=25+((40-age)/2)$ if age ≤ 40
Illinois	IL	$YOS=10$ if age ≥ 57 $YOS=10+(57-age)$ if age < 57
Indiana	IN	$YOS=10$ if age ≥ 55 $YOS=10+(55-age)$ if $30 \leq \text{age} < 55$ $YOS=29+((30-age)/2)$ if age < 30
Kansas	KS	$YOS=5$ if age ≥ 60 $YOS=5+(60-age)$ if $35 \leq \text{age} < 60$ $YOS=30$ if $30 \leq \text{age} < 35$ $YOS=30+(30-age)$ if age < 30
Kentucky	KY	$YOS=5$ if age ≥ 55 $YOS=5+(55-age)$ if $33 \leq \text{age} < 55$ $YOS=27$ if age < 33
Louisiana	LA	$YOS=5$ if age ≥ 55 $YOS=5+(55-age)$ if age < 55
Massachusetts	MA	$YOS=10$ if age ≥ 50 $YOS=10+(50-age)$ if age < 50
Maryland	MD	$YOS=10$ if age ≥ 55 $YOS=10+(55-age)$ if $40 \leq \text{age} < 55$ $YOS=25+((40-age)/2)$ if age < 40
Maine	ME	$YOS=1$ if age ≥ 64 $YOS=1+(64-age)$ if age < 64
Michigan	MI	$YOS=10$ if age ≥ 50 $YOS=10+(50-age)$ if age < 50
Minnesota	MN	$YOS=3$ if age ≥ 63 $YOS=3+(63-age)$ if age < 63
Missouri	MO	$YOS=5$ if age ≥ 55 $YOS=5+(55-age)$ if $40 \leq \text{age} < 55$ $YOS=20+((40-age)/2)$ if $20 \leq \text{age} < 40$ $YOS=30$ if age < 20
Northern Marianas	MP	--
Mississippi	MS	$YOS=8$ if age ≥ 57 $YOS=8+(57-age)$ if $35 \leq \text{age} < 57$ $YOS=30$ if age < 35
Montana	MT	$YOS=5$ if age ≥ 55 $YOS=5+(55-age)$ if $35 \leq \text{age} < 55$ $YOS=25$ if age < 35
North Carolina	NC	$YOS=10$ if age ≥ 55 $YOS=10+(55-age)$ if $40 < \text{age} \leq 55$ $YOS=25$ if $35 < \text{age} \leq 40$ $YOS=25+(35-age)$ if $30 < \text{age} \leq 35$ $YOS=30$ if age ≤ 30

North Dakota	ND	$YOS=5$ if age ≥ 60 $YOS=5+(60-age)$ if $40 < age \leq 60$ $YOS=25+((40-age)/2)$ if $30 < age \leq 40$ $YOS=30+(30-age)$ if age ≤ 30
Nebraska	NE	$YOS=1$ if age ≥ 64 $YOS=1+(64-age)$ if $45 < age \leq 64$ $YOS=20+((45-age)/2)$ if $25 < age \leq 45$ $YOS=30+(25-age)$ if age ≤ 25
New Hampshire	NH	$YOS=1$ if age ≥ 64 $YOS=1+(64-age)$ if age < 64
New Jersey	NJ	$YOS=10$ if age ≥ 55 $YOS=10+(55-age)$ if age < 55
New Mexico	NM	$YOS=5$ if age ≥ 62 $YOS=5+(62-age)$ if $55 < age \leq 62$ $YOS=12+((55-age)/2)$ if $37 < age \leq 55$ $YOS=30$ if $25 < age \leq 37$ $YOS=30+(25-age)$ if age ≤ 25
Nevada	NV	$YOS=5$ if age ≥ 60 $YOS=5+(60-age)$ if $55 < age \leq 60$ $YOS=10$ if $52 < age \leq 55$ $YOS=10+(52-age)$ if $32 < age \leq 52$ $YOS=30$ if age ≤ 32
New York	NY	$YOS=10$ if age ≥ 55 $YOS=10+(55-age)$ if $40 < age \leq 55$ $YOS=25$ if $35 < age \leq 40$ $YOS=25+(35-age)$ if $30 < age \leq 35$ $YOS=30$ if age ≤ 30
Ohio	OH	$YOS=5$ if age ≥ 60 $YOS=5+(60-age)$ if $30 < age \leq 60$ $YOS=35$ if $25 < age \leq 30$ $YOS=35+(25-age)$ if age ≤ 25
Oklahoma	OK	$YOS=5$ if age ≥ 60 $YOS=5+(60-age)$ if age < 60
Oregon	OR	$YOS=5$ if age ≥ 60 $YOS=5+(60-age)$ if $35 < age \leq 60$ $YOS=35$ if $28 < age \leq 35$ $YOS=35+(25-age)$ if age ≤ 28
Pennsylvania	PA	$YOS=3$ if age ≥ 62 $YOS=3+(62-age)$ if $30 \leq age < 62$ $YOS=35+((30-age)/2)$ if age < 30
Puerto Rico	PR	--
Rhode Island	RI	$YOS=5$ if age ≥ 57 $YOS=5+(57-age)$ if age < 57
South Carolina	SC	$YOS=8$ if age ≥ 57 $YOS=8+(57-age)$ if $40 \leq age < 57$ $YOS=25+((40-age)/2)$ if age < 40

South Dakota	SD	<p>YOS=3 if age \geq 62 YOS=3+(62-age) if $40 < \text{age} \leq 62$ YOS=25+((40-age)/2) if $25 < \text{age} \leq 40$ YOS=35+(25-age) if age ≤ 25</p>
Tennessee	TN	<p>YOS=5 if age \geq 55 YOS=5+(55-age) if $30 \leq \text{age} < 55$ YOS=30 if age < 30</p>
Texas	TX	<p>YOS=5 if age \geq 60 YOS=5+(60-age) if $50 < \text{age} \leq 60$ YOS=15+((40-age)/2) if $40 < \text{age} \leq 50$ YOS=20+(40-age) if age ≤ 40</p>
Utah	UT	<p>YOS=4 if age \geq 61 YOS=4+(61-age) if $30 \leq \text{age} < 61$ YOS=35 if age < 30</p>
Virginia	VA	<p>YOS=5 if age \geq 57 YOS=5+(57-age) if $34 \leq \text{age} < 57$ YOS=28+((34-age)/2) if age < 34</p>
Virgin Islands	VI	--
Vermont	VT	<p>YOS=5 if age \geq 60 YOS=5+(60-age) if $40 \leq \text{age} < 60$ YOS=25+((40-age)/2) if age < 40</p>
Washington	WA	<p>YOS=5 if age \geq 60 YOS=10 if $55 < \text{age} \leq 60$ YOS=11+(55-age) if $44 < \text{age} \leq 55$ YOS=10+(44-age) if age ≤ 44</p>
Wisconsin	WI	<p>YOS=5 if age \geq 60 YOS=5+(60-age) if $35 < \text{age} \leq 60$ YOS=30 if $27 < \text{age} \leq 35$ YOS=30+(57-age) if age ≤ 27</p>
West Virginia	WV	<p>YOS=5 if age \geq 55 YOS=5+(55-age) if $30 < \text{age} \leq 55$ YOS=30 if $25 < \text{age} \leq 30$ YOS=30+(25-age) if $20 < \text{age} \leq 25$ YOS=35 if age ≤ 20</p>
Wyoming	WY	<p>YOS=4 if age \geq 61 YOS=4+(61-age) if $45 \leq \text{age} < 61$ YOS=20+((45-age)/2) if age < 45</p>

Table 3:

	<u>Odds Ratio</u>	<u>P-Value</u>
Generosity of Benefits	0.9999953	0.058
Vesting	0.987441	0.299
Contribution Rate	3.084215	0.136

Only Out-of-State Licensure	0.1851565	0.000
Teacher Education Ratio	1.004595	0.923
Years of Teaching Experience	1.045473	0.003
Age	0.9784618	0.000
EVAAS Mean Score	0.9771979	0.013
NCEES Mean Score	0.7765498	0.000
Urbanicity	1.070399	0.000
School Performance Composite	0.9953837	0.014
Title One	1.144056	0.033
School FRPM Rate	0.9970282	0.077
School Minority Rate	1.003689	0.015
Short Term Suspension Rate	1.001428	0.288
School Violent Acts Rate	1.000349	0.918
Per Pupil Expenditure	0.993241	0.657
School Novice Teacher Rate	1.660527	0.016
Gender	1.081452	0.175
Black	0.8779327	0.197
Hispanic	1.127893	0.486
Asian	1.294369	0.297
Other Ethnicity/Race	1.322661	0.436

n=16,075

Bibliography

Backes, B., Goldhaber, D., Grout, C., Koedel, C., Ni, S., Podgursky, M., Xiang, P. B., & Xu, Z. (2016). Benefit or Burden? On the Intergenerational Inequity of teacher Pension Plans.

Educational Researcher, 45:6, 367-377.

Bastian, K. C., & Henry, G. T., (2015) Teachers Without Borders: Consequences of Teacher Labor Force Mobility. *Education Evaluation and Policy Analysis*, 37:2, 163-183.

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

Costrell, R. M., Podgursky, M., & Weller, C. E. (2011). Fixing Teacher Pensions: Is it Enough to Adjust Existing Plans? *Education Next*, 61-69.

Darling-Hammond, Linda, Chung, Ruth, & Frelow, Fred. (2002) Variation in Teacher Preparation: How Well Do Different Pathways Prepare Teachers to Teach? *Journal of Teacher Education*, 53(4), 286-302.

Doherty, K. M., Jacobs, S., & Lieken, M. F. (2015). Doing the Math on Teacher Pensions: How to Protect Teachers and Taxpayers. *National Council on Teacher Quality*, i-21.

Donitsa-Schmidt, S., & Zuzovsky, R. (2016). Quantitative and Qualitative Teacher Shortage the Turnover Phenomenon. *International Journal of Educational Research*, 77, 83-91.

Hanushek, E. A., Rivkin, S. G., & Schiman, J. C. (2016). Dynamic Effects of Teacher Turnover on the Quality of Instruction. *Economics of Education Review*, 55, 132-148.

Harris, D. N., & Adams, S. J. (2007). Understanding the Level and Causes of Teacher Turnover: A Comparison with Other Professions. *Economics of Education Review*, 26, 325-337.

Henry, G. T., Bastian, K. C., & Fortner, C. K. (2011). Stayers and Leavers: Early-Career Teacher Effectiveness and Attrition. *Educational Researcher*, 40:6, 271-280.

Henry, G. T., & Redding, C. (2018). The Consequences of Leaving School Early: The Effects of Within-Year and End-of-Year Teacher Turnover. *Education, Finance and Policy*.

Lindqvist, P., Nordänger, U. K., & Carlsson, R. (2014). Teacher Attrition the First Five Years – A Multifaceted Image. *Teaching and Teacher Education*, 40, 94-103.

Ni, S., & Podgursky, M. (2016). How Do Teachers Respond to Pension System Incentives: New Estimates and Policy Applications. *Journal of Labor Economics*, 34:4, 1075-1103.

Podgursky, M., Pendergrass, S. A., & Hesla, K. (2018). Pension Under Pressure: Charter Innovation in Teacher Retirement Benefits. *Education Next*, 9-15.

Redding, C., & Henry, G. T. (2018) Leaving School Early: An Examination of Novice Teachers' Within- and End-of-Year Turnover. *American Educational Research Journal*, 1-33.