



The Impact of Oregon's Pension Legacy Costs on New Teacher Turnover and Quality

Kevin E. Cahill, ECONorthwest, Center for Aging & Work
Andrew Dyke, ECONorthwest
John Tapogna, ECONorthwest

Summary

Pension legacy costs can restrict the amount of resources available for current public education, potentially making it more difficult to attract and retain high-quality teachers. Oregon provides a useful case study in pension legacy costs because many school districts in the state are now reallocating General Fund expenditures to cover sizeable past pension promises. In this *Issue Brief*, we describe how Oregon's past pension promises, compared with nearby Washington's, are affecting the level of resources available to compensate new teachers. We then assess potential impacts by examining how new teacher turnover differs in districts along the Oregon–Washington border and within Oregon across school districts. We find early career quit rates in school districts on the Oregon side of the Oregon–Washington border have exceeded those on the Washington side in recent years, and overall teacher experience on the Oregon side has fallen below that on the Washington side. Further, using district-level variation within Oregon, we find early career quit propensities are positively associated with the percentage of General Fund revenues allocated to Oregon's Public Employees Retirement System expenditures. These findings are consistent with the notion that Oregon's pension legacy costs are negatively impacting teacher retention.

Suggested citation:

Cahill, K., Dyke, A., and Tapogna, J. (2016). The Impact of Oregon's Pension Legacy Costs on New Teacher Turnover and Quality. CEDR Policy Brief 2016-5. University of Washington, Seattle, WA.

Acknowledgment/Disclaimer: The Laura and John Arnold Foundation supported this research through a grant to American Institutes for Research (AIR) and ECONorthwest. All views expressed in this paper are those of the authors and do not necessarily reflect the views or policies of ECONorthwest, AIR, or the Laura and John Arnold Foundation. We are grateful to Cyrus Grout and Kris Holden for very helpful comments and suggestions.

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I. Introduction

Throughout the second half of the 20th century, public-sector teacher salaries in the United States were generally supplemented with defined-benefit public-sector pension coverage. This deferred compensation enabled districts to offer additional financial incentives to attract and retain a quality workforce (Gustman, Mitchell, & Steinmeier, 1994; Rajnes, 2001; Zeehandelaar & Winkler, 2013). While school districts presumably benefited by offering teachers higher levels of overall compensation, states accrued substantial pension liabilities over time (Munnell, Aubry, & Carafelli, 2015; Novy-Marx & Rauh, 2011; The Pew Center on the States, 2010). A recent study by The Pew Charitable Trusts reported that, nationwide, retirement systems were just 72% funded (The Pew Charitable Trusts, 2015). These unfunded pension liabilities now present a challenge for K12 education as pension legacy costs—school district payments required to cover the pension benefits of teachers who have already retired—can restrict the amount of resources available for public education and make it more difficult to attract and retain high quality teachers. In particular, current teacher salaries might be reduced to cover higher pension contributions rates.

In this *Issue Brief*, we explore whether pension legacy costs are associated with the level of turnover among newly hired teachers in the state of Oregon. Oregon provides a useful case study in pension legacy costs because its pension legacy costs are large and because the burden varies across districts within the state (Brewer, 2004; Tapogna & Batten, 2007). In many Oregon school districts, the proportion of General Fund resources dedicated to paying for past pension promises has been increasing during the past decade. We hypothesize that the growing level of resources dedicated to pension expenditures has made it more difficult for Oregon school districts to attract and retain high quality teachers.

To explore this hypothesis, we first examine early career quit rates among teachers in school districts along the Oregon–Washington border—teacher populations that face similar economic circumstances and different unfunded actuarial liabilities (UALs) associated with each state’s pension system (the legacy costs in Washington are relatively small).¹ If pension legacy costs do impact teacher attrition, then we would expect to see differences in teacher attrition between border districts. Variation within the state of Oregon also provides an opportunity for analysis. Oregon school districts differ with respect to their pension legacy costs due in part to their issuance of pension obligation bonds. As a result, the percentage of the General Fund allocated to Oregon’s Public Employees Retirement System (PERS) varies substantially across school districts. If pension legacy costs impact teacher attrition, then we would expect the amount of resources allocated to PERS to be positively related to teacher attrition, all else equal.

Using teacher-level data from the Oregon Department of Education and data from the National Center for Education Statistics, we find that early career quit rates in school districts on the Oregon side of the Oregon–Washington border have exceeded those on the Washington side in recent years, corresponding to increases in Oregon’s UAL relative to Washington’s UAL. Average teacher experience on the Oregon side has also fallen below that on the Washington side. Further, using district-level variation within Oregon, we find that early career quit propensities are positively associated with the percentage of General Fund revenues allocated to PERS.

This *Issue Brief* is structured as follows. The next section describes Oregon’s and Washington’s pension systems, and it compares teacher attrition and experience within districts

¹ There are, of course, other differences between Oregon’s and Washington’s teacher labor markets that may also influence turnover (e.g., salaries and licensure rules) that we do not control for in the descriptive analysis presented below. See Goldhaber, Grout, Holden, and Brown (2015) for a detailed description of the Oregon and Washington teacher labor markets, including licensure procedures, tenure and seniority, and salaries.

along the Oregon–Washington border. Section III describes district-level variation in Oregon with respect to PERS expenditures and explains the process through which districts issued pension obligation bonds to cover their PERS costs. Section IV examines the relationship between district-level PERS expenditures and early-career quit rates. Section V translates the teacher turnover impacts into overall teacher quality impacts using information about gains in effectiveness during teachers’ early years.

II. Public pension legacy costs and teacher attrition in Oregon and Washington

Currently, it is standard practice in the United States to pre-fund promised pension benefits. Under pre-funding, when an employees accrue retirement benefits worth $\$X$ during the current year of employment, their employer(s) set aside the funds necessary to cover that accrued liability.² Full funding is achieved when the present value of a pension plan’s accrued liabilities is equal to the present value of the pension plan’s assets. UALs may result when employers fail to fully fund the liabilities they are accruing, or when actuarial assumptions turn out to be overly optimistic. UALs can be thought of as legacy costs in that they are associated with previous cohorts of employees, many of whom may no longer be actively employed members of their pension plan (i.e., they are no longer making contributions).

Both Oregon and Washington face substantial costs associated with the accrual of unfunded pension liabilities, and as discussed below, Oregon’s liabilities have become relatively large during the last decade. In Oregon, the accrual of unfunded liabilities has largely been driven by features of its Tier One pension plan (which closed to new enrollment in 1996) that resulted in employees retiring in the years before 2003 receiving disproportionately large

² For a review of pension funding practices, see Boyd and Yin (2016).

retirement benefits.³ In Washington, a major source of unfunded liabilities in its Teacher Retirement System (TRS) is TRS1, which closed to new enrollment in 1977 and has few active members remaining in the workforce.⁴ Although relatively well funded ahead of the 2008 financial crisis, Washington's two newer plans, TRS2 and TRS3, also currently carry significant unfunded liabilities.

To compare the extent to which Oregon and Washington face burdens imposed by pension legacy costs, we focus on the size of each state's UAL during 2001–2014. In Oregon, we look at the school district UALs associated with its Tier One and Tier Two pension plans, as reported in the annual Actuarial Valuation Reports (AVRs).⁵ In Washington, we look at the UALs associated with its TRS1, TRS2, and TRS3 pension plans as reported in the state's AVRs. To account for the size difference between Oregon and Washington, the UAL figures are presented in Figure 1 in per-student terms. In most years, the per-student liabilities in Oregon are significantly larger than in Washington, particularly following the 2008 financial crisis.

As noted above, we hypothesize that Oregon might experience higher turnover than Washington due to its larger legacy costs. We find that Oregon and Washington border districts do not differ systematically with respect to two-year quit rates between academic years 2000-01 and 2006-07 (Figure 2a). In contrast, two year quit rates are higher among teachers in Oregon border districts relative to those in Washington from academic years 2007–08 through 2011–12, with the percentage in Oregon being nearly double that of Washington for all but one year (2009–10). We find a similar result for five-year quit rates as well (Figure 2b). So, while quit

³ Among employees retiring with at least 30 years of service during 1999–2003, the average salary replacement rate ranged between 93% (Oregon Public Employees Retirement System, 2015). Over 14% of all retirees during that time period obtained replacement rates in excess of 100%.

⁴ As of 2010, fewer than 7% of teachers in Washington were members of TRS1 (Goldhaber et al., 2012).

⁵ The state's AVRs report Tier One and Tier Two liabilities separately for school districts. Liabilities associated with Oregon's newer pension system (established in 2003), the Oregon Public Service Retirement Plan are not reported separately for school districts in the AVRs, and are relatively small.

rates between Oregon and Washington are mixed earlier in the observation period, as pension legacy costs have grown so has the discrepancy in quit rates along the Oregon–Washington border. A comparison of average teacher experience among all teachers in districts along the Oregon–Washington border reveals a similar result. Notably, average teacher experience in academic year 2013–14 is a full one year lower in Oregon districts relative to Washington districts (12.7 years in Oregon compared with 13.7 years in Washington) (Figure 3).⁶

III. District-level variation in pension expenditures within Oregon

The pension costs associated with Tier One beneficiaries are paid from each district’s General Fund. General Fund revenues come from state and local property taxes and are disaggregated into seven expenditure categories: salaries, associated payroll costs, purchased services, supplies and materials, capital outlays, and other costs (Oregon Department of Education, 2015). The second category includes PERS costs,⁷ Social Security, contractual employee benefits, and other payroll costs.⁸ For the purposes of our analysis, we use district-level variation in the financial burden of the PERS program as a fraction of General Fund expenditures as a proxy for variation in the burden imposed by pension legacy costs.

Between 2002 and 2008, several school districts in Oregon facing the financial strains of their pension obligations covered their current and anticipated future shortfalls by issuing pension obligation bonds (Larrabee & Preppernau, 2015; Sickinger, 2012; Tapogna & Batten,

⁶ As noted above, other differences between Oregon and Washington may also influence teacher turnover and we emphasize that these results should be interpreted with that in mind.

⁷ Line item 210 of the Oregon Department of Education’s Actual Expenditures by Fund and Object is allocated specifically to PERS expenditures.

⁸ Salaries include licensed salaries and classified salaries for teachers, as well as salaries for administrators, managerial positions, substitutes, temporary workers, and others. The third category of the General Fund is purchased services. Purchased services include property services, instructional, professional, and technical services, student transportation services, travel, communication and other services. The fourth category is supplies and materials: consumable and non-consumable supplies and materials, textbooks, library books, periodicals, and computer software and hardware. The last three categories of the General Fund are capital outlays, other objects, and transfers (Oregon Department of Education, 2015).

2007). Districts that issued the bonds used the proceeds to pay off their pension obligations in advance. So long as the rate of return on their prepaid pension assets exceeded the interest rate at which the bonds were issued, the district gained an advantage by issuing these bonds. Indeed, districts such as Portland Public Schools that issued bonds in the mid-2000s benefited substantially. Those that issued bonds in 2008 just prior to the market downturn, such as David Douglas, in contrast, did not fare well, as they faced a negative rate of return on their pension assets against positive interest payments on the issued bonds.⁹ The takeaway from Oregon school districts' experience with pension obligation bonds is that some districts gained a short-term advantage by leveraging the market, while others lost. The difference between the market return on assets and the interest paid on the pension obligation bonds represents in many ways the premium that comes with assuming the market risk of these assets—a cost to the district.

The percentage of General Fund revenues allocated to the PERS program takes into account any costs associated with the issuance of pension obligation bonds and varies by school district and over time. In the 2000–01 academic year, for example, the 25th percentile for the portion of districts' General Fund expenditures allocated to PERS was approximately 7% and the 75th percentile was just under 10%; the median was just above 8% (Figure 4). In the 2013–14 academic year, the 25th and 75th percentiles were approximately 9% and 13%, respectively, with a median value of nearly 11%. While district PERS expenditures vary somewhat year to year, a general trend upward exists over the time period 2000–01 to 2013–14.

⁹ Other factors besides the timing of issuance could have contributed to a school districts' ability to leverage pension obligation bonds as well, and these features might influence new teacher turnover. Districts' ability to limit legacy costs in this way could also play a role in teacher turnover decisions.

IV. General fund pension expenditures and K12 early career quit rates

We use district-level variation in PERS expenditures as a percentage of General Fund revenues to examine the relationship between pension costs and early-career quit rates. Nearly two thirds (63%) of Oregon’s current PERS liabilities are for members who are retired and another 17% are for active Tier One members (Oregon Public Employees Retirement System, 2015). Changes in General Fund expenditures on PERS from 2000–01 to 2013–14 by and large represent pension costs associated with Oregon’s Tier One plan; therefore, we assume that observed changes in PERS expenditures can reasonably be attributed to pension legacy costs.

If legacy costs are causing higher levels of turnover, we may expect to see districts with higher fractions of PERS expenditures to have higher turnover. At first glance, a systematic relationship does not appear to exist between early-career quit rates and the percentage of district General Fund expenditures allocated to PERS (Figures 6a and 6b).¹⁰ Two-year quit rates for new teachers who started working in districts with more than 10% of General Fund revenues allocated to PERS were higher in some years relative to their counterparts in other districts but lower in other years. The same is true when examining five-year quit rates. To account for the possibility that confounding factors are clouding any relationship between, we adopt a multivariate approach.

We use teacher-level data from the Oregon Department of Education (ODE), the National Center for Education Statistics’ (NCES) Common Core of Data (CCD), and the NCES National Public Education Financial Survey Data obtained from the ODE School Finance Department. The ODE data contains information on 57,763 unique teachers from the 2000-01 academic year through the 2013–14 academic year. For each teacher we observe work status and full-time

¹⁰ The correlation coefficient between district-level two-year (five-year) quit rates and the percentage of district General Fund expenditures allocated to PERS varies year to year, ranging between -.11 and .10 (-.24 and .00).

equivalent status in each academic year, as well as age, gender, ethnicity, base salary, and years of service both within Oregon and outside of Oregon. The CCD and SCF datasets provide controls for our analysis, including school size, school level, and school ethnic composition, as well as district size, district ethnic composition, and whether a district covers an employee’s pension contribution.

The framework of our empirical model is based on Goldhaber, Grout, and Holden (2015), as follows:

$$q_{ijd} = \beta'_1 \text{benefitshare}_d + \beta'_2 T_i + \beta'_3 S_j + \beta'_4 D_j + \sum_{t=2000-1}^{2013-4} (\sigma_t 1(\text{FY} = t)) + \varepsilon_{ijd}$$

where:

$q_{ijd} = 1$ if new teacher i in school j and district d quits within x years of starting
 benefitshare = share of district d ’s General Fund revenues allocated to the PERS system at
 time the time teacher i is hired

T_i = characteristics of teacher i measured at the time teacher i is hired

S_j = school-level characteristics measured at the time teacher i is hired

D_j = district-level characteristics measured at the time teacher i is hired

$\sum_{t=1}^T (1(\text{FY} = t))$ = series of dummy variables denoting the teacher’s hire year

We estimate separate models to examine early-career quit rates over different time periods, ranging from one to five years. Each new teacher in Oregon who started between academic years 2000–01 and 2013–14 contributes one observation, although the number of years used in each model depends on the time period over which quits are observed. For example, the analysis of quits within two years includes new teachers who started between 2000–01 and 2011–12 only in order to allow two years of follow-up data for the most recent cohort. Each model is estimated using logistic regression with standard errors clustered at the school district level.

The key right-hand side variable is the new teacher’s district’s share of general revenues allocated to the PERS system, based on line item 210 (“Public Employees Retirement System”) from the ODE’s financing/funding reports as a share of the General Fund. This variable is

entered directly into the model as a continuous variable (“Specification 1”) and, to allow for potential nonlinearities, is entered as a categorical variable using dichotomous indicators (<7.5%, 7.5% to 10.0%, and >10.0%) (“Specification 2”).

We find that the PERS share of the General Fund is positively associated with two-year quit rates when entered as a continuous variable ($p = 0.033$) and marginally significant when entered as a categorical variable ($p = 0.099$ for a district’s percentage being <7.5% and $p = 0.222$ for a district’s percentage being > 10.0%) (Table 2).¹¹ The coefficient of the PERS share of the General Fund has the expected sign and magnitude when examining five-year quit rates, but it is not statistically significant. This latter result is not too surprising, as the PERS share of the General Fund is measured as of the time of hire and the time period over which this model is estimated extends through 2008–09 only in order to allow five years of follow-up. The PERS share of the General Fund is a statistically significant predictor of one-year quit rates and marginally significant for three-year quit rates (see Appendix Tables A.1 and A.2).

This multivariate analysis of early career quit rates suggests that, once confounding factors are taken into account, the share of PERS expenditures does exhibit a positive relationship with one- and two-year quit rates. The relationship between early-career quit rates and the PERS percentage becomes less clear with a broader time horizon, such as four and five years. One potentially fruitful area for future research is to explore these longer time horizons using alternative models and alternative measures of pension legacy costs that might quantify UALs at the district level.

¹¹ The level of statistical significance is more pronounced in the one-year quit rate model. See Appendix Table A.1.

V. Translating teacher turnover impacts into overall teacher quality impacts

The derived odds ratios from the multivariate analysis suggest that the odds of quitting within one year are 4.3% higher for a district that has an extra percentage point applied to PERS, all else equal, and that the odds of quitting within two years is 2.7% higher. As noted above, the median district PERS expenditures as a share of the General Fund increased from approximately 8% in 2000–01 to 11% in 2013–14 (see Figure 4). Given that the one-year quit rate in Oregon was 16.9% in the 2012–13 academic year (see Figure 5), the increase in PERS expenditures from 8% to 11% corresponds to a 1.8 percentage point increase in the probability of quitting within one year. The two-year quit rate in the 2011–12 academic year was 27.8% (again, see Figure 5), so the increase in the PERS percentage corresponds to a 1.6 percentage point increase in the probability of quitting within two years. In terms of the number of teachers for each new cohort, the increase in the share of district PERS expenditures as a share of the General Funds is projected to result in approximately 25 additional teachers quitting within two years.

The loss of teachers within the first two years may have detrimental effects on Oregon’s students. Teacher effectiveness has been shown to increase substantially within the first two years and then increase gradually or plateau thereafter. For example, student math scores are on average approximately 5% of a standard deviation higher with a teacher who has two years of experience compared with a new teacher, and reading and English language arts scores are approximately 10% of a standard deviation higher (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2006; Center for Education Policy Research, 2011). Oregon’s students who are taught by new teachers instead of those with two or more years of experience due to the increase in early career quit rates can be expected to have lower math and reading scores. With a median class size in Oregon of 25 students (Oregon Department of Education, 2016) and assuming

districts replace the 25 teachers who separate, one can expect lower math and reading scores for approximately 625 students each year. The increases in early career quit rates alone translate into a substantial impact on Oregon's students, not to mention any other costs to Oregon's school districts that might be attributed to higher teacher turnover. Moreover, Oregon's PERS costs are expected to increase substantially within the next few years, implying the magnitude of these impacts could increase in the years ahead (Sickinger, 2015).

V. Conclusion

Pension reforms in Oregon over the past two decades have limited the extent to which the State's unfunded pension liabilities continue to grow; however, the pension legacy costs from benefit promises made in past decades remain, and Oregon is faced with the challenge of paying for these past benefit promises while funding current K12 education. In this *Issue Brief*, we examine the impact of pension legacy costs on teacher turnover and find that teachers in districts along the Oregon–Washington border differ in ways that are consistent with cross-state differences in pension legacy costs. Further, using district-level variation within Oregon, we find that a higher share of General Fund revenues allocated to PERS is associated with higher early career quit rates. These results suggest that the pension legacy costs associated with pension promises made decades ago may be having a negative impact on today's teachers and students in Oregon.

The challenge facing Oregon's policymakers is whether it makes sense for Oregon's current teachers to fund the Tier One pension promises made decades earlier or, alternatively, whether some combination of pension reductions or alternative funding should be used to make up for the shortfall. A key attribute of Oregon's pension challenge is that the source of financial strain is not the result of an ongoing chronic underfunding of its pension liabilities but rather the

creation of a generous plan with benefits that became very pronounced in the midst of the market volatility of the past two decades. Oregon's pension shortfalls, therefore, are on track to be phased out over time as the share of retirees who began working under PERS prior to January 1, 1996 dwindles. Policymakers might want to consider alternative ways to fund this medium-term shortfall to avoid negatively impacting its current K12 workforce.

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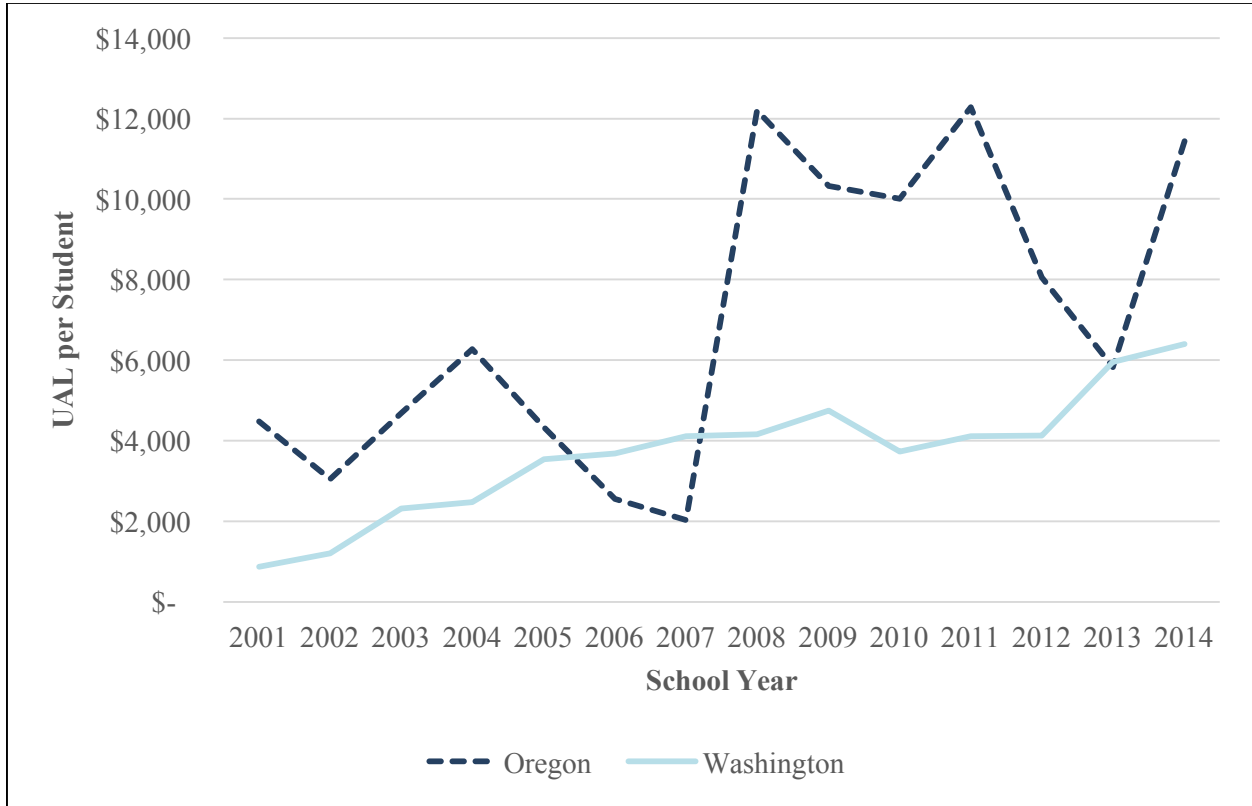
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Figure 1. Unfunded actuarial liability (UAL), Oregon PERS and Washington TRS plans

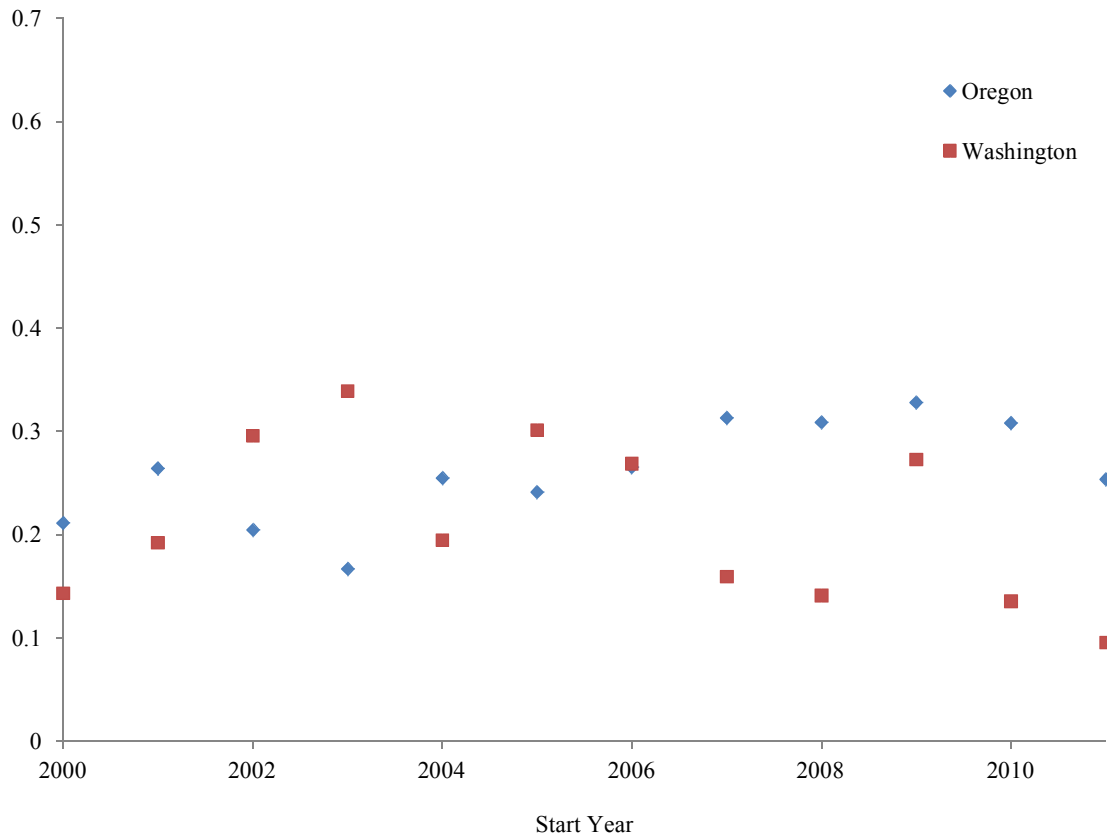


Note. The large downward shift in 2012 and 2013 is primarily the result of pension reforms adopted by Oregon’s legislature that were later overturned by Oregon’s Supreme Court, which declared it to be unconstitutional to retroactively reduce cost-of-living adjustments to PERS beneficiaries (Balmer, 2015).¹² The school year refers to the year in which each school year ends.

Sources: Oregon PERS Actuarial Valuation Reports, Washington State Actuarial Valuations.

¹² Oregon Senate Bills 822 and 861 were signed into law in 2013. See Balmer (2015) for details.

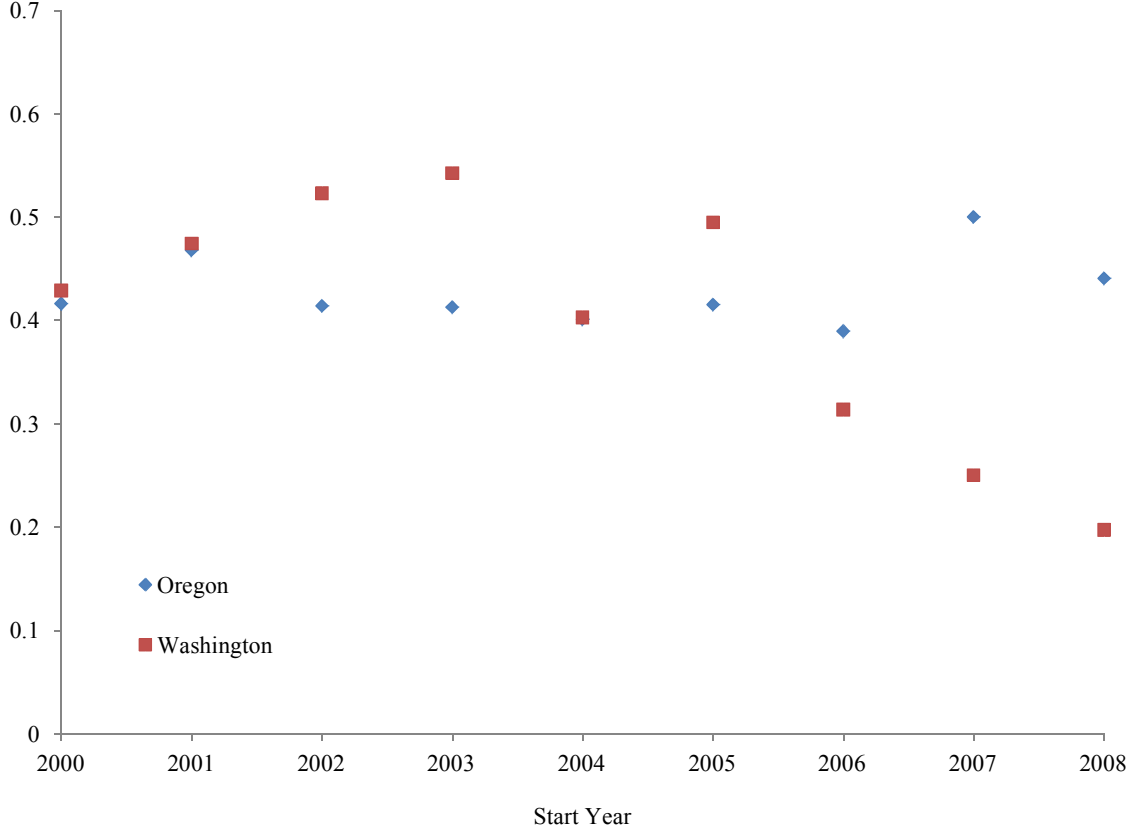
Figure 2a: Early-career quit rates (within 2 years) among Oregon and Washington teachers in border districts, academic years 2000-1 to 2011-12



Notes:

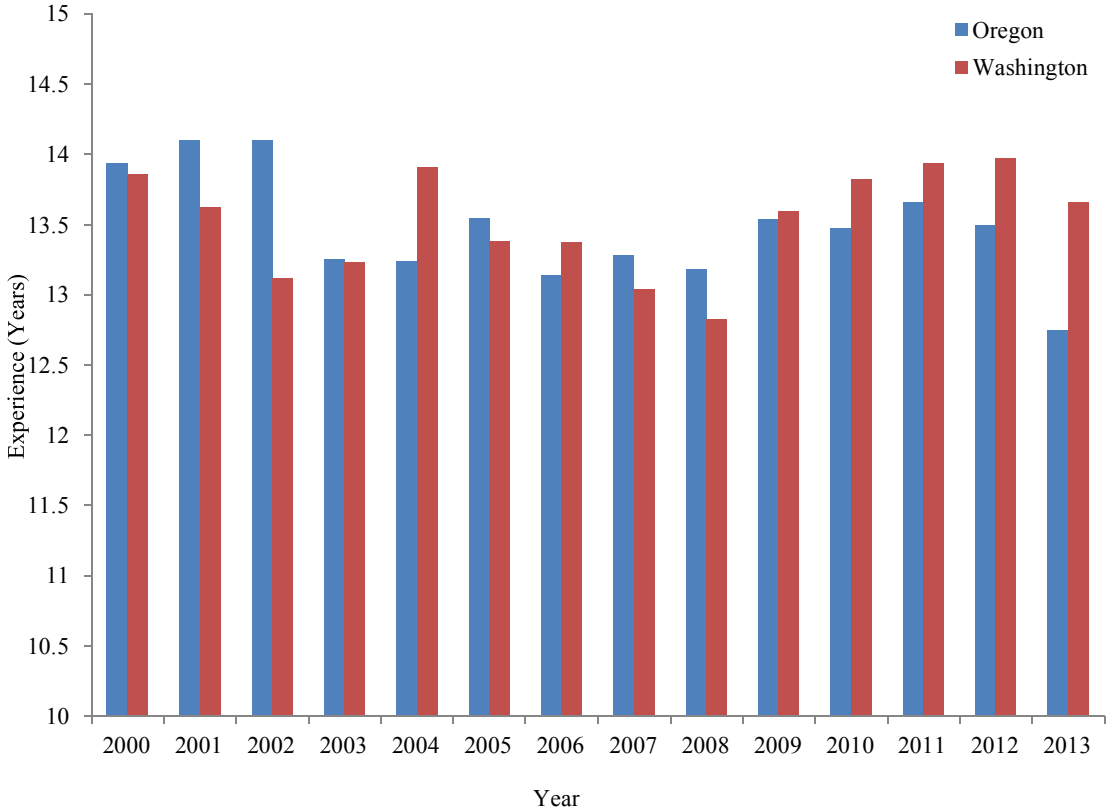
The early-career quit rates shown are for teachers who worked in districts along the Oregon-Washington border, who began working between academic years 2000-1 and 2011-12, and who were working in an instructional position for at least 0.5 FTE. Data is available through academic year 2011-12 only because two years of follow-up data is necessary to assess whether a quit took place in the 2-year period from 2012-13 through 2013-14.

Figure 2b: Early-career quit rates (within 5 years) among Oregon and Washington teachers in border districts, academic years 2000-1 to 2008-9



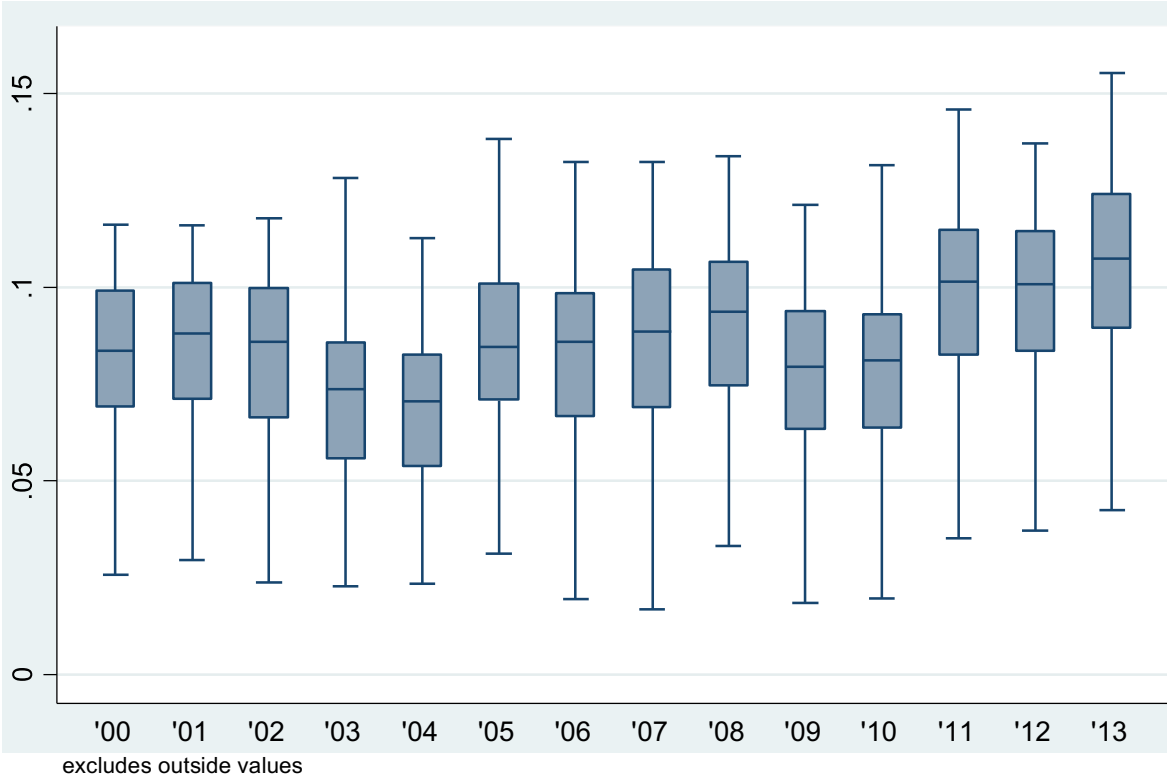
Notes:
The early-career quit rates shown are for teachers who worked in districts along the Oregon-Washington border, who began working between academic years 2000-1 and 2009-10, and who were working in an instructional position for at least 0.5 FTE. Data is available through academic year 2008-09 only because five years of follow-up data is necessary to assess whether a quit took place in the 5-year period from 2009-10 through 2013-14.

Figure 3: Average experience among Oregon and Washington teachers in border districts, academic years 2000-1 to 2013-4



Notes:
Average teacher experience is based on teachers who worked in districts along the Oregon-Washington border and who were working in an instructional position for at least 0.5 FTE.

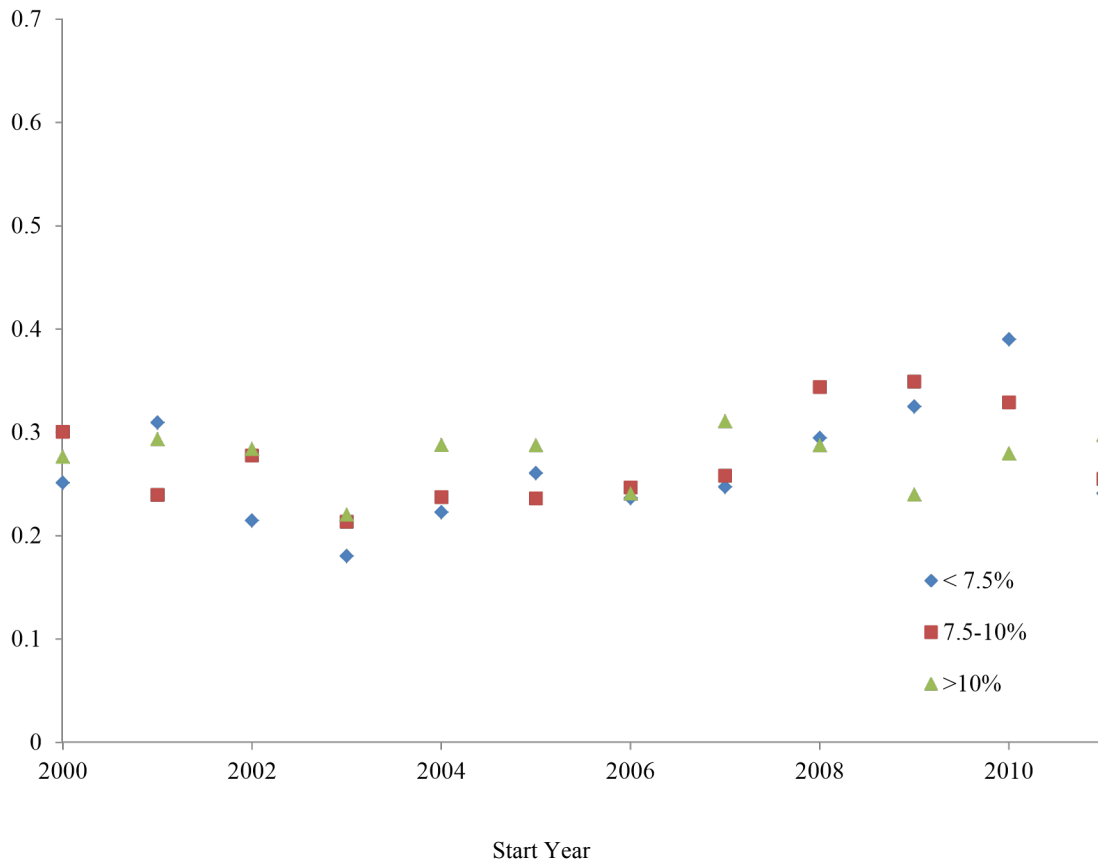
Figure 4: Annual distribution of district PERS expenditures as a share of General Fund revenues, academic years 2000-1 to 2013-14



Notes:
 Observations are at the school district level and are not weighted for district size. Four district-year observations were set equal to the prior year's value because values were deemed to be erroneous. The four district-years were as follows: District 2051-Ashwood, 2002-3; District 2086-Creswell, 2007-8; District 2104Santiam Canyon, 2003-4; and District 2142-Salem-Keizer, 2007-8.

Source: Authors' calculations based on Oregon Department of Education data.

Figure 5a: Early-career quit rates (within 2 years) by district PERS expenditures category, academic years 2000-1 to 2011-12

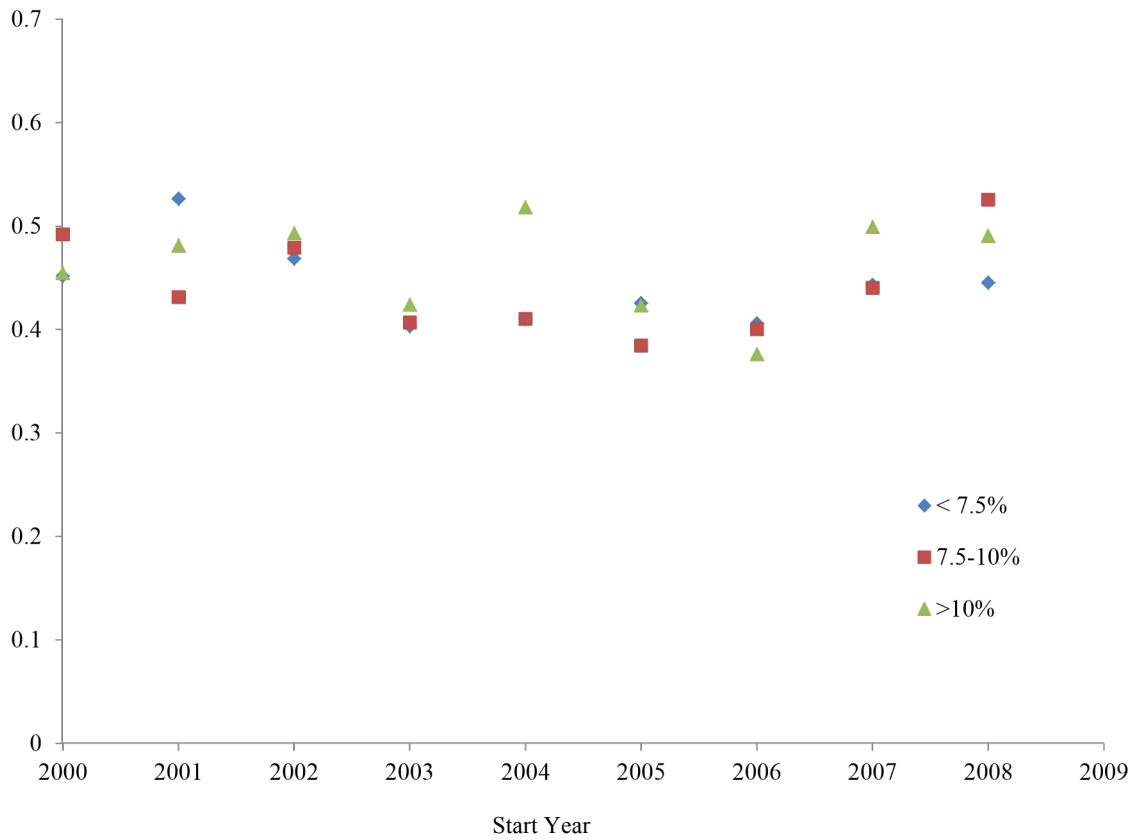


Notes:

The early-career quit rates shown are for Oregon teachers who began working between academic years 2000-1 and 2011-12, and who were working in an instructional position for at least 0.5 FTE. Data is available through academic year 2011-12 only because two years of follow-up data is necessary to assess whether a quit took place in the 2-year period from 2012-13 through 2013-14. District-level PERS expenditures are measured as of the year the teacher was hired.

Source: Authors' calculations based on Oregon Department of Education data.

Figure 5b: Early-career quit rates (within 5 years) by district PERS expenditures category, academic years 2000-1 to 2008-09



Notes:

The early-career quit rates shown are for Oregon teachers who began working between academic years 2000-1 and 2008-9, and who were working in an instructional position for at least 0.5 FTE. Data is available through academic year 2008-9 only because five years of follow-up data is necessary to assess whether a quit took place in the 5-year period from 2009-10 through 2013-14. District-level PERS expenditures are measured as of the year the teacher was hired.

Source: Authors' calculations based on Oregon Department of Education data.

Table 1: Early-career quit propensities for Oregon teachers, academic years 2000-01 to 2013-14

	Exit within 2 years				Exit within 5 years			
	Specification 1		Specification 2		Specification 1		Specification 2	
	ln(odds ratio)	p-value	ln(odds ratio)	p-value	ln(odds ratio)	p-value	ln(odds ratio)	p-value
Year hired								
2000	-----	-----	-----	-----	-----	-----	-----	-----
2001	-0.002	0.983	-0.026	0.810	0.015	0.862	-0.001	0.995
2002	-0.042	0.621	-0.068	0.411	-0.006	0.940	-0.018	0.816
2003	-0.349	0.000 ***	-0.363	0.000 ***	-0.207	0.006 ***	-0.208	0.006 ***
2004	-0.163	0.112	-0.178	0.077 *	-0.158	0.040 **	-0.160	0.036 **
2005	0.014	0.877	0.004	0.967	-0.164	0.041 **	-0.169	0.035 **
2006	-0.060	0.533	-0.075	0.426	-0.207	0.004 ***	-0.217	0.003 ***
2007	0.136	0.167	0.114	0.252	0.088	0.274	0.084	0.310
2008	0.376	0.000 ***	0.367	0.000 ***	0.235	0.004 ***	0.225	0.006 ***
2009	0.412	0.001 ***	0.401	0.001 ***				
2010	0.565	0.000 ***	0.562	0.000 ***				
2011	0.171	0.215	0.166	0.224				
Age at hire	0.019	0.000 ***	0.019	0.000 ***	0.004	0.072 *	0.004	0.083 *
Female	0.048	0.375	0.050	0.349	0.166	0.001 ***	0.166	0.001 ***
Ethnicity								
Asian	0.178	0.226	0.181	0.220	0.210	0.057 *	0.210	0.056 *
Black	0.093	0.628	0.090	0.638	0.234	0.135	0.251	0.114
Hispanic	-0.222	0.122	-0.228	0.118	-0.025	0.859	-0.028	0.842
Native American	0.164	0.461	0.168	0.452	-0.091	0.722	-0.094	0.715
White	-----	-----	-----	-----	-----	-----	-----	-----
Other	0.233	0.009 ***	0.232	0.008 ***	0.209	0.003 ***	0.207	0.004 ***
Advanced degree holder	-0.134	0.000 ***	-0.134	0.000 ***	-0.103	0.001 ***	-0.103	0.001 ***
Salary (\$10,000s)	-0.195	0.000 ***	-0.194	0.000 ***	-0.098	0.004 ***	-0.091	0.007 ***
School level								

Elementary	-----	-----	-----	-----	-----	-----	-----	-----
Middle	0.147	0.002 ***	0.148	0.002 ***	0.161	0.000 ***	0.161	0.000 ***
High	0.314	0.000 ***	0.318	0.000 ***	0.411	0.000 ***	0.415	0.000 ***
Other	0.339	0.009 ***	0.357	0.006 ***	0.239	0.028 **	0.245	0.026 **
Percent under-rep minority	0.000	0.939	0.000	0.906	-0.001	0.131	-0.001	0.165
Students (100s)	-0.022	0.000 ***	-0.023	0.000 ***	-0.026	0.000 ***	-0.027	0.000 ***
PERS contribution covered	-0.095	0.035 **	-0.109	0.014 **	-0.051	0.159	-0.063	0.078 *
PERS pct of General Fund								
Continuous	0.027	0.033 **			0.012	0.245		
< 7.5%			-0.094	0.099 *			-0.050	0.246
7.5% to 10.0%			-----	-----			-----	-----
> 10.0%			0.081	0.222			0.056	0.316
Constant	-1.168	0.000 ***	-0.916	0.000 ***	-0.117	0.443	-0.018	0.879
Observations	16,499		16,549		14,355		14,392	
Pseudo-R ²	0.0199		0.0202		0.0110		0.011	
Log-pseudolikelihood	-9321		-9346		-9723		9749	

Notes:

***: Statistically significant at the 1-percent level; **: Statistically significant at the 5-percent level; *: Statistically significant at the 10-percent level. Coefficients are reported as log-odds ratios. Standard errors are clustered at the district level. Sample consists of Oregon teachers who began working between academic years 2000-1 and 2013-4 and who were working in an instructional position for at least 0.5 FTE. Time-varying independent variables are measured as of the year the teacher was hired.

Source: Authors' calculations based on data from the Oregon Department of Education (ODE).

Table A.1: Early-career quit propensities for Oregon teachers, academic years 2000-1 to 2013-4

	Exit within 1 year				Exit within 3 years			
	Specification 1		Specification 2		Specification 1		Specification 2	
	ln(odds ratio)	p-value	ln(odds ratio)	p-value	ln(odds ratio)	p-value	ln(odds ratio)	p-value
Year hired								
2000	-----	-----	-----	-----	-----	-----	-----	-----
2001	-0.021	0.853	-0.049	0.670	-0.130	0.149	-0.152	0.098 *
2002	0.120	0.220	0.085	0.382	-0.193	0.022 **	-0.215	0.009 ***
2003	-0.227	0.036 **	-0.250	0.018 **	-0.318	0.000 ***	-0.326	0.000 ***
2004	-0.149	0.197	-0.177	0.114	-0.170	0.040 **	-0.178	0.024 **
2005	-0.059	0.589	-0.072	0.500	-0.096	0.255	-0.102	0.219
2006	0.050	0.683	0.033	0.789	-0.191	0.022 **	-0.204	0.012 **
2007	0.155	0.128	0.134	0.202	0.021	0.794	0.008	0.927
2008	0.606	0.000 ***	0.589	0.000 ***	0.283	0.003 ***	0.275	0.004 ***
2009	0.291	0.028 **	0.267	0.047 **	0.277	0.017 **	0.268	0.017 **
2010	0.764	0.000 ***	0.758	0.000 ***	0.377	0.001 ***	0.376	0.001 ***
2011	0.358	0.050 *	0.338	0.059 *				
2012	0.093	0.446	0.098	0.421				
Age at hire	0.025	0.000 ***	0.025	0.000 ***	0.014	0.000 ***	0.014	0.000 ***
Female	0.015	0.714	0.015	0.706	0.082	0.089 *	0.083	0.083 *
Ethnicity								
Asian	0.434	0.006 ***	0.449	0.005 ***	0.086	0.529	0.088	0.520
Black	0.342	0.128	0.367	0.112	0.248	0.144	0.243	0.146
Hispanic	-0.274	0.008 ***	-0.263	0.015 **	-0.127	0.339	-0.128	0.331
Native American	0.287	0.156	0.291	0.150	0.263	0.320	0.266	0.318
White	-----	-----	-----	-----	-----	-----	-----	-----
Other	0.178	0.047 **	0.181	0.036 **	0.256	0.000 ***	0.258	0.000 ***
Advanced degree	-0.144	0.000 ***	-0.142	0.000 ***	-0.149	0.000 ***	-0.149	0.000 ***
Salary (\$10,000s)	-0.251	0.000 ***	-0.251	0.000 ***	-0.146	0.000 ***	-0.146	0.000 ***
School level								
Elementary	-----	-----	-----	-----	-----	-----	-----	-----
Middle	0.107	0.047 **	0.113	0.035 **	0.104	0.019 **	0.105	0.017 **
High	0.202	0.005 ***	0.208	0.004 ***	0.303	0.000 ***	0.307	0.000 ***
Other	0.406	0.007 ***	0.419	0.005 ***	0.254	0.043 **	0.267	0.031 **
Percent under-rep minority	0.000	0.786	0.000	0.805	-0.002	0.063 *	-0.002	0.063 *
Students (100s)	-0.018	0.000 ***	-0.018	0.000 ***	-0.025	0.000 ***	-0.025	0.000 ***
PERS contribution as pct of General Fund	-0.157	0.000 ***	-0.162	0.000 ***	-0.086	0.026 **	-0.102	0.006 ***
Continuous	0.043	0.001 ***			0.021	0.065 *		
< 7.5%			-0.111	0.086 *			-0.081	0.102
7.5% to 10.0%			-----	-----			-----	-----
> 10.0%			0.140	0.02 **			0.072	0.229
Constant	-1.926	0.000 ***	-1.542	0.000 ***	-0.645	0.000 ***	-0.443	0.001 ***
Observations	17,259		17,313		15,828		15,871	

Pseudo-R ²	0.027	0.0273	0.0160	0.0163
Log-pseudolikelihood	-7596	-7621	-9954	-9979

Notes:

***: Statistically significant at the 1-percent level; **: Statistically significant at the 5-percent level; *: Statistically significant at the 10-percent level. Coefficients are reported as log-odds ratios. Standard errors are clustered at the district level. Sample consists of Oregon teachers who began working between academic years 2000-1 and 2013-4 and who were working in an instructional position for at least 0.5 FTE. Time-varying independent variables are measured as of the year the teacher was hired.

Source: Authors' calculations based on data from the Oregon Department of Education (ODE).

Table A.2: Early-career quit propensities for Oregon teachers, academic years 2000-1 to 2013-4

	Exit within 4 years Specification 1		Exit within 4 years Specification 2	
	ln(odds ratio)	p-value	ln(odds ratio)	p-value
Year hired				
2000	-----	-----	-----	-----
2001	-0.133	0.117	-0.146	0.091 *
2002	-0.094	0.229	-0.104	0.186
2003	-0.265	0.000 ***	-0.266	0.000 ***
2004	-0.147	0.045 **	-0.150	0.039 **
2005	-0.146	0.064 *	-0.147	0.061 *
2006	-0.239	0.001 ***	-0.243	0.001 ***
2007	0.058	0.487	0.048	0.569
2008	0.252	0.002 ***	0.250	0.002 ***
2009	0.219	0.039 **	0.216	0.040 **
Age at hire	0.009	0.000 ***	0.009	0.000 ***
Female	0.138	0.009 ***	0.138	0.009 ***
Ethnicity				
Asian	0.197	0.075 *	0.198	0.073 *
Black	0.256	0.064 *	0.246	0.075 *
Hispanic	-0.025	0.869	-0.028	0.848
Native American	0.097	0.656	0.097	0.660
White	-----	-----	-----	-----
Other	0.252	0.000 ***	0.254	0.000 ***
Advanced degree holder	-0.147	0.000 ***	-0.146	0.000 ***
Salary (\$10,000s)	-0.124	0.001 ***	-0.124	0.001 ***
School level				
Elementary	-----	-----	-----	-----
Middle	0.143	0.001 ***	0.144	0.000 ***
High	0.387	0.000 ***	0.391	0.000 ***
Other	0.257	0.026 **	0.269	0.020 **
Percent under-rep minority	-0.002	0.070 *	-0.002	0.068 *
Students (100s)	-0.026	0.000 ***	-0.027	0.000 ***
PERS contribution covered	-0.059	0.109	-0.072	0.042 **
PERS pct of General Fund				
Continous	0.015	0.161		
< 7.5%			-0.045	0.333
7.5% to 10.0%			-----	-----
> 10.0%			0.072	0.21
Constant	-0.312	0.050 *	-0.177	0.141
Observations	14,906		14,947	
Pseudo-R ²	0.0134		0.0135	
Log-pseudolikelihood	-9837		-9862	

Notes:

***: Statistically significant at the 1-percent level; **: Statistically significant at the 5-percent level; *: Statistically significant at the 10-percent level. Coefficients are reported as log-odds ratios. Standard errors are clustered at the district level. Sample consists of Oregon teachers who began working between academic years 2000-1 and 2013-4 and who were working in an instructional position for at least 0.5 FTE. Time-varying independent variables are measured as of the year the teacher was hired

Source: Authors' calculations based on data from the Oregon Department of Education (ODE).