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**AN ANALYSIS OF SOUTH DAKOTA
ELEMENTARY AND SECONDARY
TEACHER'S SALARIES**

PREPARED BY

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AN ANALYSIS OF SOUTH DAKOTA ELEMENTARY AND SECONDARY TEACHER'S SALARIES

Low teacher's salaries have been an area of concern in South Dakota as well as the nation as a whole. Average teacher's salaries in South Dakota have consistently ranked 50th or 51st. The most recent data, 1997-98, shows that South Dakota teachers rank 51st among the states and the District of Columbia. As shown in Table 1, the average teacher's salary in South Dakota was 69.4 percent of the U.S. average or \$27,341 compared to the U.S. average of \$39,385. North Dakota was the closest in rank and salary to South Dakota while all the other states in the region had substantially higher teacher's salaries.

Fortunately, the teaching profession is an occupation where we have some detailed data on experience and education at the state level. This data will allow us to control for differences in experience and education as determinants of teacher's salaries. A model was developed which allows us to better understand the sources of the teacher's salary gap in South Dakota. Teacher's salaries by state were modeled in much the same manner as average annual wages were modeled in the previous the reports. The salary gap, after controlling for relevant state differences, was examined and the relative importance of these differences were quantified.

TABLE 1: PUBLIC ELEMENTARY AND SECONDARY TEACHER'S SALARIES

State	1997-98 Average Teacher's Salary	Ratio to U.S.	Rank
United States	\$39,385	1.00	
South Dakota	27,341	0.69	51
Iowa	34,040	0.86	31
Minnesota	38,281	0.99	17
Nebraska	32,668	0.83	42
North Dakota	27,711	0.72	50
Wyoming	32,022	0.81	44
High Connecticut	50,730	1.52	1
Low South Dakota	27,341	0.69	51

Source: National Center of Education Statistics, *1998 Digest of Education Statistics*, U.S. Department of Education, 1999.

<http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=1999036>

The Data

Data on teacher's salaries and other educational data are available from the *Digest of Education Statistics*¹ for the years 1997 and 1998. This data is prepared by the National Center for Education Statistics of the U.S. Department of Education. The data is presented by state and includes data on teacher's salaries, educational attainment of teachers, and years of full-time teaching experience. In addition, data on average annual wage by state, state and local government expenditures on elementary and secondary schools per pupil,

¹ <http://nces.ed.gov/pubs/digest97/listtables.html>

collective bargaining² (percent of teachers in districts with collective bargaining), and farm proprietors as a proportion of total employment were collected.

While the most recent data for teacher's salaries is 1997-98 the most recent data for detailed teacher characteristics such highest degree earned and experience is available only as recently as 1993-94. Therefore, all data used in the model was for the 1993-94 time period. It is doubtful that the relationships have changed much since then.

The data for years of experience is based on percent of teachers by years of full-time teaching experience. This data is tabulated by the following categories: less than three years of experience; three to nine years of experience; ten to twenty years of experience; and over twenty years of experience. The variable labels and definitions are shown below.

SALARY = Estimated average annual teacher's salary in public elementary and secondary schools for 1993-94,

EXP3 = Percent of teachers with less than 3 years experience,

EXP39 = Percent of teachers with 3 to 9 years of experience,

EXP1020 = Percent of teachers with 10 to 20 years of experience,

EXP20+ = Percent of teachers with over 20 years of experience.

Because of multicollinearity³ problems when the experience categories are included as separate regressors a single average experience variable was computed. This variable was computed as the sum of the percent in each experience category multiplied by the average years of experience. Twenty-five

² <http://www.aft.org/research/reports/collbarg/ifwf/ifwf.htm>

³ Multicollinearity is a problem where the independent variables are so highly correlated with each

years of experience was used for the over twenty years of experience value, Experimentation with reasonable values indicated the results were not sensitive to reasonable estimates for this variable. The definition of average experience is shown below.

$$\text{EXPER} = \text{EXP3} \times 1.5 + \text{EXP39} \times 6 + \text{EXP1020} \times 15 + \text{EXPER20+} \times 25$$

The level of education possessed by teachers by state for the 1993-94 year is the percent of teachers by highest degree earned. The degrees for which data was collected were: bachelors, master's education specialist, and doctor's degree. . See variable labels and definitions below.

BACH = Percent of teachers with bachelor's degree as highest degree,

MASTERS = Percent of teachers with master's degree as highest degree,

EDUCSPEC = Percent of teachers with education specialist as highest degree,

DOCTORS = Percent of teachers with doctor's degree as highest degree.

Once again, because of multicollinearity problems, a composite variable was computed. This variable was the percent of teachers with a master's degree or higher level of education. The definition of this variable is shown below.

$$\text{MASTERPLUS} = \text{MASTERS} + \text{EDUCSPEC} + \text{DOCTORS}$$

Several other variables were included in the teacher's salary model. A variable on state average annual pay (wage) for 1993 was included as measure of a state's ability to support education. A variable designed to capture the state's willingness to support elementary and secondary education was also

other that it is difficult to obtain reliable estimates of the regression coefficients.

included in the model. This variable was defined as expenditures for elementary and secondary education per pupil 1993-94. A variable designed to capture the importance of collective bargaining was the percent of teachers covered by collective bargaining contracts. The final variable was included to capture the importance of small rural areas where there are few alternative employment opportunities. It was measured as the farm proprietors as a proportion of total employment.

Statistical characteristics of this data are presented in Table 2. Analysis of this data indicates that South Dakota ranks substantially below the U.S. average for each of these variables. Thereby, if experience, education, average state wage, and expenditures do positively affect teacher's salaries we would expect South Dakota teacher's salaries to be lower than average. South Dakota ranks slightly higher for the percent of teachers covered by collective bargaining contracts. The next section of this report will examine these issues using a more sophisticated model.

TABLE 2: DESCRIPTION OF THE DATA: TEACHER'S SALARY MODEL, 1993-

94

Variable	Mean (std. dev.)	SD Value	SD Rank	SD as % Avg (100=Average)
SALARY	\$34,108 (\$6,139)	\$25,259	50 th	74.3
EXPER	15.6 years (1.52)	14.6 years	39 th	93.4
MASTERPLUS	45.7% (13.7%)	24.7%	50 th	54.0
WAGE_STATE	\$18,613 (\$3,560)	\$24,515	50 th	75.9
EDEXPPUPIL	\$5,087 (\$1,214)	\$4,109	40 th	80.7
COLLBARG	67.7% 39.4%	78.9%	29 th	116.6
FARMPROP	1.94% 1.89%	7.0%	2 nd	360.8

Source: Data from *Digest of Education Statistics, 1997*, NCES, U.S. Department of Education, American Federation of Teachers, and U.S. Department of Labor.

The Model

The basic statistical model was specified as the standard semi-log wage equation . As in previous models, a dummy variable for South Dakota, SD, was included to measure the effect of being in a South Dakota on salaries after controlling for other variables. The SD variable had the value of 1 when the observation was for South Dakota and zero otherwise. This variable is of interest because it indicates the percent difference between South Dakota teacher's salaries and the average after controlling for experience, education, household income, and education expenditures. If it is negative it indicates that South

Dakota teacher's salaries are lower than the U.S. even after controlling for relevant variables. Teacher's salaries were expected to be positively related to experience, level of teacher's education, average state wage, educational expenditures per pupil, percent of teacher's under collective bargaining contracts, and proportion of total employment as farm proprietors. The model is shown below.

$$\begin{aligned} \text{Log}(\text{SALARY}) = & B_0 + B_1\text{SD} + B_2\text{EXPER} + B_3\text{MASTERPLUS} + \\ & B_4\text{WAGE_STATE} + B_5\text{EDEXPPUPIL} + B_6\text{COLLBARG} + B_7\text{FARMPROP}^2 \\ & + u \end{aligned}$$

The regression results are presented in Table 3. The regression equation was able to explain 91.7 percent of the variation in teacher's salaries between the 50 states. The signs of the all of the regression coefficients were as expected. That is, the relationship between average teacher's salary and experience, percent of teachers with a master's degree or higher, average state wage, expenditures per pupil, and percent covered by collective bargaining contracts were all positive, as expected. The average state wage and expenditures per pupil were statistically significant from zero at the one- percent level. The experience variable was statistically significant at the 10 percent (one-sided test) and the master's degree or higher variable was significant at the 5 percent level (one-sided test).

The regression coefficient on the SD dummy was -0.035 indicating that South Dakota teacher's salaries were 3.5 percent lower than the 50-state average after controlling for experience, education, average state wage,

education spending per pupil, collective bargaining percentage, and farm proprietors percentage. However, the t-test indicates that this coefficient is not statistically significant from zero at a reasonable level of significance. In fact, the P-value indicates that there is a 54/46 chance that the SD is not zero. Rerunning the regression without the SD variable provided an equation that predicted the South Dakota salary with a -3.7 percent error. So what do we conclude? We must conclude that there is no statistical evidence to support the conclusion that the South Dakota teacher's salary is lower than average after controlling for relevant differences.

TABLE 3: REGRESSION

Dependent Variable: LOG(SALARY9394)

Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.382746	0.098896	94.87449	0.0000
SD	-0.034841	0.056922	-0.612087	0.5438
EXPER	0.009493	0.006933	1.369155	0.1782
MASTERPLUS	0.001292	0.000673	1.920423	0.0616
WAGE_STATE	2.30E-05	3.66E-06	6.289468	0.0000
EDEXPPUPIL	3.94E-05	1.07E-05	3.684241	0.0007
COLLBARG	0.000818	0.000220	3.719885	0.0006
FARMPROP^2	-0.001043	0.000760	-1.372355	0.1772
R-squared	0.929280	Mean dependent var		10.41479
Adjusted R-squared	0.917493	S.D. dependent var		0.172167

