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ABSTRACT

There will be a need for many newly hired teachers in the United States over the next 10 years as large numbers of teachers are expected to retire and enrollments are expected to increase. This report examines the problem using an algebraic model with no econometric analysis. It uses age-specific continuation rates of teachers from several different Schools and Staffing Surveys (SASS) of the National Center for Education Statistics to predict how many teachers will continue teaching from one year to another. The demand for teachers is taken as exogenous, and several scenarios are examined. The report assumes that the supply will meet the demand and that the age distribution of new teachers will be the same as the 1993-94 SASS distribution. Depending on the assumptions made, projections for the number of newly hired public school teachers needed by 2008-09 ranges from 1.7 million to 2.7 million. Some of these newly hired teachers will be needed to replace those leaving the profession, and others will be needed as enrollments continue to increase. The majority of the publication is comprised of statistical figures and tables, a technical appendix, and appendix tables. (Author/SM))

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Predicting the Need for Newly Hired Teachers in the United States to 2008-09

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William J. Hussar
National Center for Education Statistics

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NCES 1999-026

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Abstract

There will be a need for many newly hired teachers in the United States over the next ten years as large numbers of teachers are expected to retire and enrollments are expected to increase. We examine this need using an algebraic model with no econometric analysis. We use age-specific continuation rates of teachers from several different Schools and Staffing Surveys (SASS) of the National Center for Education Statistics to predict how many teachers will continue teaching from one year to another. The demand for teachers is taken as exogenous and several scenarios are examined. We assume that the supply will meet the demand and that the age distribution of new teachers will be the same as the 1993–94 SASS distribution. Depending on the assumptions made, projections for the number of newly hired public school teachers needed by 2008–09 ranges from 1.7 million to 2.7 million. Some of these newly hired teachers will be needed to replace those leaving the profession and others will be needed as enrollments continue to increase.

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I. Introduction

Each year over 150,000 public school teachers are hired to meet the ongoing demands of replacing teachers who retire or who have left the profession and to fill new positions in growing school districts or to address special needs or meet new requirements (table 1). In addition to these extensive ongoing demands for additions to the teaching force, many schools and school districts have faced the prospect of a wave of retirements as the large numbers of teachers hired during the baby boom enrollment years approach retirement age. A recent news report states that, "Almost half of Boston's 4,600 public school teachers are expected to retire in the next 10 years, and the city will have to find new teachers"(*Boston Globe,* March 30, 1998). While Boston may be facing a greater problem than most areas, it is not the only locale concerned with the aging of its teachers. Another newspaper reported: "One in five teachers in Maryland will reach the age at which they can retire in the next five years . . ." (Associated Press, December 12, 1997). Similar reports are commonplace.

The approaching wave of teacher retirements is documented not only by anecdotal information, but by statistical evidence as well. As a group, elementary and secondary teachers are significantly older than the general labor force. The median age of public school teachers in 1993–94 was 44 compared with a median age of 38 for all workers in October, 1993.[1] The burden of replacing large numbers of retiring teachers comes at a particularly challenging time, as enrollments in elementary and secondary schools are projected to set records each year well into the next decade.[2] Over the next ten years, an unusually large need for newly hired teachers is expected, both to replace teachers as they retire and to meet the needs of increasing enrollments. These newly hired teachers will include both people who are new to the profession and those who are returning to teaching after some time away from the profession.

This report examines the need for newly hired teachers for the period from 1998–99 to 2008–09 using an algebraic model based on teacher demographic data. A recursive methodology is used to examine the impact that the existing age distribution of teachers will have on the composition of the teacher force. This methodology is used to estimate how many newly hired teachers will be needed due to teachers leaving the work force, and also those needed due to the predicted enrollment increases. Several alternative projections are produced for the number of newly hired school teachers in both public and private schools at the national level, each based on differing assumptions concerning the continuation rate and the total number of teachers. The model does not analyze the issue of supply related to demand of teachers. Instead, it is assumed that there will be enough supply to meet the demand, which reflects historical precedent. However, the paper includes some discussion of how supply and demand forces might affect the results.

In order to conduct this analysis, several strong assumptions are required. For example, it is assumed that continuation rates of teachers, by age group, remain constant over time. This assumption is required as there are not enough observations to develop an econometric model for continuation rates. A sensitivity analysis of this assumption was conducted by examining several alternative scenarios. This paper includes a discussion of this and other assumptions.

[1] U.S. Department of Commerce, Bureau of the Census, Current Population Survey, October 1993, unpublished tabulations.

[2] U.S. Department of Education, National Center for Education Statistics, *Projections of Education Statistics to 2008*, NCES 98–016, by Debra E. Gerald and William J. Hussar, Washington, DC: 1998.

II. The Newly Hired Teachers Model

The model projects the total number of Newly Hired Teachers that will be needed over time due to teachers leaving the profession because of retirement and other reasons, as well as the number of teachers needed to instruct additional students that are expected to enter the system. The model uses data from the National Center for Education Statistics' Schools and Staffing Survey (SASS) and other sources. The derivation of the teacher count projections are discussed below under Data Sources.

The key component of the Newly Hired Teachers Model is the aging of the teacher force over time, based on the counts of teachers of each age from the 1993–94 SASS. The model estimates the number of teachers, by age, who continue teaching from one year to the next through the use of age-specific continuation rates from SASS. Each year, just enough newly hired teachers are brought into the teaching force so that the sum of continuing teachers and the newly hired teachers equals a projected number for total teachers. Calculating the number of "newly hired teachers" (new teacher hires) summed over the forecast period is the focus of this study.

The model may be described algebraically. For each year t, we have the total number of teachers T_t and for year 1, the number of teachers by individual age a is represented by $T_{1,a}$.

The number of teachers in year 2 can be described as:

1. $T_2 = \Sigma\, C_2 + A_2$

where C_2 is the number of teachers who taught in year 1 and who continued teaching in year 2 and A_2 is the number of newly hired teachers in year 2 who did not teach in year 1 (A_2 includes: newly graduated teachers; teachers who had not taught in year 1, but had taught before that; and those who had graduated in prior years, but never taught before.)

To estimate the number of newly hired teachers, A_t, that will be needed in a given year, we must first estimate C_t for year 2:

2. $C_2 = \Sigma C_{2,a}$

where $C_{2,a}$ is the number of continuing teachers of each age (a) in year 2. For each age, we have a continuation rate, $c_{2,a}$:

3. $c_{2,a} = C_{2,a}/T_{1,a-1}$

where $T_{1,a-1}$ is the total number of teachers of age a–1 in year 1. From a manipulation of equation 3:

4. $C_{2,a} = c_{2,a}T_{1,a-1}$

Values for the $T_{1,a-1}$ are available so the number of continuing teachers by age can be estimated using continuation rates for year 2 by age. Continuation rates by age are available from SASS for several recent years. However, not all the historical years studied in this paper are available and, of course, no forecasts are available. For this study, the estimates for each year of the forecasts are the age specific continuation rates ($c_{E,a}$) from the most recent SASS. One key assumption of this model is that the age specific continuation rates are relatively constant over time and remain similar to the rates for 1993–94 to 1994–95. The sensitivity of this assumption is discussed below.

The total number of continuing teachers in year 2, C_2, can be estimated:

5. $C_2 = \Sigma C_{2,a} \approx \Sigma\, c_{E,a}T_{1,a-1}$

We can now return to the calculation of the number of newly hired teachers, A_2. From a manipulation of equation 1:

6. $A_2 = T_2 - C_2$

The number of newly hired teachers needed in year 2 is equal to the number of teachers in period 2 less the number of teachers continuing from year 1 to year 2. However, to calculate the newly hired teachers needed in year 3, the number of teachers by age in year 2 is required, which can also be estimated. Estimates of the number of continuing teachers by age, $C_{2,a}$, are available, and the number of newly hired teachers by age, $A_{2,a}$, can be estimated:

7. $\Sigma A_{2,a} = \Sigma R_{2,a}A_2$

$A_{2,a}$ is the number of newly hired teachers of age a in year 2 and $R_{2,a}$ is the ratio of the number of newly hired teachers of age a in year 2 to the total number of newly hired teachers in year 2 (the values of the $R_{2,a}$ all together form the age distribution of the newly hired teachers). We have for each a:

8. $R_{2,a} = A_{2,a}/A_2$

The value of A_2 is known and each of the $A_{2,a}$ can be calculated if $R_{2,a}$ were known. As with the continuation rates, estimates of the age distribution for the newly hired teachers are only available for a limited number of years. The most recent actual age distribution of newly hired teachers was used as the estimated distribution for each year in this study. This age distribution is assumed to be stable over time.

9. $A_{2,a} \approx R_{E,a}A_2$

$R_{E,a}$ is the estimate of the ratio of the number of newly hired teachers of age a to the total number of newly hired teachers. Each $A_{2,a}$ may be computed from $R_{E,a}$ and A_2, and $T_{2,a}$ may be computed from $C_{2,a}$ and $A_{2,a}$. With the values for $T_{2,a}$, the method may be used to produce newly hired teacher values for the third year and for as many years as the total number of teachers, T_t, is available.

The total number of individuals of age a who had taught in year 1 but were not teaching by year 2, $L_{2,a}$, can be described as:

10. $L_{2,a} = (1 - c_{2,a})T_{1,a-1}$

The number of people of age a who had taught in year 1 but who were retired in year 2, $P_{2,a}$, can be described by:

11. $P_{2,a} = p_{2,a}L_{2,a}$

where $p_{2,a}$ is the ratio of the number of people of age a who had taught in year 1 but who were retired in year 2 to the number of individuals of age a who had taught in year 1 but were not teaching by year 2. Age-specific values of the ratio of people who retired to the total number of those who left teaching, $p_{E,a}$, are available for a limited number of years using SASS. Assuming that these values are relatively constant over time, we can estimate the number of retirees by individual age:

12. $P_{2,a} \approx p_{E,a}L_{2,a}$

III. Data Sources

The Newly Hired Teachers Model requires four data items: 1) the number of teachers by age for a recent year; 2) the total number of teachers for each year under study including both historical years and forecast years; 3) an estimate of the continuation rate for each age; and 4) an estimate of the age distribution of the newly hired teachers.

The main source for these data is the 1993–94 Schools and Staffing Survey and the 1994–95 Teacher Followup, though other sources such as the Common Core of Data and the *Projections of Education Statistics to 2008* are used as well. The model requires time series data for the number of public school teachers and the number of private school teachers. A time series was constructed for public school teachers for the U.S. using the NCES Common Core of Data (CCD) survey. Also, a time series was constructed for private school teachers by combining data from several NCES sources. The most recent *Projections of Education Statistics* contains both teacher and enrollment projections to 2008–09, which coincides with the years selected for this analysis.

The analysis was conducted at the national level only, as some parts of SASS were not designed for state level analysis. For example, continuation rates for each state could not be calculated due to the sample size of the Teacher Followup Survey. An option considered was the use of national continuation rates at the state level. This was rejected as there are state variations in the continuation rates due to differences in salaries, retirement policies, grade steps, and working conditions.

Number of Teachers

Three different assumptions were used to produce alternative scenarios for the numbers of public and private school teachers. In the first method, the pupil/teacher ratio was assumed to remain constant from 1996–97 to 2008–09. The total number teachers needed each year was estimated by dividing the appropriate enrollment projections (table A1) from the *Projections of Education Statistics to 2008* by the 1995–96 pupil/teacher ratio. Greatest emphasis was given to the results using the first scenario, although results from the other scenarios were analyzed. The projections of the number of public school teachers for each of the three scenarios appear in table 2 and the private teacher projections appear in table 3. The pupil/teacher ratios associated with each scenario are in figures 1 and 2.

For the second scenario, it was assumed that for each year from 1996–97 to 2008–09, the number of teachers remained at their 1995–96 levels.

For the third scenario, the national teacher projections from the *Projections of Education Statistics to 2008* were used. This method gave the highest newly hired teachers needed figures because it included some decline in the pupil/teacher ratio.

Teacher Age Distribution

The total number of public and private teachers, by age, was obtained from the 1993–94 SASS (figures 3 and 4 and table 4).[3] The median age was 44 for all public school teachers and 42 for private school teachers. There were some differences in the median age of public school teachers from state to state. Georgia and South Dakota had the lowest median age at 41, while Washington D.C. had the highest at 47. Several states had median ages of 46, including the state with the largest population, California. For the nation as a whole, there were more public school teachers age 46 than any other age. The mode of the age distribution occurred at or near 46 for most of the states. The SASS age distribution is for a headcount of the number of individual full-time and part-time public school teachers. The time series data, however, are expressed in full-time-equivalent (FTE) teachers. The headcount number for 1993–94 is slightly greater than the FTE number for that same year (2,561,294 versus 2,503,901). As the number of teachers forecasted for each of the later years is for FTE teachers, the FTE teacher number by age for 1993–94 is required. For modeling purposes, it was assumed that the age distribution of FTE teachers was the same as the age distribution of teachers using the headcount number. This seems to be a reasonable assumption since a comparison of the age distributions of full-time teachers and part-time teachers found them to be similar in 1993–94. Also, the vast majority of public school teachers teach full-time and the impact from the relatively small number of part-time teachers on the overall age distribution

[3] Note that while several tables present data by several age categories, all age-specific data used in the model were for individual years of age.

would be minimal. The age distributions by attendance status for public school teachers from the 1993–94 SASS are presented on table A2.

Continuation Rate by Age

Data on the age-specific continuation rates for the sum of full-time and part-time teachers were obtained from the SASS Teacher Followup Survey. Separate continuation rates were produced for teachers who continued teaching in public schools and for those who continued teaching in private schools. Three sets of continuation rates are available: from 1993–94 to 1994–95; from 1990–91 to 1991–92; and from 1987–88 to 1988–89.

The continuation rates for public and private school teachers for several age categories are presented in table 5. Statistical tests were conducted to compare the continuation rates for public school teachers to private school teachers by various age categories for the 1993–94 to 1994–95 time period. There were significant differences in the rates for public and private school teachers for many age categories: private school teacher continuation rates were lower than public rates for three of the four age categories for teachers less than 50 years old and higher than public rates for teachers 60 to 64.

Statistical tests were also conducted to compare the continuation rates for the 1993–94 to 1994–95 time period to those from the 1990–91 to 1991–92 time period for the various age categories for public school teachers and for private school teachers. There were significant differences for public school teachers overall and for teachers in their forties. There were no significant differences for private school teachers. Most of the results presented in this paper were produced using the continuation rates from 1993–94 to 1994–95. The sensitivity of the model was examined by using the other sets of continuation rates.

Newly-minted teachers and returning teachers have lower continuation rates than those of the same age who had been teaching the previous year. If the proportion of new teachers in the teaching force grows over time, it would tend to push continuation rates downward. In this analysis, continuation rates are examined by age and sector. Continuation rates also differ by such factors as elementary/secondary, field of study, and socioeconomic characteristics of the teacher and the school district.[4]

The proportion of retirees among those who left teaching were compared by age group to all those who left teaching using data from the 1994–95 SASS Teacher Followup Survey. (See table A4.) The standard errors around the retirement proportions are, for many age categories, quite large compared to those for the continuation rates.

SASS also includes information about the primary occupation of those who left teaching in the preceding year. According to the 1994–95 Teacher Followup Survey, 27 percent of the people who left teaching in public schools after the 1993–94 school year did so to retire. Other primary activities included homemaking and/or child rearing (16 percent); working in an elementary or secondary school with an assignment outside of teaching (21 percent); and working in an occupation outside of elementary or secondary education (20 percent). Not surprisingly, the primary activity of those who did not continue teaching varied significantly by age. Fewer than four percent of those under age 50 retired; 53 percent of those in their fifties retired; and over 90 percent of teachers 60 years old and over retired. As the median age of teachers increases, an increasing percentage of them will be retiring.

Age Distribution of Newly Hired Teachers

The fourth type of data needed for the model is the age distribution of the newly hired teachers who taught in the year under study, but had not taught the previous year. As with the continuation rates, we can find usable data for public school teachers and private school teachers.

The 1993–94 SASS captures the count of new public school teachers in 1993–94 by individual age who: 1) never taught before in either a public or private school; 2) had taught previously, but did not teach in a public or private school in 1992–93; and 3) taught in a private school in 1992–93 and had taught only in private schools until then. This survey does not identify the new public school teachers who taught in private schools in 1992–93 and also taught in public schools during their prior career. The lack of this type of teacher data affects the age distribution of the newly hired teachers to an unknown though probably small extent. However, neither the number of these teachers nor their age distribution is available. A similar limitation occurs for private school teachers.

An important assumption is that in the forecast period the age distribution of newly hired teachers remains similar to that in the 1993–94 SASS. To examine the stability of the age distribution, age distribution for newly hired public school teachers from the 1993–94 SASS was compared to those from the 1987–88 SASS and the 1990–91 SASS (table 6). The age distributions are similar though not identical over time. One factor that may change this age distribution over time is the aging of the baby boom

[4] U.S. Department of Education, National Center for Education Statistics, *Characteristics of Stayers, Movers, and Leavers, Results from the Teacher Followup Survey: 1994–95*, NCES 97–450, by Summer D. Whitener, Kerry J. Gruber, Hilda Lynch, Kate Tingoes, Mia Perona, and Sharon Fondelier, Project Officer; Summer D. Whitener, Washington, DC: 1997.

generation. As this generation retires, there may be relatively fewer people in their forties and fifties who become newly hired teachers thus pushing the average age of newly hired teachers lower. However, programs to encourage the rehiring of retirees may partially diminish this effect.

Estimates of the number and percentages of newly hired public and private school teachers were tabulated for seven different age categories and for the three types of newly hired teachers (table A5). For all newly hired public school teachers, slightly less than one half were under 30, while a quarter each were between 30 to 39 and between 40 and 49. Roughly two-thirds of the newly hired public school teachers, who had not taught in the previous year, were new teachers and about a quarter were returning teachers. The remainder had been teaching in private schools. A majority (61 percent) of first-time public school teachers were 30 or under, but there was still a large number that were older (17 percent of first-time teachers were 40 or older). The returning teachers and former private school teachers tended to be older.

Several assumptions, some rather strong, were made regarding the data for this model. These were: 1) the age distribution of FTE teachers was similar to that of headcount teachers; 2) the continuation rates will be stable over time; and 3) the age distribution of newly hired teachers will be stable over time.

The first assumption has been shown to be reasonable and would have minimal impact on the model in any case because of the small relative size of the part-time teaching force. Assumption 2 regarding the age distribution of new teachers should have a generally small impact as it affects only a relatively small proportion the teaching force every year. If the age distribution of the newly hired teachers sustained a long-term and large change early in the projection period, however, it could result in some shift in overall newly hired teacher demand. While there were few statistically significant differences in continuation rates over time, comparisons of the demand for newly hired teachers using the continuation rates from each of the Teacher Followup Surveys were conducted to determine the importance of assumption 2. These experiments determined that continuation rates were by far the most sensitive facet of the model. Since these rates apply to the entire count of teachers every year, it is not surprising that the continuation rates have more impact than the age distribution of new teachers, which affects only a relatively small proportion of the teaching force every year. Because of the sensitivity of the continuation rates, they were scrutinized in some detail and described below under "Alternative Continuation Rates." The alternative continuation rates were used to determine a range of plausible counts of newly hired teachers.

IV. Newly Hired Teachers

Public School Teachers

The model projects that approximately 2.4 million newly hired public school teachers will be needed from 1998–99 and 2008–09 using scenario 1 (see table 7). These newly hired teachers are needed to replace teachers who retire or leave the profession for other reasons, and to keep the pupil/teacher ratio constant as total enrollment increases. These "newly hired" public school teachers include people who had not taught before, people who are returning to public school teaching after time away, and people who had been teaching in private schools.

Number of newly hired public school teachers needed for the eleven years from 1998–99 to 2008–09, by continuation rate used and teacher total assumption

Scenario number	Continuation rate from 1987–88 to 1988–89	Continuation rate from 1990–91 to 1991–92	Continuation rate from 1993–94 to 1994–95
Scenario 1 (constant pupil/teacher ratio)	2.1 million	1.9 million	2.4 million
Scenario 2 (constant number of teachers)	1.8 million	1.7 million	2.2 million
Scenario 3 (*Projections of Education Statistics to 2008*)	2.3 million	2.2 million	2.7 million

The combination of three teacher scenarios and three continuation rates produces a relatively wide range of estimates, from about 1.7 to 2.7 million newly hired teachers. Even for the same set of continuation rates, there is a considerable range in the estimates. For example, using the most recent set of continuation rates, the forecast of 2.4 million newly hired teachers needed by 2008–09 using scenario 1 (constant pupil/teacher ratio and increasing enrollment) is 10 percent greater than the 2.2 million newly hired teachers projected using scenario 2 (constant number of teachers), but 12 percent less than the 2.7 million teachers projected using scenario 3 (increasing enrollment and declining pupil/teacher ratio).

Alternative Continuation Rates

One of the important assumptions in this model is that the continuation rates will be stable over time. The importance of this assumption can be tested by comparing projections using continuation rates for the two other periods of time for which data are available (from 1990–91 to 1991–92 and from 1987–88 to 1988–89). Forecasts were made using these three alternative continuation rates for scenario 1. The results are sensitive to the choice of continuation rates (table 8). Using continuation rates from the 1994–95 Teacher Followup Survey, the model projects that 2.4 million newly hired teachers will be needed. Using the continuation rates from 1990–91 to 1991–92, approximately 450,000 fewer newly hired teachers are predicted to be needed (19 percent lower than the number using the more recent continuation rates). This relatively large difference in the forecasts for the need for newly hired teachers occurs because of the cumulative impact of the relatively small differences in the continuation rates for the two time periods. Even though the overall continuation rates were significantly different, in most cases the age-specific rates were not significantly different. Approximately 350,000 fewer teachers (14 percent) will be needed if the 1987–88 to 1988–89 rates are used. The numbers of newly hired teachers needed are lower using the older sets of continuation

rates because the older sets of continuation rates are generally higher.

The results of this sensitivity analysis suggest that the Newly Hired Teachers model is sensitive to changing continuation rates. Some factors are out of the control of local school districts or state education agencies. For example, the state of the economy affects continuation rates since the better the economy the greater the opportunities in alternative employment. However, local school districts or state education agencies can promote policies that affect continuation rates. For example, if faced with an aging teacher force and an inadequate supply, they could enact policies that increase continuation rates, such as creating incentives to delay retirements or retain teachers in part-time status who may otherwise have left the profession. Such policies could have a sizable impact on the number of newly hired teachers that will be needed. It is important to point out that "newly hired teachers" includes not only first-time teachers but also returning teachers and people who were formerly teaching in private schools.

Changing Age Distribution of Teachers

Another way to compare the results for the alternative scenarios is to look at the age distributions that are projected for the three scenarios. The estimated number of public school teachers at each age for 2008–09 for each of the three scenarios appears in figure 5. Since they look very much alike, the discussion will concentrate on the results for scenario 1.

Figure 6 shows that the age distribution of full-time-equivalent (FTE) teachers is predicted to flatten over time, with a more equal distribution of teachers in each age group. Specifically, the proportion of teachers who are in their forties is expected to decrease over time, while other age groups, which had been underrepresented, are expected to increase. Yet, even in 2008–09, the model projects that a sizable number of the teachers who had been in their forties in 1993–94 will still be teaching. The model forecasts that there will be more public school teachers in their late fifties in 2008–09 than there were in 1993–94.

As this model uses age-specific data, it can be used to forecast what might happen to individual age groups over time. An examination of the individual age groups shows how age is related to people's entering and leaving the teaching profession. For example, there is the population cohort of all people who were 44 years old in 1993–94. In 1993–94, members of that age cohort made up about 108,000 FTE public school teachers (figure 7). The model estimates that the next year, the number of FTE public school teachers from that age cohort (now 45 years old) rose to 113,000. The number increased because more members of the age cohort became public school teachers from 1993–94 to 1994–95 than left the profession. The model projects that through the rest of the decade people from that age cohort will enter and leave the teaching profession at approximately the same rate. The model projects that only when members of an age cohort near fifty, will consistently more members of that cohort leave the profession than enter it.

The model predicts more people who were 34 in 1993–94 will become teachers each year than will leave the profession every year through 2008–09. While there were approximately 53,000 34-year-old teachers in 1993–94, by 2008–09 (when they will be 49), the model predicts that there will be 87,000 from that cohort. For the group of individuals who were 54 in 1993–94, the model predicts that more people will leave the profession than will enter it for every year from 1993–94 to 2008–09. While 56,000 members of that group were teachers in 1993–94, the model predicts that virtually none will be teachers in 2008–09.

This model can also project how many teachers there will be of each age for each year. For example, figure 8 shows the number of teachers age 34, 44, and 54 for each year from 1993–94 to 2008–09. We see that the number of teachers age 34 is predicted to increase gradually over time. In contrast, the number of teachers age 44 is predicted to enter a period of steady declines from 1994–95 to 2002–03 before stabilizing. The pattern for teachers age 54 is important because it indicates the number of teachers approaching retirement. From 1993–94 through 1998–99, the number of teachers age 54 is predicted to increase from 55,000 teachers to 74,000. Then from 1998–99 to 2000–01, there is a more rapid increase in the number of teachers 54 years old, as the large number of teachers who were in their mid to late forties in 1993–94 start to reach their mid fifties. The number of teachers who are 54 is predicted to increase by 37,000 teachers in just two years. After that, the number of teachers who are 54 is predicted to decline, but still remain higher than its 1998–99 level.

Retirement of Public School Teachers

Using scenario 1, approximately 759,000 teachers will retire from 1998–99 to 2008–09. As there are fewer teachers each year in scenario 2 compared to scenario 1, there will be fewer teachers who will be retiring. Conversely, as there are more teachers in scenario 3, there will be more teachers who will be retiring.

Number of public school teachers retiring for the eleven years from 1998–99 to 2008–09

	Scenario 1 (constant pupil/teacher ratio)	Scenario 2 (constant number of teachers)	Scenario 3 (*Projections of Education Statistics to 2008*)
Number of retirees	759,000	745,000	765,000

Private School Teachers

Some 568,000 newly hired private school teachers are projected to be needed from 1998–99 to 2008–09 using scenario 1 (see table 9). Using scenario 2, the comparable number is somewhat lower (524,000), and using scenario 3, it is somewhat higher (620,000). Figure 9 shows a forecast of how the age distribution will change so that the numbers of older teachers and younger teachers are both predicted to increase while the number of teachers in their forties is predicted to fall.

As with public school teachers, the alternative sets of continuation rates were used to see how they affected the results (see table 10). The range of these alternative rates was small compared with public school teachers under scenario 1, with the forecasted numbers of newly hired private school teachers ranging from 2 percent lower to 5 percent higher than the number calculated using the continuation rates from the most recent SASS.

In this analysis, the public school and private school sectors have been treated as if they are independent of each other. Clearly, there are instances when they are not. For example, substantial increases in the salaries of public school teachers could increase continuation rates by making teaching a more desirable profession. However, this might be an incentive to private school teachers to move to public schools, pushing down continuation rates for private school teachers.

The Bureau of Labor Statistics Projections

Another source of national-level estimates of newly hired elementary and secondary school teachers is the U.S. Department of Labor's Bureau of Labor Statistics (BLS), which produces projections for all occupations. BLS forecasts annual average job openings due to growth and total replacement needs from 1996 to 2006 for elementary and secondary school teachers[5] at approximately 400,000[6] per year. For the eleven-year period, this suggests a total need of approximately 4.5 million newly hired teachers. This is significantly greater than the 3.3 million newly hired teachers projected in the highest scenario presented in this paper.[7]

One reason for the larger BLS projection is that their definition of teacher includes all preprimary institutions and training centers. According to the BLS, there were approximately 3.8 million in the teaching profession in 1996, compared to 3.0 million based on NCES surveys. The more expansive BLS definition of education institutions may be related to differences in teacher continuation rates as well. Public secondary schools may have a much lower turnover rate of experienced teaching staff than minimum or low wage part-time staff often working at day care institutions. A second reason is that the BLS forecasts greater growth in the number of teachers from 1996 to 2006 than does NCES (21.1 percent from BLS versus 12.7 percent from NCES scenario number 3). Again, some of the growth projected by BLS would occur outside of the traditional elementary and secondary schools counted by NCES. While there is a significant difference between the NCES and the BLS definitions of the teaching sector, both sets of projections suggest a need for large numbers of newly hired teachers over the next decade.[8]

Conclusions

This paper examines a model for predicting the need for newly hired teachers. If the pupil-teacher ratio remains constant, at least 2 million newly hired public school teachers and about 500,000 newly hired private school teachers will be needed between 1998 and 2008 (encompassing 11 school years). Some of the alternative assumptions and scenarios result in higher forecasts for public and private needs

[5] The sum of the preschool and kindergarten school teachers, elementary school teachers, secondary school teachers, and special education teachers.

[6] Table 1 of *Occupational Projections and Training Data,* Bureau of Labor Statistics, 1998.

[7] The sum of the NCES public and private school numbers for newly hired teachers is not strictly comparable to the BLS number. In the NCES analysis, some of the newly hired public school teachers are coming from private schools and some newly hired private school teachers are coming from public schools. Hence, the NCES total for the number of newly hired teachers is biased upward.

[8] BLS produces an alternative measure, which measures the replacement need due to job growth and net replacement. As it only considers replacement for people who permanently leave a profession, it is not comparable to the NCES measure.

for newly hired teachers, particularly for scenario 3, which assumes some decline in the pupil/teacher ratio. Further analysis finds that these results are sensitive to the assumptions that are made concerning the teacher continuation rate. For example, when the 1990–91 set of continuation rates are used, the need for newly hired public school teachers is 20 percent lower than from the baseline scenario (1.9 million newly hired public school teachers versus 2.4 million). Data from BLS also indicate a need for large numbers of newly hired teachers.

At the beginning of this paper, it was noted that this is not a supply and demand study. However, one important and one critical assumption of the model can be affected by the interaction of supply and demand forces. The continuation rate, which is a critical factor in the model, can be influenced by education policy makers as well as by economic factors. For example, to increase the continuation rates, districts could enact incentives to keep teachers in the schools beyond their typical retirement ages and thus increase the continuation rates, at least temporarily. Increases in salaries or other benefits could be used to help retain teachers in their positions. Also, an economic downturn might make teaching positions more attractive because of their perceived stability. The important, but less critical, assumption regarding the age distribution of the new teachers can also be influenced by supply and demand forces. Districts could enact policies to recruit older people into the teaching profession. The supply of qualified teachers available can be increased or decreased by changing teacher certification requirements. The revised certification requirements could be adjusted to favor more new or old college graduates for teaching positions. These retention and recruitment efforts would have an impact on the age distribution of newly hired teachers, which would later affect the teacher demand.

The surveys used in this analysis were not designed for state level analysis so no projections are presented for newly hired teachers by state. There is information that may give some indication of the importance of this issue for various states. States which are expected to have large increases in enrollments and states that have relatively large numbers of older teachers may have a greater need for hiring new teachers. However, there are important difference among states and localities, such as varying retirement policies and proximity to other states that may need large numbers of teachers, which will also affect a state's need for newly hired teachers.

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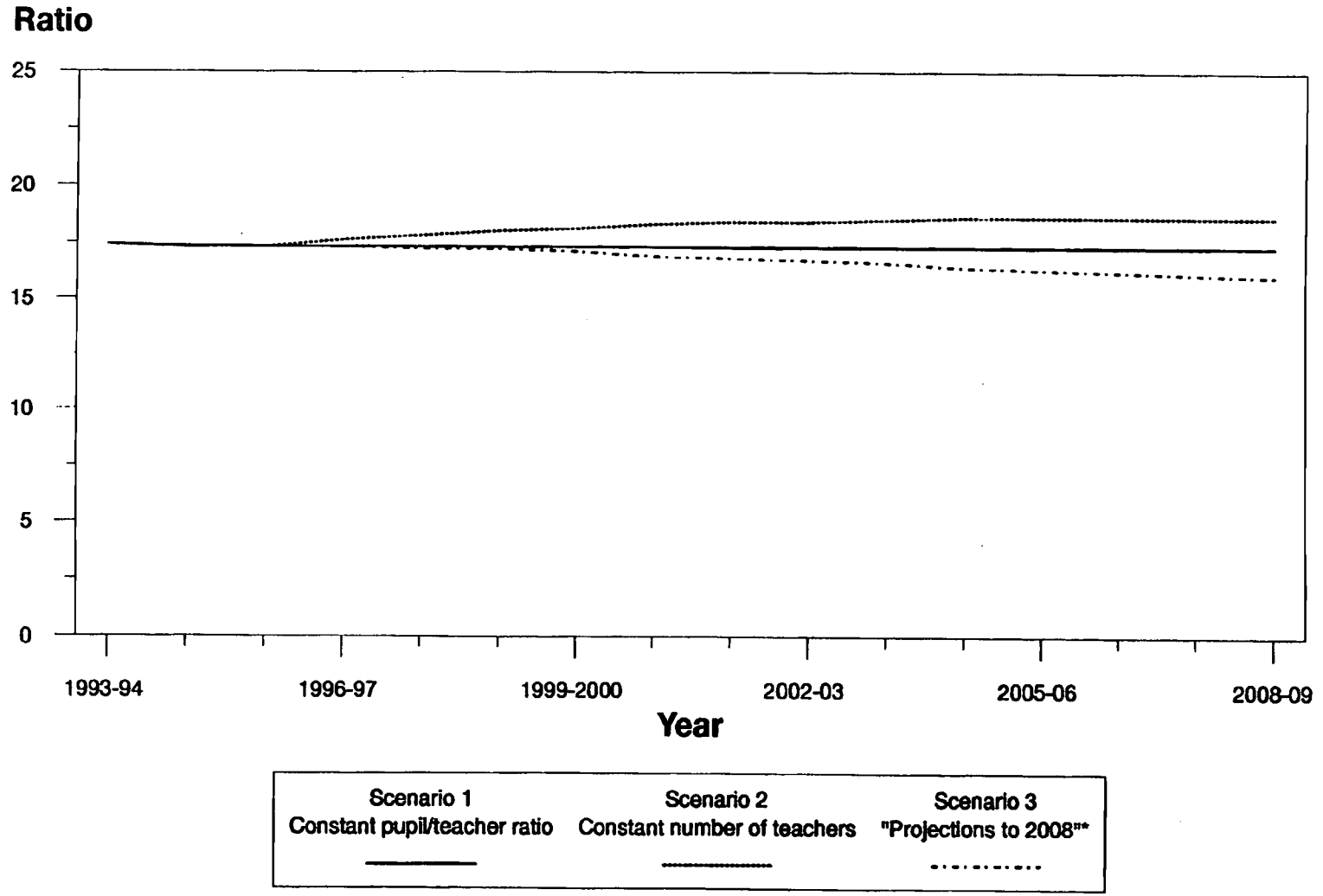
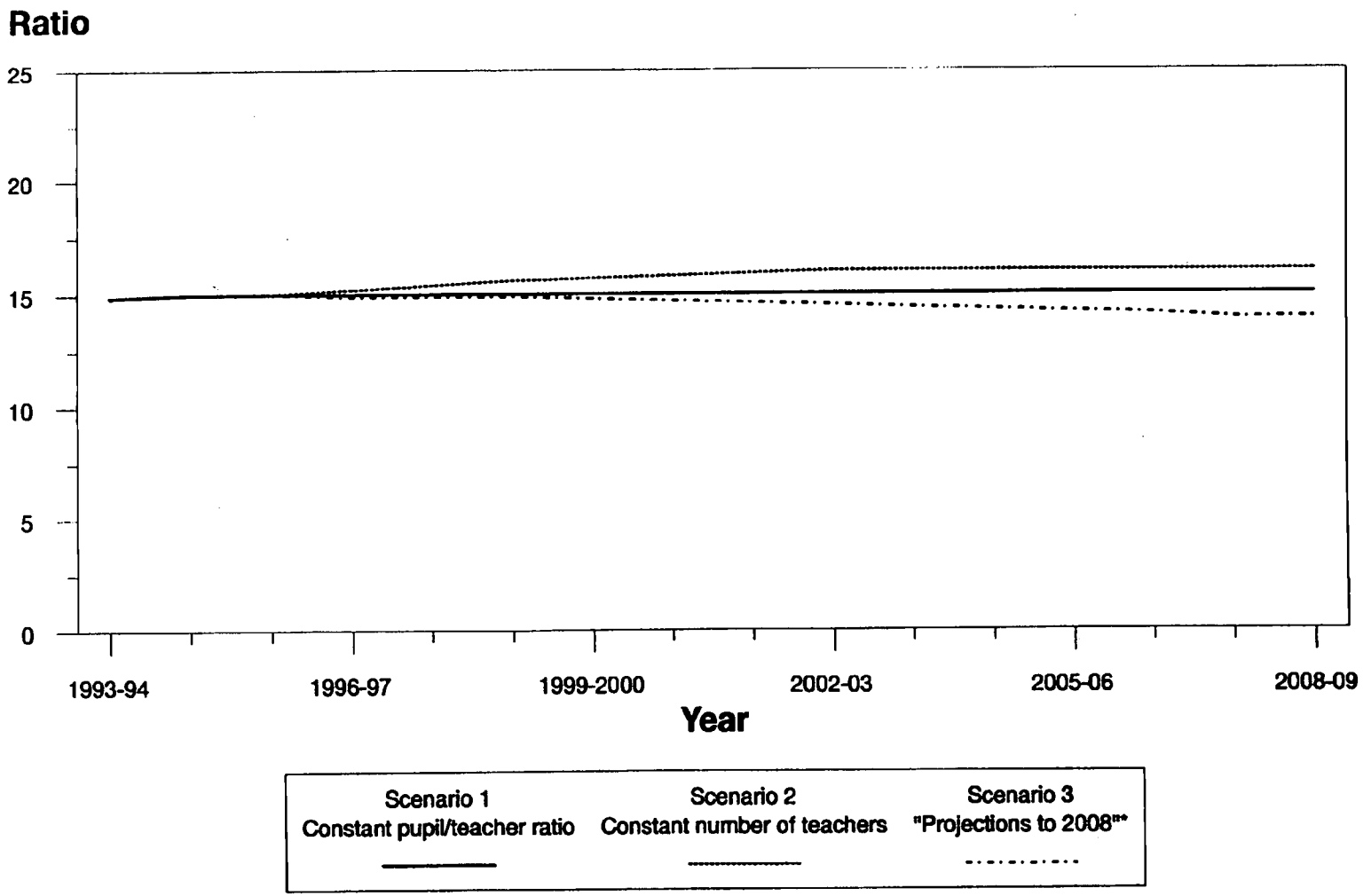
FIGURES

Figure 1: Pupil/teacher ratios for public school teachers for three alternative scenarios: 1993-94 to 2008-09



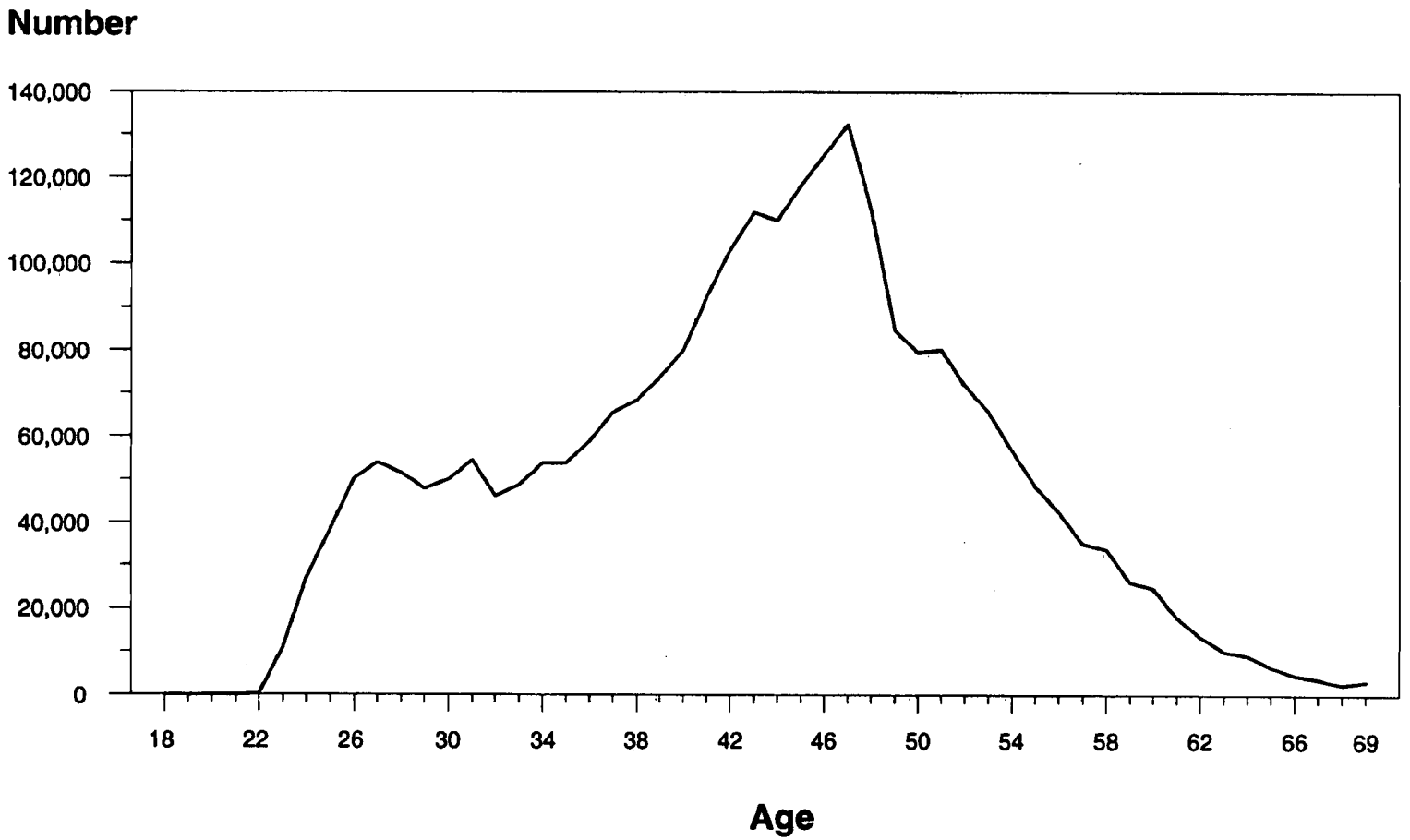
*Includes teachers needed for enrollment changes and pupil/teacher ratio reductions.
SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; *Projections of Education Statistics to 2008*; *Digest of Education Statistics, 1997*; "Common Core of Data" surveys; and unpublished data.

Figure 2: Pupil/teacher ratios for private school teachers for three alternative scenarios: 1993-94 to 2008-09



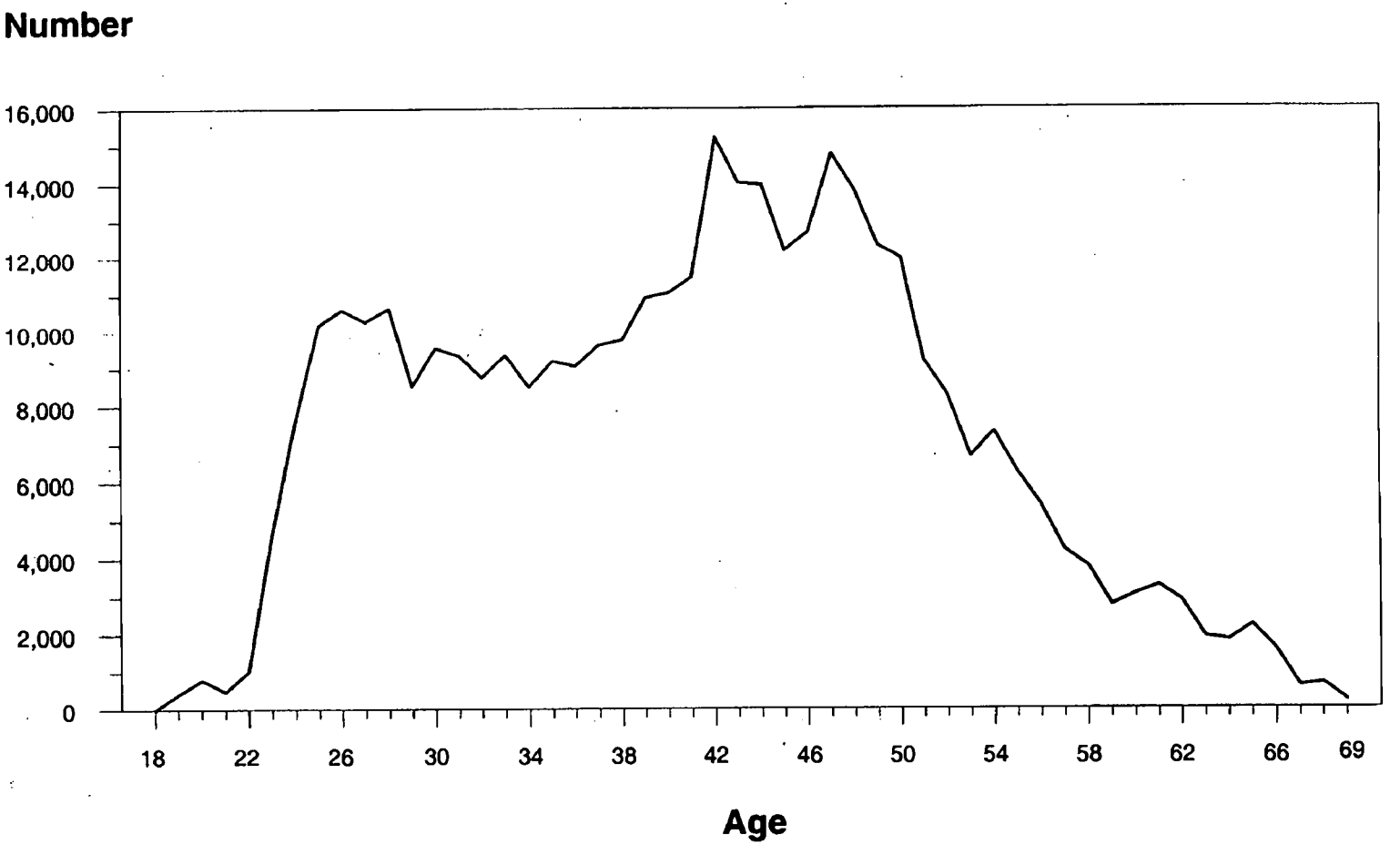
*Includes teachers needed for enrollment changes and pupil/teacher ratio reductions.
SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; *Projections of Education Statistics to 2008*; *Digest of Education Statistics, 1997*; and unpublished data.

Figure 3: Age distribution of full-time and part-time public school teachers: 1993-94



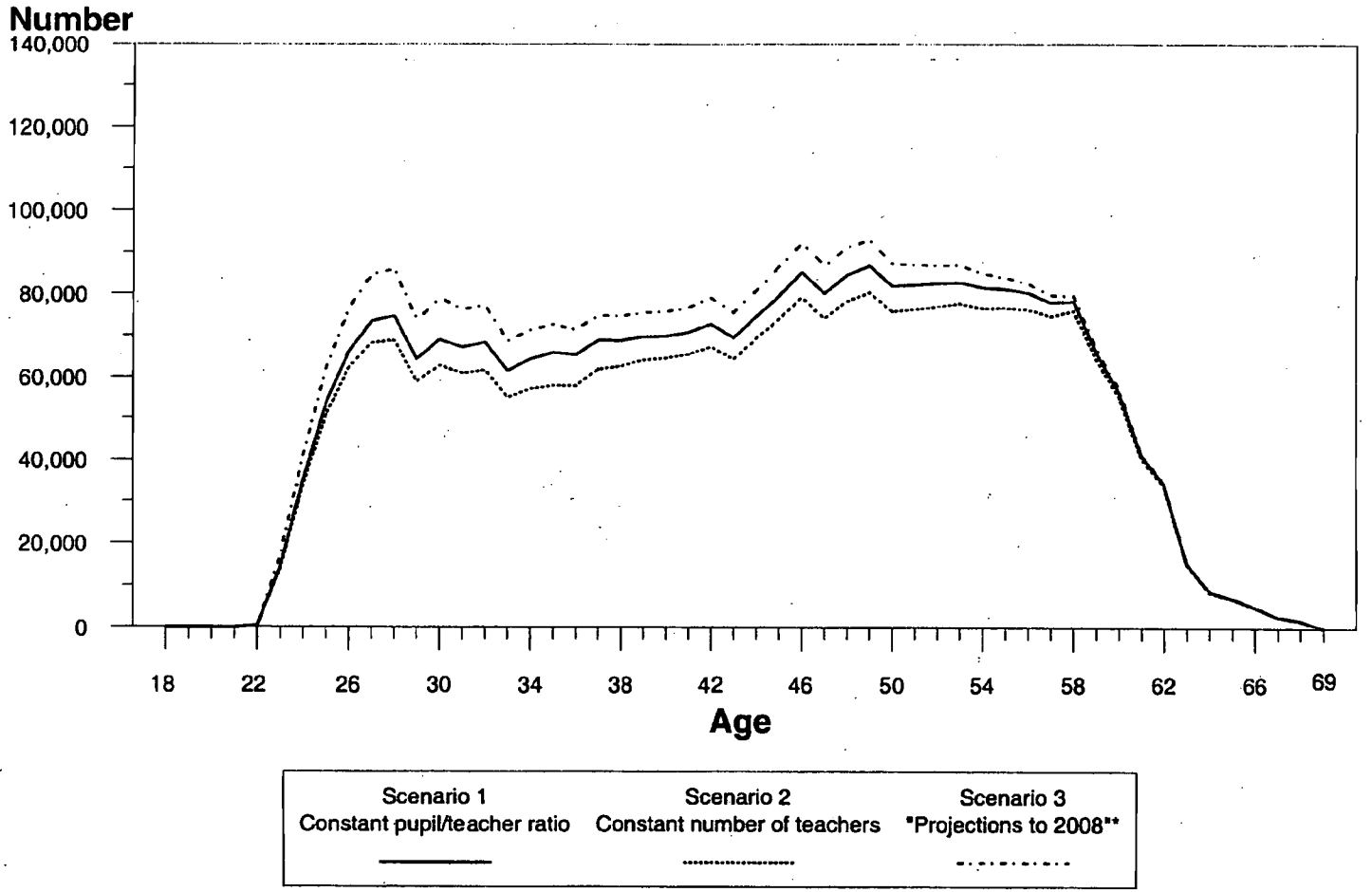
SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey."

Figure 4: Age distribution of full-time and part-time private school teachers: 1993-94



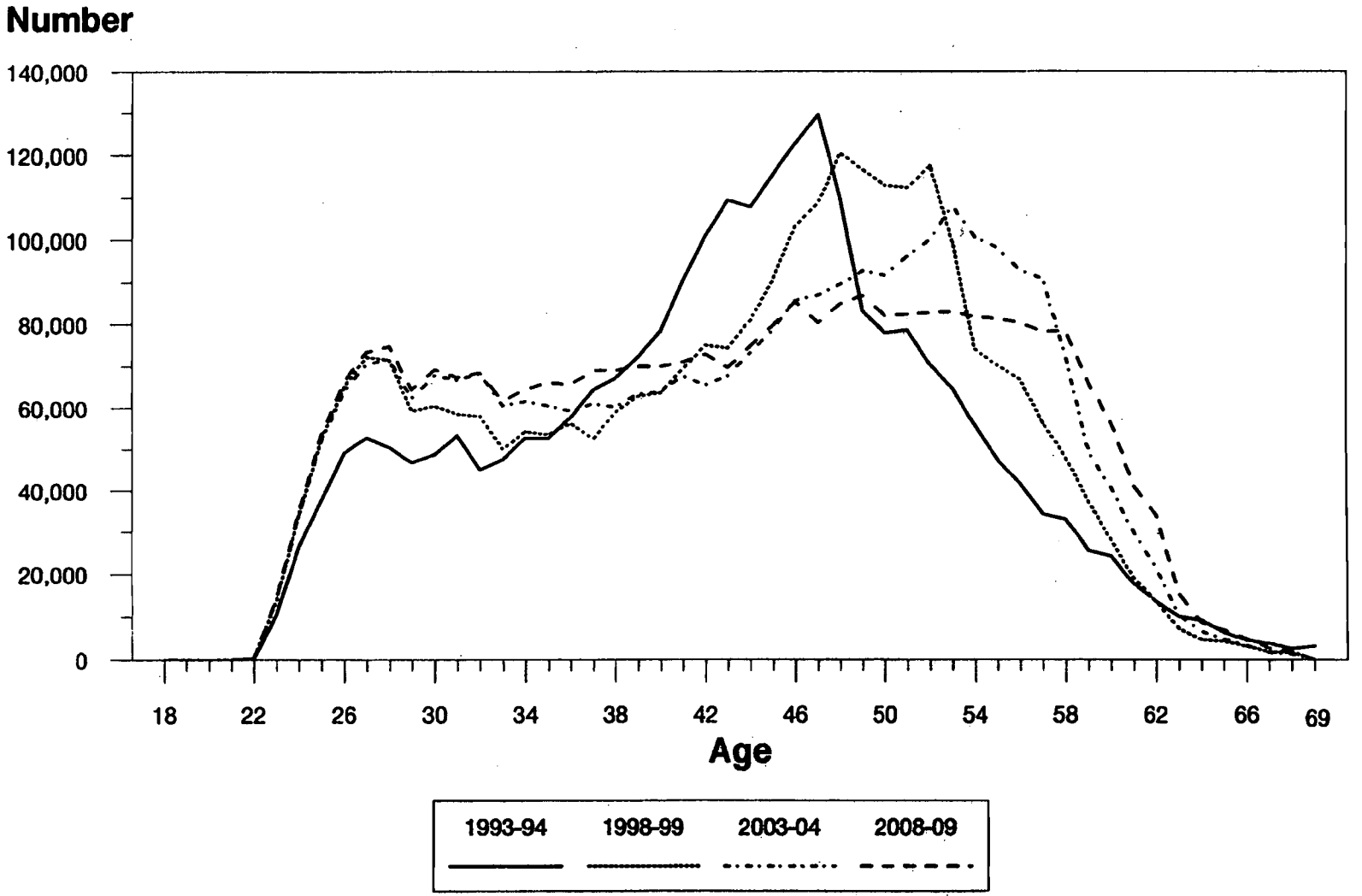
SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey."

Figure 5: Estimated age distribution of full-time-equivalent public school teachers for three alternative scenarios using continuation rates from 1993-94 to 1994-95: 2008-09



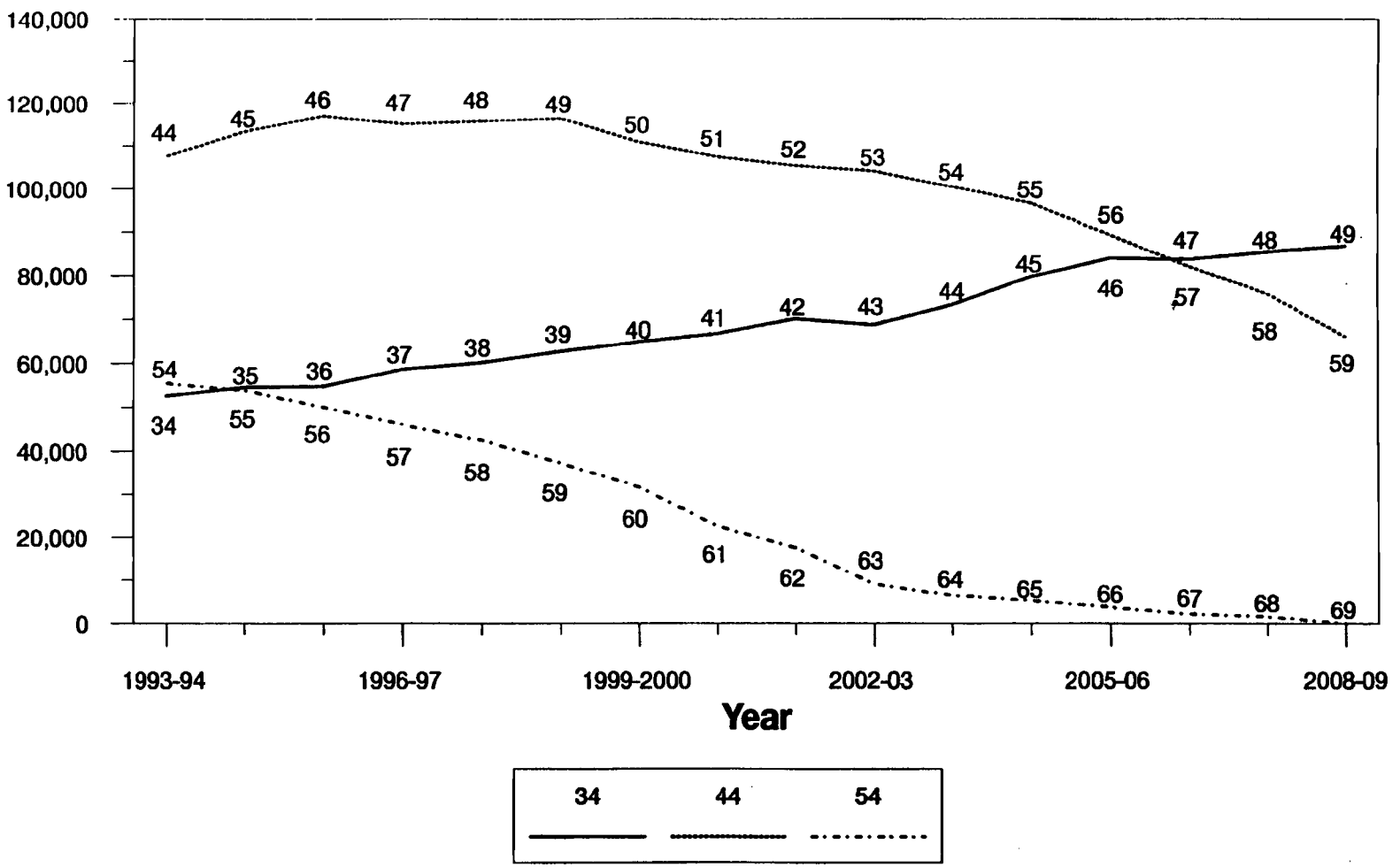
*Includes teachers needed for enrollment changes and pupil/teacher ratio reductions.
SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; *Projections of Education Statistics to 2008*; *Digest of Education Statistics, 1997*; "Common Core of Data" surveys; and unpublished data.

Figure 6: Estimated age distribution of full-time-equivalent public school teachers using a constant pupil/teacher ratio and continuation rates from 1993-94 to 1994-95: 1993-94, 1998-99, 2003-04, and 2008-09



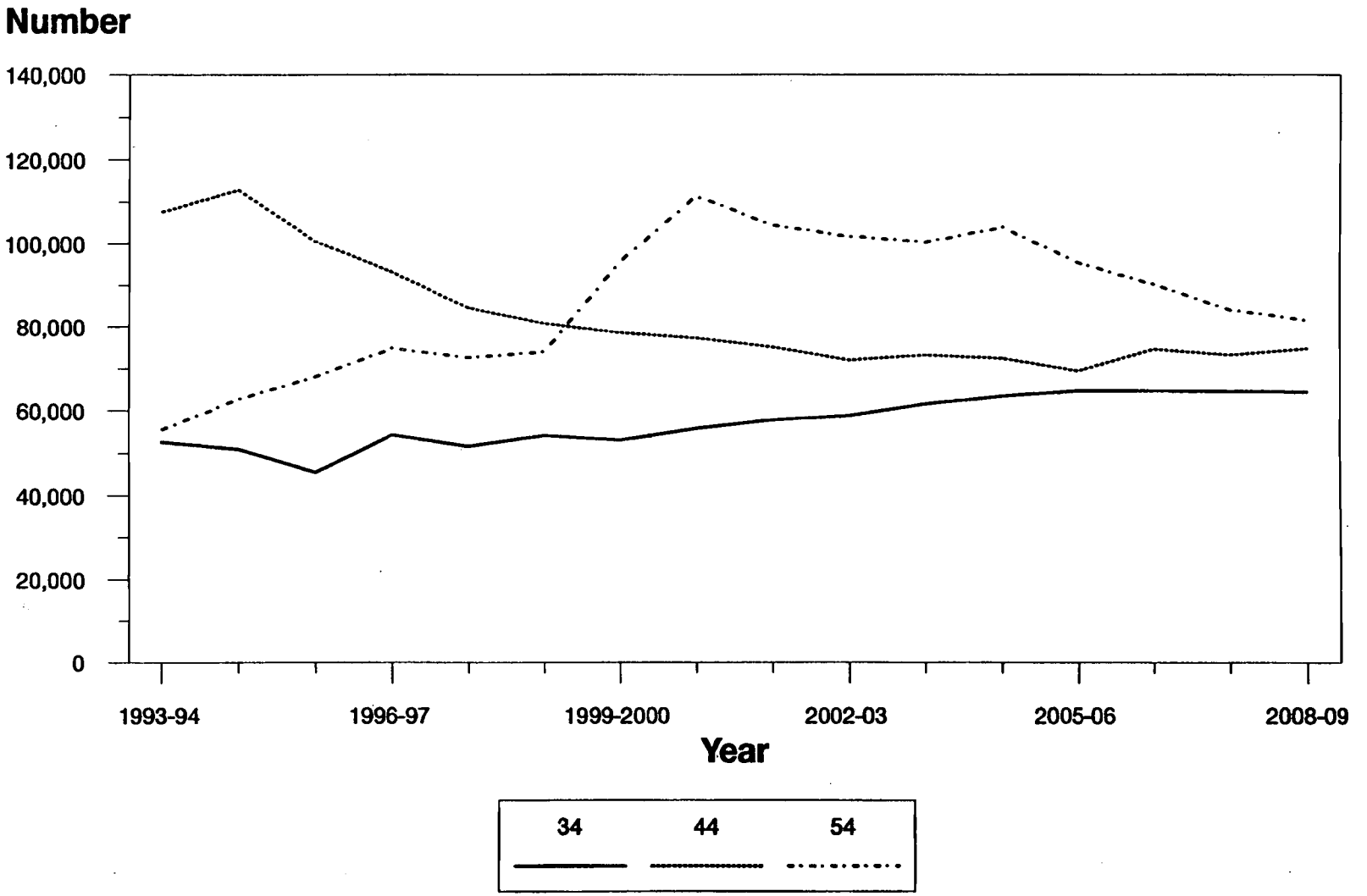
SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; *Projections of Education Statistics to 2008*; *Digest of Education Statistics, 1997*; "Common Core of Data" surveys; and unpublished data.

Figure 7: Projected number of public school teachers from the cohorts of persons who were 34, 44, and 54 in 1993-94 using a constant pupil/teacher ratio and continuation rates from 1993-94 to 1994-95: 1993-94 to 2008-09



NOTE.- The current age for each cohort is shown for each year.
SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; *Projections of Education Statistics to 2008*; *Digest of Education Statistics, 1997*; "Common Core of Data" surveys; and unpublished data.

Figure 8: Projected number of full-time-equivalent public school teachers who are 34, 44, and 54 years old using a constant pupil/teacher ratio and continuation rates from 1993-94 to 1994-95: 1993-94 to 2008-09



SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; *Projections of Education Statistics to 2008*; *Digest of Education Statistics, 1997*; "Common Core of Data" surveys; and unpublished data.

Figure 9: Estimated age distribution of full-time-equivalent private school teachers using a constant pupil/teacher ratio and continuation rates from 1993-94 to 1994-95: 1993-94, 1998-99, 2003-04, and 2008-09

SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; *Projections of Education Statistics to 2008*; *Digest of Education Statistics, 1997*; "Common Core of Data" surveys; and unpublished data.

TABLES

Table 1: Full-time-equivalent (FTE) teachers, newly hired FTE teachers, and the percentage of FTE teachers that are newly hired, by control: 1988–89, 1991–92, and 1994–95

[In thousands]

	Teachers	Newly hired teachers	Percent
Public school teachers			
1988–89 [1]	2,323	174	7.5%
1991–92 [1]	2,432	156	6.4%
1994–95 [2]	2,552	220	8.6%
Private school teachers			
1988–89 [1]	345	38	10.9%
1991–92 [1]	355	43	12.2%
1994–95 [2]	374	56	15.0%

[1] The number of newly hired public school teachers was calculated by: 1) using that year's "Teacher Follow-Up Survey" for the number of people who been either a full-time or part-time public school teacher the previous year and who had left teaching in public schools; 2) multiplying that number by the previous year's ratio of full-time equivalent (FTE) public school teachers to full-time and part-time public school teachers; and 3) adding that number to the net change in FTE public school teachers. The number of newly hired private school teachers was calculated using a similar method.

[2] The number of newly hired public school teachers was calculated by: 1) for each age, multiplying the number of full-time and part-time teachers from the 1993–94 "Schools and Staffing Survey" by one minus the age specific continuation rate from the 1994–95 "Teacher Follow-Up Survey"; 2) summing those numbers by age; 3) multiplying that number by the previous year's ratio of full-time-equivalent (FTE) public school teachers to full-time and part-time public school teachers; and then 4) adding that number to the net change in FTE public school teachers. The number of newly hired private school teachers was calculated using a similar method.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; "Common Core of Data" surveys; and unpublished data.

Table 2: Full-time-equivalent (FTE) public school teachers, with three alternative scenarios for total number of teachers: 1993–94 to 2008–09

[In thousands]

	Scenario 1 (Constant pupil/teacher ratio [1])	Scenario 2 (Constant number of teachers [2])	Scenario 3 (*Projections of Education Statistics to 2008* [3])
1993–94 [4]	2,504	2,504	2,504
1994–95 [4]	2,552	2,552	2,552
1995–96 [4]	2,598	2,598	2,598
1996–97	2,644	2,598	2,645
1997–98	2,683	2,598	2,697
1998–99	2,711	2,598	2,728
1999–2000	2,732	2,598	2,764
2000–01	2,749	2,598	2,802
2001–02	2,764	2,598	2,832
2002–03	2,777	2,598	2,866
2003–04	2,786	2,598	2,903
2004–05	2,794	2,598	2,935
2005–06	2,801	2,598	2,963
2006–07	2,803	2,598	2,985
2007–08	2,801	2,598	3,005
2008–09	2,793	2,598	3,022

[1] Projections for 1996–97 through 2008–09 were produced by dividing the public school enrollment projections from the *Projections of Education Statistics to 2008* by the 1995–96 pupil/teacher ratio.

[2] Projections for 1996–97 through 2008–09 equal the number for the last year there is an actual value, 1995–96.

[3] Projections for 1996–97 through 2008–09 are from the *Projections of Education Statistics to 2008.*

[4] Actual data.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; "Common Core of Data" surveys; *Projections of Education Statistics to 2008;* and unpublished data.

Table 3: Full-time-equivalent (FTE) private school teachers, with three alternative scenarios for total number of teachers: 1993–94 to 2008–09

[In thousands]

	Scenario 1 (Constant pupil/teacher ratio [1])	Scenario 2 (Constant number of teachers [2])	Scenario 3 (*Projections of Education Statistics to 2008* [3])
1993–94 [4]	366	366	366
1994–95 [4]	374	374	374
1995–96 [4]	380	380	380
1996–97	386	380	387
1997–98	391	380	394
1998–99	395	380	399
1999–2000	398	380	404
2000–01	400	380	409
2001–02	403	380	413
2002–03	404	380	418
2003–04	405	380	423
2004–05	406	380	427
2005–06	406	380	430
2006–07	406	380	433
2007–08	405	380	436
2008–09	404	380	438

[1] Projections for 1996–97 through 2008–09 were produced by dividing the private school enrollment projections from the *Projections of Education Statistics to 2008* by the 1995–96 pupil/teacher ratio.

[2] Projections for 1996–97 through 2008–09 equal the number for 1995–96.

[3] Projections for 1996–97 through 2008–09 are from the *Projections of Education Statistics to 2008.*

[4] Estimated.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; *Projections of Education Statistics to 2008;* and unpublished data.

Table 4: Full-time and part-time teachers, by control, age group, and state: 1987–88, 1990–91, and 1993–94

	Total number, in thousands	Median age	Distribution, by age						
			Less than 25	25 to 39	30 to 39	40 to 49	50 to 59	60 to 64	65 or more
United States teachers, by year, and control									
Public school teachers									
1987–88	2,323	41	2 (0.05)	10 (0.16)	33 (0.27)	35 (0.26)	17 (0.24)	3 (0.10)	1 (0.05)
1990–91	2,559	43	2 (0.10)	8 (0.22)	27 (0.33)	40 (0.37)	19 (0.29)	3 (0.13)	1 (0.06)
1993–94	2,561	44	1 (0.08)	9 (0.17)	22 (0.30)	42 (0.33)	21 (0.29)	3 (0.11)	1 (0.07)
Private school teachers									
1987–88	307	39	4 (0.27)	15 (0.66)	33 (0.80)	30 (0.82)	12 (0.50)	4 (0.43)	2 (0.26)
1990–91	356	41	3 (0.26)	13 (0.58)	28 (0.78)	34 (0.74)	15 (0.55)	4 (0.30)	3 (0.26)
1993–94	376	42	4 (0.21)	13 (0.35)	25 (0.48)	35 (0.60)	17 (0.48)	3 (0.20)	2 (0.16)
Public school teachers—1993–94									
Public, total	**2,561**	**44**	**1**	**9**	**22**	**42**	**21**	**3**	**1**
Alabama	45	42	2	9	23	46	17	3	1
Alaska	8	43	—	4	30	48	17	1	—
Arizona	38	43	1	9	25	42	18	4	1
Arkansas	31	42	2	10	30	38	16	3	—
California	209	46	1	8	21	37	28	4	1
Colorado	36	44	—	7	25	41	23	2	1
Connecticut	35	46	—	5	18	49	25	3	1
Delaware	7	44	1	11	20	44	21	3	—
District of Columbia	5	47	3	3	15	38	36	5	—
Florida	107	43	1	9	25	39	20	4	2
Georgia	75	41	2	14	28	35	18	3	—
Hawaii	11	45	2	11	21	38	25	2	—
Idaho	12	43	1	10	25	43	17	3	1
Illinois	112	45	3	9	18	46	21	2	1
Indiana	58	44	1	8	21	45	22	3	—
Iowa	36	44	1	9	21	43	22	4	1
Kansas	31	42	1	12	26	38	20	3	1
Kentucky	42	42	1	12	28	43	13	2	2
Louisiana	49	42	1	13	26	39	17	4	1
Maine	16	44	1	6	21	47	21	3	1
Maryland	44	44	4	10	19	43	20	1	1
Massachusetts	58	46	1	5	16	50	24	4	1
Michigan	83	46	1	9	18	42	27	2	1
Minnesota	44	44	1	8	22	40	24	3	1
Mississippi	30	44	3	8	24	44	20	2	—
Missouri	62	43	1	12	27	39	18	3	—
Montana	13	42	2	9	26	44	17	2	1
Nebraska	20	43	2	12	23	43	18	3	1
Nevada	13	43	1	11	24	38	22	3	1
New Hampshire	12	44	2	7	25	43	20	3	—
New Jersey	84	46	2	9	14	41	26	6	2
New Mexico	19	43	1	9	26	42	18	3	—
New York	179	45	1	9	20	43	24	3	1
North Carolina	72	42	3	11	25	40	17	3	1
North Dakota	8	42	1	11	27	41	17	2	—
Ohio	112	43	2	8	22	46	19	3	—
Oklahoma	42	42	1	10	26	43	17	2	—
Oregon	26	45	1	5	22	46	25	2	—
Pennsylvania	115	45	1	9	16	48	24	2	—
Rhode Island	9	44	2	6	18	51	20	2	1
South Carolina	40	42	4	11	27	39	16	2	—
South Dakota	11	41	2	13	28	35	17	3	1
Tennessee	48	44	2	11	20	42	20	4	1
Texas	224	42	2	12	27	39	18	2	1
Utah	20	44	2	8	23	39	23	4	—
Vermont	7	44	1	7	23	45	20	4	—
Virginia	65	43	2	10	24	42	19	3	—
Washington	48	44	1	9	22	43	22	2	—
West Virginia	21	43	1	5	23	49	18	3	—
Wisconsin	63	44	1	12	22	39	23	3	1
Wyoming	8	43	1	8	25	43	21	2	1

—Less than .5 percent.

NOTE: Standard errors appear in parentheses. Because of rounding, details may not add to totals.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; and unpublished data.

Table 5: Continuation rates of public and private full-time and part-time school teachers, by age group: 1987–88 to 1988–89, 1990–91 to 1991–92, and 1993–94 to 1994–95

Year, by control	Total	Continuation rates, by age						
		Less than 25	25 to 29	30 to 39	40 to 49	50 to 59	60 to 64	65 or more
Public[1]								
1987–88 to 1988–89 ..	94 (0.30)	96 (0.91)	91 (1.18)	94 (0.59)	97 (0.32)	94 (0.82)	77 (0.82)	83 (4.90)
1990–91 to 1991–92 ..	95 (0.36)	91 (2.30)	91 (1.21)	96 (0.76)	98 (0.31)	93 (0.95)	73 (4.30)	59 (13.80)
1993–94 to 1994–95 ..	93 (0.34)	96 (1.05)	90 (1.25)	93 (0.94)	96 (0.54)	94 (0.77)	70 (4.78)	66 (7.79)
Private[2]								
1987–88 to 1988–89 ..	87 (0.85)	81 (3.79)	83 (2.42)	88 (1.59)	89 (1.63)	89 (2.45)	84 (5.93)	92 (3.16)
1990–91 to 1991–92 ..	88 (0.80)	76 (4.91)	82 (2.27)	86 (1.65)	92 (1.03)	90 (1.90)	82 (4.62)	79 (5.83)
1993–94 to 1994–95 ..	88 (0.70)	80 (4.19)	87 (1.35)	85 (1.54)	91 (1.02)	92 (1.53)	87 (2.74)	58 (8.67)

[1] Percentage of public school teachers from the first year who continued teaching in public schools in the second year.

[2] Percentage of private school teachers from the first year who continued teaching in private schools in the second year.

Note.—Standard errors appear in parentheses.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey," various years; and unpublished data.

Table 6: Distribution of full-time and part-time newly hired teachers,[1] by age group and control of school: 1987–88, 1990–91, and 1993–94

Year, by control	Percentage distribution, by age						
	Less than 25	25 to 29	30 to 39	40 to 49	50 to 59	60 to 64	65 or more
Public							
1987–88	18	24	33	21	4	(2)	(2)
1990–91	17	24	31	21	6	1	(2)
1993–94	16	29	25	25	5	1	(2)
Private							
1987–88	17	22	33	19	5	3	1
1990–91	16	26	29	21	6	1	1
1993–94	19	24	25	23	7	1	(2)

[1] Using the Schools and Staffing Survey (SASS), it is possible to approximate the number of the teachers, by control of school, who had not taught in that type of school the year before. One method is to consider four types of teachers who had not taught the year before. Of those four components, the SASS can be used to measure three of them. They are, for public school teachers: 1) new teachers who had never taught before in either public or private schools; 2) returning teachers who had taught in public and/or private schools in the past but had not taught last year; and 3) teachers who had taught in a private school last year and had never before taught in a public school. The missing component is the number of teachers who had been teaching in a private school the previous year but had earlier experience teaching in public schools.

[2] Less than .5 percent.

NOTE.—Because of rounding, details may not add to totals.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; and unpublished data.

Table 7: Estimated number of newly hired FTE public school teachers needed using continuation rates from 1993–94 to 1994–95, using alternative scenarios for total number of teachers: 1994–95 to 2008–09

[In thousands]

	Scenario 1 (Constant pupil/teacher ratio [1])	Scenario 2 (Constant number of teachers [2])	Scenario 3 (*Projections of Education Statistics to 2008* [3])
Total needed 1998–99 to 2008–09 (11 years)	**2,399**	**2,159**	**2,693**
1994–95 [4]	220	220	220
1995–96 [4]	220	220	220
1996–97	223	177	224
1997–98	220	177	233
1998–99	214	180	218
1999–2000	210	181	227
2000–01	212	184	235
2001–02	214	188	233
2002–03	218	192	244
2003–04	217	196	252
2004–05	221	199	253
2005–06	224	203	256
2006–07	224	208	256
2007–08	225	212	259
2008–09	221	215	261

[1] Total number of teachers for 1996–97 through 2008–09 were produced by dividing the public school enrollment projections from the *Projections of Education Statistics to 2008* by the 1995–96 pupil/teacher ratio.

[2] Total number of teachers for 1996–97 through 2008–09 equals last actual value, 1995–96.

[3] Total number of teachers for 1996–97 through 2008–09 are from the *Projections of Education Statistics to 2008*.

[4] The number of newly hired teachers was computed using the actual number of teachers.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; "Common Core of Data" surveys; *Projections of Education Statistics to 2008*; and unpublished data.

Table 8: Estimated number of newly hired FTE public school teachers needed in scenario 1 (constant pupil/teacher ratio)[1] using alternative continuation rate assumptions: 1994–95 to 2008–09

[In thousands]

	Alternative 1	Alternative 2	Alternative 3
	Percentage of teachers who remained teaching from 1987–88 to 1988–89	Percentage of teachers who remained teaching from 1990–91 to 1991–92	Percentage of teachers who remained teaching from 1993–94 to 1994–95
Total needed 1998–99 to 2008–09 (11 years)	**2,055**	**1,949**	**2,399**
1994–95[2]	188	182	220
1995–96[2]	189	183	220
1996–97	193	183	223
1997–98	188	181	220
1998–99	183	174	214
1999–2000	179	170	210
2000–01	180	171	212
2001–02	182	173	214
2002–03	186	176	218
2003–04	187	177	217
2004–05	191	181	221
2005–06	193	182	224
2006–07	191	181	224
2007–08	192	183	225
2008–09	190	180	221

[1] Projections of the total number of teachers for 1996–97 through 2008–09 were produced by dividing the public school enrollment projections from the *Projections of Education Statistics to 2008* by the 1995–96 pupil/teacher ratio.

[2] The number of newly hired teachers was computed using the actual number of teachers.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; "Common Core of Data" surveys; *Projections of Education Statistics to 2008; Digest of Education Statistics, 1997;* and unpublished data.

Table 9: Estimated number of newly hired FTE private school teachers needed using continuation rates from 1993–94 to 1994–95, using alternative scenarios for total number of teachers: 1994–95 to 2008–09

[In thousands]

	Scenario 1 (Constant pupil/teacher ratio [1])	Scenario 2 (Constant number of teachers [2])	Scenario 3 (*Projections of Education Statistics to 2008* [3])
Total needed 1998–99 to 2008–09 (11 years)	**568**	**524**	**620**
1994–95 [4]	56	56	56
1995–96 [4]	54	54	54
1996–97	53	47	54
1997–98	53	46	54
1998–99	52	46	53
1999–2000	51	46	54
2000–01	51	47	55
2001–02	52	47	55
2002–03	52	47	57
2003–04	52	47	57
2004–05	52	48	58
2005–06	52	48	57
2006–07	52	49	58
2007–08	52	49	58
2008–09	51	49	58

[1] Projections for 1996–97 through 2008–09 were produced by dividing the private school enrollment projections from the *Projections of Education Statistics to 2008* by the 1995–96 pupil/teacher ratio.

[2] Projections for 1996–97 through 2008–09 equal the number for 1995–96.

[3] Projections for 1996–97 through 2008–09 are from the *Projections of Education Statistics to 2008*.

[4] The number of newly hired teachers was computed using an estimate for the number of teachers.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; *Projections of Education Statistics to 2008*; and unpublished data.

Table 10: Estimated number of newly hired FTE private school teachers needed in scenario 1 (constant pupil/teacher ratio)[1] using alternative continuation rate assumptions: 1994–95 to 2008–09

[In thousands]

	Alternative 1	Alternative 2	Alternative 3
	Percentage of teachers who remained teaching from 1987–88 to 1988–89	Percentage of teachers who remained teaching from 1990–91 to 1991–92	Percentage of teachers who remained teaching from 1993–94 to 1994–95
Total needed 1998–99 to 2008–09 (11 years)	596	555	568
1994–95[2]	55	52	56
1995–96[2]	53	51	54
1996–97	54	51	53
1997–98	55	52	53
1998–99	55	51	52
1999–2000	54	51	51
2000–01	55	51	51
2001–02	55	51	52
2002–03	55	51	52
2003–04	54	51	52
2004–05	54	50	52
2005–06	54	50	52
2006–07	54	50	52
2007–08	53	50	52
2008–09	53	50	51

[1] Projections for 1996–97 through 2008–09 were produced by dividing the private school enrollment projections from the *Projections of Education Statistics to 2008* by the 1995–96 pupil/teacher ratio.

[2] The number of newly hired teachers was computed using an estimate for the number of teachers.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; "Common Core of Data" surveys; *Projections of Education Statistics to 2008; Digest of Education Statistics, 1997;* and unpublished data.

TECHNICAL APPENDIX

Technical Appendix

A1. Schools and Staffing Survey

The Schools and Staffing Survey (SASS) is a set of linked questionnaires that covers public school districts, public and private schools, principals, and teachers as its core components. SASS was first conducted for the National Center for Education Statistics by the Bureau of the Census during the 1987–88 school year. SASS subsequently was conducted in 1990–91 and in 1993–94. The next SASS is scheduled for school year 1999–2000. SASS is a mailed questionnaire with telephone follow-up that collects data on the nation's public and private elementary and secondary teaching force, characteristics of schools and school principals, demand for teachers, and school/school district policies. The 1990–91 and 1993–94 SASS also collected data on Bureau of Indian Affairs (BIA) schools. The SASS data are collected through a sample survey of schools, the school districts associated with sampled schools, school principals, and teachers. The 1993–94 SASS expanded to cover school libraries and librarians, and field tested an administrative student records questionnaire.

The 1993–94 SASS estimates are based upon a sample consisting of approximately 9,900 public schools, 3,300 private schools, and 5,500 public school districts associated with the public schools in the sample. From these schools, about 57,000 public school teachers and 11,500 private school teachers were selected for the 1993–94 SASS teacher survey.

The public school sample for the 1993–94 SASS was based upon the 1991–92 school year Common Core of Data (CCD), a compilation of all the nation's public school districts and public schools. CCD is collected annually from state education agencies. The frame includes regular public schools, Department of Defense-operated military base schools in the United States, and nonregular schools such as special education, vocational, and alternative schools. SASS is designed to provide national estimates for public and private school characteristics and state estimates for school districts, public schools, principals, and teachers. The teacher survey is designed to allow comparisons between new and experienced teachers, and between bilingual/ESL teachers and other teachers.

The private school sample for the 1993–94 SASS was selected from the 1991–92 Private School Universe Survey (PSS), supplemented with list updates from states and some associations available in time for sample selection. PSS collects basic data on all of the nation's private schools from two sources: the list frame and the area search frame. The list frame was compiled from a set of private school associations that provide NCES with their membership lists and states that gather lists of private schools. The area search frame consisted of schools not included on the list frame that were compiled from local sources in a sample of counties around the United States. Private school estimates are available at the national level and by type of private school.

The Teacher Demand and Shortage (school district) and School Principal Questionnaires were mailed out first in October 1993, along with School Library/Media Center and Library Media Specialist/Librarian Questionnaires. The weighted response rate for the Teacher Demand and Shortage Questionnaire was 93.9 percent. Weighted response rates for the Public School Principal Questionnaire and the Private School Questionnaire were 96.6 percent and 87.6 percent, respectively.

The public, private, and BIA school questionnaires were mailed out in several batches, between mid-December 1993 and early February 1994. Weighted response rates for the Public School Questionnaire and the Private School Questionnaire were 92.3 percent and 83.2 percent, respectively. Five percent of public schools and 9 percent of private schools did not provide a list of teachers in their schools and were thus ineligible for sampling. Weighted response rates were 88.2 percent for public school teachers and 80.2 percent for private school teachers.

Item response rates were varied, but generally high, ranging from 67 to 100 percent for the TDS, 65 to 100 percent for public school principal questions, 55 to 100 percent for private school principal items, 83 to 100 percent for public school items, 61 to 100 percent for private school survey items, 71 to 100 percent for public school teacher items, and 69 to 100 percent for private school teacher items.

Public-use and restricted-use microdata files are available on CD-ROM. Summary data from the 1993–94 SASS can be found in *Schools and Staffing in the United States: Selected Data for Public and Private Schools, 1993–94* (NCES 95–191). More detailed results from the 1993–94 SASS are published

in *Schools and Staffing in the United States: A Statistical Profile, 1993–94* (NCES 96–124). Data by state are available in *SASS by State—1993–94 Schools and Staffing Survey Selected State Results* (NCES 96–312). Further information about the sample may be obtained from *1993–94 Schools and Staffing Survey: Sample Design and Estimation* (NCES 96–086). Data from previous SASS collections are published in the 1987–88 and 1990–91 *Profile* reports (NCES 92–127 and 93–146, respectively), as well as the 1987–88 and 1990–91 versions of the sample design report (NCES 91–127 and 93–449, respectively).

A2. Teacher Follow-up Survey

The Teacher Follow-up Survey (TFS), a component of SASS, provides data used to study teacher attrition and retention in public and private schools. It consists of a subsample of SASS teachers, and has been implemented one year after each of the SASS surveys. The TFS identifies and collects data from various groups of teachers who were surveyed the previous year. Teachers who remain in the teaching profession can be identified as such, including those who remain in the same school (stayers) and those who changed schools (movers). Teachers who stay in teaching can be contrasted with those who had left teaching (leavers) in the year after participating in the SASS survey.

For the 1994–95 TFS, respondents to the 1993–94 SASS Public School Teacher Questionnaire were sorted within strata by teacher subject, Census region, urbanicity, school enrollment, and the SASS teacher control number. Respondents to the 1993–94 SASS Private were sorted within strata by teacher subject, association membership or afflication, urbanicity, school enrollment, and the SASS teacher control number. After sorting, teachers were selected within strata using a probability-proportional-to-size sampling procedure, using the 1993–94 SASS intermediate teacher weight of size. A total of 5,025 public school teachers, 2,098 private school teachers, and 50 Bureau of Indian Affairs (BIA) school teachers were selected, of whom 4,528, 1,751, and 44, respectively, were interviewed.

Weighted response rates for the Teacher Follow-up Survey (shown in percentages).

Sampled Teachers	Response rate
Public	92.3
Current teachers	92.5
Former teachers	89.2
Private	87.2
Current teachers	87.2
Former teachers	87.6
Bureau of Indian Affairs	99.5
Current teachers	99.9
Former teachers	88.9
Total	91.6
Current teachers	91.8
Former teachers	88.8

A3. *Projections of Education Statistics to 2008* Classroom Teachers Models

The projections for the numbers of public teachers used in scenario 3 were those from the middle alternative scenario originally presented in *Projections of Education Statistics to 2008*. Single equation models were developed for the elementary and secondary levels. The particular equations shown were selected on the basis of their statistical properties, such as coefficients of determination (R2s), the t-statistics of the coefficients, the Durbin–Watson statistic, and residual plots.

The public elementary classroom teacher model is:

$$ELTCH = -222.9 + \underset{(4.3)}{0.039PCI87} + \underset{(1.6)}{0.7SGRANT} + \underset{(4.9)}{0.03ELENR}$$

$R2 = .99$
Durbin–Watson statistic = 1.5

where:

ELTCH is the number of public elementary classroom teachers.

PCI87 is disposable income per capita in 1986–87 dollars;

SGRANT is the level of education revenue receipts from state sources per capita in 1986–87 dollars; and

ELENR is the number of students enrolled in public elementary schools.

The time period of observations used in this equation was from 1960 to 1993. The equation was estimated using the AR1 model for correcting for autocorrelation.

The public secondary classroom teacher model is:

$$SCTCH = -171.7 + \underset{(5.0)}{0.03PCI87} + \underset{(2.2)}{0.5SGRANT3} + \underset{(12.9)}{0.04SCENR}$$

$R2 = .97$
Durbin–Watson statistic = 2.0

where:

SCTCH is the number of public secondary classroom teachers;

PCI87 is disposable income per capita in 1986–87 dollars;

SGRANT3 is the level of education revenue receipts from state sources per capita in 1986–87 dollars, lagged 3 years, and;

SCENR is the number of students enrolled in public secondary schools.

The time period of observations used in this equation was from 1965 to 1993. The equation was estimated using the AR1 model for correcting for autocorrelation.

Projections of private classroom teachers were derived in the following manner. For 1960 to 1994, the ratio of private school teachers to public school teachers was calculated by organizational level. These ratios were projected using single exponential smoothing, yielding a constant value over the projection period. This constant value was then applied to projections of public school teachers by organizational level to yield projections of private school teachers. This method assumes that the future pattern in the trend of private school teachers will be the same as that for public school teachers.

Further information concerning these teacher forecasts, including the projections for the independent variables and a discussion of the projection accuracy of teacher projections from previous editions of the *Projections of Education Statistics* can be found in the *Projections of Education Statistics to 2008*.

APPENDIX TABLES

Table A1: Enrollment in elementary and secondary school: by control of institutions: 1993–94 to 1994–95

[In thousands]

	Public	Private
1993–94	43,465	5,471
1994–95	44,111	5,596
1995–96	44,840	5,700
1996–97	45,630	5,783
1997–98	46,308	5,867
1998–99	46,792	5,927
1999–2000	47,143	5,970
2000–01	47,439	6,006
2001–02	47,698	6,038
2002–03	47,924	6,063
2003–04	48,075	6,078
2004–05	48,221	6,087
2005–06	48,335	6,091
2006–07	48,368	6,088
2007–08	48,342	6,082
2008–09	48,201	6,067

SOURCE: U.S. Department of Education, National Center for Education Statistics, *Projections of Education Statistics to 2008.*

Table A2: Distribution of public school teachers, by age group and attendance status: 1993–94

Attendance status	Percentage distribution, by age						
	Less than 25	25 to 29	30 to 39	40 to 49	50 to 59	60 to 64	65 or more
Full-time	1	10	22	42	21	3	1
Part-time	2	8	25	44	18	3	1

NOTE.—Because of rounding, details may not add to totals.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; and unpublished data.

Table A3: Continuation rates of public full-time and part-time school teachers, by individual age from 50 to 70 years old: 1987–88 to 1988–89, 1990–91 to 1991–92, and 1993–94 to 1994–95

Age	1987–88 to 1988–89	1990–91 to 1991–92	1993–94 to 1994–95
50	97	95	95
51	95	96	98
52	96	97	93
53	96	95	94
54	94	95	97
55	95	92	92
56	89	92	93
57	94	92	84
58	87	87	92
59	95	84	87
60	87	70	82
61	86	78	61
62	57	51	71
63	57	71	78
64	71	(1)	75
65	85	67	43
66	(1)	(1)	(1)
67	(1)	(1)	(1)
68	(1)	(1)	(1)
69	(1)	(1)	(1)
70	(1)	(1)	(1)

[1] Too few samples cases (fewer than 30) for a reliable estimate.

SOURCE: U.S. Department of Education, National Center for Education Statistics,

Table A4: Proportion of non-continuing teachers who retired, by age group: 1993–94 to 1994–95

Year	Total	Age				
		Less than 50	50 to 54	55 to 59	60 to 64	65 or more
Retirement rates	27.0 (2.0)	3.4 (1.6)	37.7 (7.5)	65.3 (8.5)	91.5 (2.1)	95.2 (2.0)

Note.—Standard errors appear in parentheses.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey", various years; and unpublished data.

Table A5: Distribution of full-time and part-time teachers who had not taught the previous year,[1] by age group, type, and control of school: 1993–94

	Total	Percentage distribution, by age						
		Less than 25	25 to 29	30 to 39	40 to 49	50 to 59	60 to 64	65 or more
Public school teachers								
Number, in thousands								
Total[1]	168	27	48	42	41	8	1	(3)
First year teaching[2]	114	27	42	25	17	3	(3)	(3)
Returning teachers[4]	44	(3)	4	14	21	5	1	(3)
Private school teachers[5]	10	(3)	2	3	4	1	(3)	(3)
Percent within Group								
Total[1]	100	16 (0.91)	29 (1.15)	25 (1.04)	25 (1.16)	5 (0.63)	1 (0.13)	(6) (0.09)
First year teaching[2]	100	24	37	22	15	2	(6)	(6)
Returning teachers[4]	100	(6)	9	31	46	12	1	(6)
Private school teachers[5]	100	4	19	30	40	5	1	1
Percent within Age Group								
Total[1]	100	100	100	100	100	100	100	100
First year teaching[2]	68	98	87	60	40	33	17	1
Returning teachers[4]	26	(6)	9	33	50	61	73	58
Private school teachers[5]	6	2	4	7	10	6	10	40
Private School Teachers								
Number, in thousands								
Total[1]	51	10	12	13	11	4	1	(3)
First year teaching[2]	31	9	9	7	5	1	(3)	(3)
Returning teachers[4]	10	(3)	1	3	4	1	(3)	(3)
Public school teachers[7]	10	(3)	2	3	3	1	(3)	(3)
Percent within Group								
Total[1]	100	19 (1.13)	24 (1.19)	25 (1.15)	23 (1.18)	7 (0.85)	1 (0.20)	(6) (0.23)
First year teaching[2]	100	31	29	21	15	3	(6)	(6)
Returning teachers[4]	100	(6)	11	33	39	14	2	2
Public school teachers[7]	100	3	23	28	30	14	2	(6)
Percent within Age Group								
Total[1]	100	100	100	100	100	100	100	100
First year teaching[2]	61	97	72	52	40	25	17	35
Returning teachers[4]	19	(6)	9	25	33	35	38	63
Public school teachers[7]	20	3	19	23	27	40	45	2

[1] Using the 1993–94 Schools and Staffing Survey (SASS), it is possible to approximate the number of the teachers by control of school who had not taught in that type of school the year before. One method is to consider four types of teachers who had not taught the year before. Of those four components, SASS can be used to measure three of them. They are, for public school teachers: 1) new teachers who had never taught before in either public or private schools; 2) returning teachers who had taught in public and/or private schools in the past but had not taught last year; and 3) teachers who had taught in a private school last year and had never before taught in a public school. The missing component is the number of teachers who had been teaching in a private school the previous year but had earlier experience teaching in public schools.

[2] New teachers who had never taught before, in either public or private schools.

[3] Less than 500.

[4] Teachers who had taught in public and/or private schools in the past but were not teaching the year before.

[5] Teachers who were teaching in public schools in 1993–94 who taught in private schools the previous year and who had never taught in public schools before.

[6] Less than .5 percent.

[7] Teachers who were teaching in private schools in 1993–94 who taught in public schools the previous year and who have never taught in private schools before.

NOTE.—Standard errors appear in parentheses. Because of rounding, details may not add to totals.

SOURCE: U.S. Department of Education, National Center for Education Statistics, "Schools and Staffing Survey"; and unpublished data.

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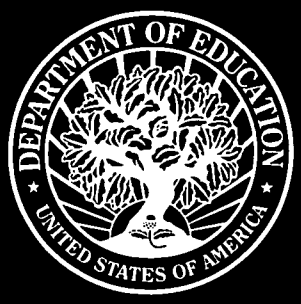

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