What Different Benchmarks Suggest About How Financially Attractive it is to Teach in Public Schools

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I. Introduction

There is significant public policy concern that teacher salaries in the United States are insufficient to make teaching in public schools a financially attractive occupation (Talorico, 2000; Hartocollis, 2002; Schneiderman, 2000; Henry, 2002). Consequently, in the view of many, there are not enough high quality individuals who choose teaching as an occupation. This concern has been particularly acute of late for two reasons. First, new empirical research shows teacher quality to be the most important schooling variable influencing student achievement (Goldhaber, 2002a). Thus, investing in a high quality teacher workforce may be the best way to increase student learning. Second, a combination of increasing student enrollments, an aging teacher workforce, and class size reduction policies have resulted in what is considered by some to be an imminent teacher shortage (Ingersoll, 2001). Though the magnitude of the crisis may be exaggerated (Dilworth et al, 2001; Murphy and Dearmond, 2002) and certainly varies from one subject to the next, one geographic area to the next and, in fact, one school to the next (Hare et al, 2000; Harrington, 2001; Shields et al, 2001), the perception of a teacher shortage may serve the important purpose of focusing public policy on the necessity of recruiting high quality teachers.

A number of policymakers and high profile reports have made the recommendation to raise teacher salaries.[1] This is consistent with a widespread *perception* that teachers are poorly paid and have lost ground economically when compared to those employed in other occupations. Is this perception correct? The short answer is this: it depends on how teacher salaries are measured and to what they are compared. More importantly, this may not be the right question if one wishes to better understand how financially attractive it is to be in the teacher labor market. This is because the opportunity costs - the salaries teachers must forgo to enter and remain in the

teaching profession - can differ significantly from individual to individual.[2] It is therefore problematic to treat teachers as a generic entity. Although we use the generic term "teacher salaries," in this paper we focus on what the right teacher salary comparisons are for teachers with different training and educational experiences. We draw on a variety of data sources to provide several benchmarks showing how teacher salaries compare to those in other occupations and how they have changed over time. Based on these comparisons we discuss how financially attractive it is to teach in public schools for individuals with different training and backgrounds.[3]

The paper is laid out as follows. Section II provides background on the importance of better understanding the teacher compensation issue. Section III describes the data we use in our analysis as well as our methodological approach. Section IV presents several benchmarks showing how teacher salaries have changed over time, and a discussion of what this means about the attractiveness of teaching as a career. Section V provides a summary of our findings and offers some thoughts on the implications of our findings for public policy.

II. Background

There is a significant amount of empirical research on the various influences on student achievement. This research reveals how essential it is to hire and retain high quality teachers in order to improve students' learning. Teacher quality appears to have a larger impact on student achievement than any other school-related factor (Goldhaber, 2002; Hanushek et al, 2002). Hanushek et al (1999), for instance, estimate that teacher quality accounts for a minimum of seven and a half percent of the variation in students' test scores. This is far more than the estimated influence of other educational interventions, such as reducing class sizes.

It is not clear, however, that teacher quality is strongly correlated with easily quantifiable teacher attributes, such as degree and experience levels. One study (Goldhaber et al., 1999) found that only about 3 percentage points of the contribution made by teachers could be attributed to differences in teacher credentials, such as experience and degree-level. Thus, while getting the "right" individuals into the classroom can have a profound positive educational effect, determining who those "right" individuals are is neither a simple nor inconsequential task. This task is likely to be more difficult in a tight labor market that offers prospective teachers many alternate career opportunities. Schools and districts in this environment have difficulty attracting enough applicants to enable them to be very selective in their hiring.[4]

Understanding the attractiveness of teaching relative to other occupations in the labor market is fundamental to making good public policy decisions. Compensation is simply one factor to be considered when making job and career decisions; other considerations such as job location, career stability and work environment (including the attributes of the students in the district/school) are also clearly important to those making career decisions.[5] This is very evident in the teacher labor market, where research shows that teachers are sometimes willing to accept lower salaries in order to teach more academically proficient students (Antos & Rosen, 1975; Hanushek & Luque, 2000). Thus, schools and districts may be able to affect recruitment and retention through a variety of both pecuniary and non-pecuniary job factors.[6] Compensation, however, is clearly one of the primary considerations when making a career decision, and it may be particularly important to those who are just entering the labor market. While teacher salaries comprise only one part of a total compensation package, which includes other benefits such as health and retirement plans, sick leave, vacation, and holidays, we focus only on salaries because there is little detailed data on differences between districts in non-salary compensation.

Relatively few studies find a direct link between teacher salary and student outcomes (Hanushek, 1986, 1997). This may be a result, at least in part, of poor measures of a teacher's true salary due to compensating differentials that affect the opportunity cost of teaching. These non-pecuniary benefits may include a community's attitude about education, the academic level of students, or the quality of a school district's facilities.[7]

Though few studies find this link between salaries and student outcomes, more evidence exists that salaries influence where teachers choose to teach and other career decisions. Several studies have found a relationship between districts' salary levels and teacher attributes believed by many to be correlated with teacher quality (Figlio, 1997, 2002; Chambers, 1998). Figlio (2002), for instance, finds that increases in teachers' salaries are associated with an increased probability that a district will hire applicants who graduated from more selective colleges and an increased probability that the district will have teachers who hold a college degree in the subject they teach. Murnane and Olsen (1989; 1990) find results that are consistent with the hypothesis that opportunity costs influence the length of time a teacher will remain in teaching, and affect schools' abilities to attract and retain teachers. Teachers in high- paying districts were found to be less likely to leave the profession, while teachers with better outside-of-teaching labor market opportunities were found to be more likely to leave.

There are a number of potential methodologies and benchmarks that might be used to measure teachers' opportunity costs (see, for instance, Chambers, 1998; Goldhaber, 1999; Hanushek, 1999). One measure of opportunity costs facing prospective teachers is the salary in teaching relative to those in other occupations (Goldhaber, 2001). All else equal, as salaries in other occupations rise relative to teacher salaries, the opportunity costs of teaching increase. This, however, is a rudimentary measure of opportunity costs since occupations may

differentially reward individual skills and attributes, thereby implying that measures of average changes in occupational wages could mask the true opportunity costs to particular types of individuals. The decision to enter an occupation is likely influenced by the extent to which various skills and attributes are rewarded, and the reward structure may differ between occupations. We would expect that, all else equal, individuals will seek to enter the professions which most tend to strongly reward their attributes.[8]

The prevailing salary structure in teaching – the single salary schedule – is explicitly designed to reward experience and degree attainment. In a recent paper, Goldhaber and Liu (2002) examine this salary structure in the context of comparing the attributes rewarded in teaching to those attributes rewarded in other occupations employing recent college graduates. Based on their analyses, they speculate about how the single salary schedule affects the decisions of prospective teachers. They find that calculated opportunity costs vary greatly depending on one's college major and the selectivity of the college from which one graduates, and that individuals who face high opportunity costs to enter teaching are less likely to do so. The Goldhaber and Liu (2002) findings are consistent with those of Murnane and Olson (1989, 1990) discussed above in that they support the notion that opportunity costs, which vary depending on an individual's background characteristics, affect the likelihood that they will enter or remain in the teaching profession.

Because the decision to enter teaching is often made long before a teacher begins his or her career, it is useful to examine *ex ante* how anticipated salaries affect this decision when individuals are faced with many occupational choices. Milanowski (2002) explores this question focusing specifically on the salary level necessary to entice math and science students to enter teaching as opposed to another occupation. Interviews with undergraduates who were enrolled in

math and science classes revealed that many perceived teaching to be a low paying occupation that was quite demanding, both in terms of maintaining student discipline and preparing daily lessons. The majority of interviewed students indicated, however, that if the salary were raised "to the appropriate level," they would be interested in teaching despite the rigors associated with the job. For example, Milanowski finds that 48 percent of sophomores reported they would be attracted to teaching if the teacher salary were 45 percent higher than the current level in the local teacher labor market.

All of the studies cited above suggest that individuals examine the financial benefits of teaching in relation to those of competing occupations when making job and career decisions. Consequently, salary levels can have an impact on who enters and remains in the teacher labor market. The studies also suggest that, for purposes of determining how attractive teaching is as an occupation, teachers should not be defined generically since individuals with different training and labor market experiences may face different opportunity costs. Thus, although we discuss some traditional measures of changes in teacher salaries over time (e.g. measures of the purchasing power of average and starting teacher salaries), we will focus particular attention on the attractiveness of the teaching occupation for individuals with different skill sets. Below we describe the data used for our analyses.

III Data and Methodological Approach

To establish salary benchmarks we draw on several data sources: data from the American Federation of Teachers (AFT), data from the Bureau of Labor Statistics (BLS), data from the Occupational Information Network (O*NET), and data from the Schools and Staffing Survey (SASS). Each source has particular advantages that allow for different types of analyses.

The AFT Survey and Analysis of Teacher Trends (2001) provides data compiled from the results of the AFT's annual survey of state departments of education, including teacher salary data on city school districts prepared for the Department of Defense Dependent Schools (DoDDS) by the Department of Defense Civilian. This report provides data for beginning and average teacher salaries both by state and nationwide, and also compares teacher salaries to those in selected fields. While this is not specifically stated, we presume that the selected fields are considered by the AFT to be those that compete for the labor of potential teachers. The AFT data allows us to examine changes in teacher salaries over time, and compare this to changes in salaries for other selected occupations. The AFT data is also useful in that it provides information not only on average salaries but on beginning teacher salaries as well.

Data from the Bureau of Labor Statistics (BLS) National Compensation Survey (NCS) includes information about average wages in over 400 occupations. These data also have information on average wages for individuals who fall into different skill levels within each occupation. The BLS data is detailed enough to permit a number of different occupational comparisons, however much of this detailed information dates back only to 1997, therefore we cannot use it for long-run comparisons of relative changes in salaries. Furthermore, while the NCS provides data on *average* salaries, it does not include information on *starting* salaries.

The information included by NCS about salary level is essential to the analysis provided below, thus some explanation of how individuals are grouped into skill categories is called for. Surveys are conducted within a national sample of establishments employing at least 50 people, with each establishment selected randomly proportionate to size. At the time of the survey, skill levels are determined for each occupation within an establishment. This skill level determination is based on nine factors[9]: knowledge, supervision received, guidelines, complexity, scope and effect, personal contacts, purpose of contacts, physical demands and work environment.

The fact that leveling occurs at the job site means that each occupation may include a range of skill levels. For example, two teachers may fall into different skill levels based on judgments about their skill level requirements. Unfortunately, it is impossible to match a specific kind of teacher to a certain skill level since the BLS does not make this information available. However, some differences in skill levels are likely attributed to the knowledge required for subjects taught, including differences between elementary and secondary teachers.[10]

Since we do not have information about which teacher categories (e.g. grade-level or subject matter) fall into which skill levels, it is not possible to use this data set to determine how salaries for different categories of teachers compare to those in competing occupations. Furthermore, it is possible (at least in theory) that teachers of a particular subject at a particular grade level (e.g. a high school geometry teacher) may be grouped into different skill levels.[11]

The Occupational Information Network (O*NET) is a comprehensive database of worker attributes and job characteristics. It was developed by the National O*NET Consortium for the US Department of Labor, Employment and Training Administration (ETA). The purpose of the O*NET database is to provide detailed information about various job characteristics for prospective workers, employers, and others. O*NET information may be used to help structure compensation and reward systems and create skills-match profiles, among other uses.

One advantage of the O*NET database is that it also provides information on levels of education and training connected to occupations. These levels, however, are defined differently than they are in the NCS.[12] In the O*NET database, experience and training for occupations are categorized into *Job Zones* based on four criteria: how employees typically enter into the occupation, how much overall experience is needed for the occupation, how much education is needed to do the work and how much on-the-job training is required. The Job Zones range from

level one (little or no preparation) to level five (extensive preparation). For our analysis, we utilize the information related to Job Zones to determine occupations similar in training to teaching. Teaching is found in Job Zone Four. Examples of other Job Zone Four occupations include landscape architects, physical therapists, and human resource managers.[13]

In order to provide prospective workers with detailed salary estimates, the O*NET database uses the salary information provided by the BLS Occupational Employment Statistics (OES). The OES provides average salaries for the same set of Job Zone Four occupations at different salary percentiles.[14] The OES is therefore distinct from the NCS in that all employees in a particular occupation fall into the same Job Zone. These data permit a comparison, for instance, of the income of a teacher who earns the average salary at the 10th percentile of the teacher salary distribution with the income of someone who earns the average salary at the 10th percentile of the salary distribution in another occupation.

The advantage of the NCS and the OES is the level of detail they provide for a given occupation. The primary disadvantage is that this detailed data has only been gathered since 1997, thereby making long-run comparisons impossible. The absence of starting salary information is an additional drawback to the NCS/OES data. In addition to comparing changes in relative salaries by skill level, a key part of our analysis is examining the transitions out of the teaching profession to determine whether different types of teachers tend to transition into different occupations. Based on these transitions, we calculated a weighted "competing occupation" wage index.To assess transitions out of the teaching profession, we rely on the Schools and Staffing Survey (SASS) Teacher Follow-up Survey (TFS) for 1988-89, 1990-91, and 1993-1994. For each wave of the survey more than 45,000 teachers were interviewed, and in the year following the original data collection, a nationally representative sample of the original

respondents was re-interviewed. We use the entire sample of public school teachers (approximately 4,700 per year) who were re-interviewed as part of the Teacher Follow-up Survey (TFS) to determine the occupations into which teachers transition if they leave the teaching profession.

Before turning our attention to the analysis, we offer one final note on salary comparisons. One difficulty in comparing teaching to competing occupations is finding a standard measure of compensation. Teachers typically work ten months while non-teachers usually work twelve months, which makes it difficult to directly compare pay in teaching and non-teaching jobs. Some argue that a comparison of annual salaries is appropriate since teachers may not have the flexibility of *teaching* longer than the ten months in their contracts even if they would choose to do so. Others argue that comparing annual salaries in teaching and non-teaching occupations is inappropriate since it implicitly includes two months of time during which teachers are not working but are being paid. They argue that this is time that teachers could choose to moonlight in non-teaching jobs. Using these arguments, it seems more appropriate to compare earnings per hour in teaching to earnings per hour in other occupations, however there is no clear answer about the appropriate way construct teacher salary comparisons.

For this paper we choose to use actual annual salaries for our comparisons. In practice, when focusing on the relative attractiveness of teaching over time by comparing teacher salaries to those in other occupations, the annual versus hourly debate is irrelevant since the relative changes are not affected by the metric chosen so long as one is consistent in the comparison used.

It was necessary to adjust the data in order to ensure consistent results. The NCS reports all salaries, including teacher salaries, in terms of hourly wages. These are computed by dividing

the total annual salary by the number of required work hours listed on the company payroll. To convert hourly wages of teachers to a comparable annual salary, we multiplied the hourly wages by 5/6 to reflect the pay that teachers would receive over a year of working.[15] The result is a generated hourly salary that represents what teachers would be paid per hour if they were required to work the same number of hours that non-teachers do.[16] Other sources of data provided annual salaries so no further adjustments were needed.

IV. How Financially Attractive is it to Teach in Public Schools?

A. Changes in Average Teacher Salaries

It is common in popular press to make comparisons about what teachers earn today on average versus what they earned in prior years, with some adjustments for inflation (NEA, 1988; McMahon 2002). We report this trend in Figure 1. Unadjusted teachers' salaries increased by 684 percent in the last three decades (from 1962-63 to 2000-01), however in real terms (in constant 2001 dollars), this actually represents a much more modest 35 percent increase. In fact, most of these gains occurred during the 1960s, and actually declined for parts of the 1970s. Average salaries recovered and rose somewhat over the next ten years, but have remained relatively constant through much of the 1990s.

(FIGURE 1 ABOUT HERE)

The finding that real teacher salaries have grown suggests that someone earning the average teaching salary would (over that time period) have seen a substantial increase in the buying power of their salary. Many, however, use these figures to draw inferences about how financially attractive it is to teach today relative to some point in the past, but in fact this is a poor indicator for at least three reasons. First, the vast majority of school systems use the single

salary schedule whereby teacher salaries are determined solely on the basis of degree and experience levels. This means changes in averages over time can result from demographic shifts in the teacher workforce rather than increases in the underlying pay structure. Second, average salaries provide no direct information on entry level salaries (starting salaries), and individuals deciding which occupation to enter may place more weight on the immediate wages available to them after college (Betts, 1996; Munasinghe and Sicherman, 2000)[17]. Finally, examining salaries of teachers alone provides no benchmark for the opportunity costs associated with taking a teaching job instead of one in another occupation. This has particular relevance for teaching because it is a predominately female profession and the occupational opportunities for women in the workforce have expanded significantly since the 1950s. Recent works by Corcoran et al (2002) and Lakdawalla (2001) illustrate that this has had a profound impact on the likelihood that academically proficient women choose teaching as occupation. For these reasons, in the next sub-section we examine how salaries in teaching (both average and starting) compare to those in other occupations.

B. Teacher Salaries Compared to Those in Other Occupations

When college undergraduates are making their career decisions, there is evidence that most of their energy is focused on learning the starting salaries of various occupations (Betts, 1996). We would expect that starting salaries would be an important determinant in career decisions and so an important benchmark is likely the beginning salaries of teaching relative to other occupations.

While average starting salaries in teaching increased in the 1990s, they continue to lag far behind salaries in other occupations. A recent report by the American Federation of Teachers

shows the average starting salary offer for college graduates was $42,712 in 2001, whereas the average starting salary for beginning teachers was $28,986 – a difference of $13,726 (Nelson et al, 2001).

This is reflected in **Figure 2,** which shows the ratios of starting salaries of several occupations to teaching.[18] The ratios that appear on the graph represent the degree to which the comparison occupations correspond to teaching. A ratio equal to one indicates that the comparison occupation has the same salary as teaching. Anything above one implies that the comparison occupation has a higher average salary. For example, a ratio 1.5 means that the comparison occupation has a beginning salary that is 1.5 times the beginning teacher salary. The figure indicates that starting salaries in other occupations are well above starting salaries for teaching, although the degree of disparity is not constant over time.

(FIGURE 2 ABOUT HERE)

The starting salary ratios illustrate the relative attractiveness of teaching over time. Beginning in 1980 the starting salaries of other occupations tend to be well above the starting salaries of teaching. Through the early to mid-1980s the ratios began to fall, indicating that teacher salaries became more attractive than they had been relative to other occupations. The eight-year period from 1988-1996 is marked by relatively stable ratios, suggesting that teaching was not gaining or losing any substantial ground to these comparison groups. Following 1996 we see a general rise in the ratios, implying that starting teaching salaries began to lag behind the comparison occupations. This period was a time of rapid economic growth, particularly in technical occupations. The growth in salaries in these occupations was not matched by growth in teacher salaries.

One important and striking finding is that the starting salary ratio, although generally following the same trend (i.e. having a slope of the same sign) for various occupations, tends to rise or fall at different rates (i.e. the slopes have the same sign but different magnitudes) for different occupations. This implies that the change in relative salaries is more pronounced for some comparison groups than others. In particular, the figure shows ratios in the latter 1990s rising far more rapidly for occupations employing individuals with training in computer science, math and statistics than those with training in liberal arts or accounting. Thus, while the increase in the ratio in the latter 1990s suggests that, all else equal, teaching is becoming less financially attractive than employment in many other occupations, the *rate* at which this is occurring is not uniform across occupations. This strongly suggests that individuals with different types of training (e.g. different college majors) may tend to receive different economic returns in the labor market. Research does in fact show this to be true (Grogger and Eide, 1995; Brewer et al, 1999; Goldhaber and Liu, 2002).

The fact that individuals with different college majors tend to receive different salaries is an important point to consider when thinking about the opportunity costs for teachers because it implies that the opportunity costs may differ between specific categories of teachers. Of the occupations displayed, the highest opportunity costs (as measured by the salary ratios in Figure 2) are for those teachers who might, were they not teaching, be employed in technical occupations.

It is certainly plausible that the skill set teachers possess influences what other occupations they might consider for employment, and that different categories of teachers are systematically more likely to possess different skill sets. For this reason the opportunity costs for different categories of teachers may be quite different. Occupations requiring skills in

engineering or chemistry, for instance, are likely to be more closely competing occupations for a secondary teacher who teaches (and has training in) similar subjects such as chemistry or physics than they may be for an elementary teacher (not possessing this type of training).

We would therefore expect teaching to be more financially appealing to the (prospective or actual) elementary school teacher than to the (prospective or actual) high school chemistry or physics teacher. This notion is supported by some of the research cited above. For example, Murnane and Olsen (1990) find that elementary teachers have the longest tenure in teaching while high school teachers have the shortest tenure. Among high school teachers, they find that physics and chemistry teachers have the shortest median stay at 4.8 years. We further explore the issue of differentiated opportunity costs in the next sub-section focusing on salary comparisons by skill category.

C. *Teacher Salaries Relative to Those in Similar Skill Categories*

As the previous sub-section describes, there are significant differences between salaries in teaching and those in other occupations. It is not clear, however, that all these differences are relevant since teachers may not have skill sets that are complementary with those of all other occupations. Thus, for a more precise measure of teaching salaries relative to salaries at a similar skill level, we rely on the BLS and O*NET databases, which allow us to compare salaries for individuals with comparable skills across occupations.

Figure 3 shows the comparison of the 10^{th}, 25^{th}, median, 75^{th}, and 90^{th} salary percentiles of all occupations listed at the same Job Zone as teaching in the O*NET database[19]. At each percentile, teacher salaries lie below those of all other occupations across the salary distribution. The difference between teacher salaries and those of comparable occupations grows as the

percentile increases. To the degree that salaries reflect job skills and performance, this implies that the upper-end performers are more strongly rewarded in other Zone Four occupations than in teaching. It also implies that the opportunity costs for teachers may be higher for individuals who would, were they not teachers, be at the upper end of the salary distribution.

(FIGURE 3 ABOUT HERE)

As we discussed in the data section, the O*NET data set groups a wide variety of occupations into the same skill level and does not allow for a comparison of different skills within occupations. The NCS data set, by contrast, allows for a comparison of hourly wages (as opposed to salaries) for individuals within and across occupations. Thus, we can compare what a teacher at a given skill level earns relative to individuals with comparable skills within a particular industry. **Figure 4** reports the ratio of salaries by skill level for all employees in white collar occupations to those in teaching. Since this level of detail in the BLS data dates back only to 1997, there is little that we can conclude about changes over time in the financial opportunity costs to be a teacher; given that the lines are relatively flat, there appears to be relatively little change in the financial opportunity costs over the 4 year period. A pattern, however, emerges across skill levels. In particular, the ratio tends to be higher in the upper skill levels than in the lower skill levels. As was the case when we focused on the results from the O*NET data set on salary by percentile, this finding supports the hypothesis that higher skilled individuals face a higher opportunity cost to employment in teaching than those with lower skills (i.e. there is a lower economic return to skill in teaching).

(FIGURE 4 ABOUT HERE)

D. Teacher Salaries Relative to Competing Occupations

A useful benchmark by which to gauge the attractiveness of teaching is the comparison of teachers' salaries to those of workers in the same skill categories. The skill measures, however, are not likely to be exact since individuals' actual abilities and skills may not be strongly correlated with the attributes used by NCS and O*NETS to categorize employees by skill level. For this reason, in this sub-section we utilize information about movements of teachers out of the teaching profession and into other occupations in order to create a "competing occupation" opportunity costs measure.

This process began with an analysis of information in SASS and the TFS on transitions of teachers into other occupations. We analyzed three teacher groups: elementary, secondary technical, and secondary non-technical.[20] Elementary teachers include all teachers of grades K-6. Secondary technical teachers are defined as any teacher whose primary assignment is listed as teaching grades 7-12 and who list their primary assignment as being physics, chemistry, math, computers, biology or natural science.[21] Secondary non-technical are teachers in grades 7-12 who do not list their primary assignment in a technical field.

Table 1 shows that although there is little difference in the percentage of secondary technical and non-technical teachers who leave the profession, there is a substantial (and statistically significant) difference between the percentage of secondary and elementary teachers leaving teaching.

(TABLE 1 ABOUT HERE)

Table 2 shows the percentage of the teachers who left teaching to retire, to pursue another career, or for another reason. Again, there is evidence of different behavior between elementary and secondary teachers. The percentages of teachers who left to retire are similar for

both groups, but there is clearly a greater propensity among secondary teachers to pursue an alternative career.

(TABLE 2 ABOUT HERE)

Table 3 shows, for those teachers who moved out of teaching into another occupation, the four industries most often chosen by teachers who leave the profession: other non-college teaching, college teaching, administrative and managerial positions, and sales occupations.[22] Here again we see evidence that not all teachers are alike. There are statistically significant differences in the industries chosen by elementary, secondary non-technical, and secondary technical teachers who left the profession. For example, elementary teachers are much more likely to move to another non-college teaching job than are secondary technical teachers,[23] while secondary technical teachers are much more likely than either elementary or secondary non-technical teachers to move to college teaching or to managerial jobs.

(TABLE 3 ABOUT HERE)

To estimate the competing occupation salary we computed a weighted average salary for each group of teachers using the percentage of teachers entering each occupation multiplied by the average wage of that occupation according to the following equation:

$$OWAGE_i = \sum_j p_{ij} WAGE_j \quad i = \text{elementary, secondary non-technical, secondary technical}$$

where p_{ij} is the weighted percentage of teachers of type i entering occupation j.

The weighted average salaries by each type of teacher are listed in **Table 4.** Elementary teachers have a lower opportunity cost in each of the years in the survey, and secondary technical teachers have the highest opportunity cost in three of the four years. This confirms the hypothesis that the three types of teachers face systematically different opportunity costs.

In **Figure 5** we show the competing occupation opportunity costs faced by different teachers over time. Each line shows the ratio of the weighted average competing salary to the average salary in teaching where a ratio of one means the salaries are the same and anything above one indicates that the opportunity cost is higher than the teaching salaries.[24] Thus, increases in the line suggest, all else equal, there are increasing financial opportunity costs to teach.

As expected, there is a persistent difference in the weighted average salaries for elementary and secondary teachers, with the secondary teacher opportunity cost consistently above that for elementary teachers. This difference persists over the years for which we have data, indicating that the opportunity costs that secondary technical teachers face are consistently above those of elementary school teachers. The secondary technical and non-technical teachers' opportunity costs seem to be more closely tied to each other, and for 1997 the non-technical teachers' opportunity costs are above those for technical teachers. Still, there is an apparent difference between the opportunity costs of each group.

(FIGURE 5 ABOUT HERE)

V. Summary and Public Policy Implications

The analysis presented above illustrates how teacher compensation has changed and the possible impact of these changes on the attractiveness of the teaching profession. The comparisons of teacher salaries to those in other occupations (presented in sub-section IV-B) show changes in relative salaries over the long run, with teacher salaries becoming relatively more financially attractive in the mid 1980's through the early 1990's while beginning to lag behind those of other occupations from the mid-1990's on. Unfortunately, the data available for

making such long-run comparisons presents a crude picture at best. The more detailed information on salaries by skill level (sub-section IVC) or competing occupation (sub-section IVD) only date back to 1997, and there is no clear pattern over the 4 year time period 1997-2000, implying little relative change over this period. The more detailed information does, however, reveal an important finding: when benchmarking teacher salaries it may not be appropriate to treat all teachers generically because they appear to have very different labor market opportunities.

Our skill level comparisons show that higher skill teachers face higher opportunity costs of employment in teaching, while our competing occupation analyses show that different categories of teachers, when transitioning out of teaching, tend to find employment in different industries. These findings are consistent with research examining the decision to seek employment, and remain in, the teaching profession (Goldhaber and Liu, 2002; Murnane and Olson, 1990). They also suggest that providing across-the-board increases in salary to attract more qualified individuals into the profession and keep current teachers from exiting the profession for more lucrative opportunities may not be the most cost-effective way to increase the quality of the teacher workforce.

School systems often compare salaries to those in surrounding jurisdictions when assessing whether and by how much to increase salaries, but this benchmarking may be of limited utility considering the multitude of factors, both monetary and non-monetary, that influence the attractiveness of teaching in particular schools or school systems. For example, there are numerous influences on the quality of the workplace experience such as class-size, access to technology, or the professional development opportunities provided by the district. . Although salary, per se, is clearly important, these other job characteristics will influence the

recruitment and retention of teachers. Furthermore, schools are competing not only with each other in the quest to hire quality personnel, but with other public and private sector institutions as well. Not all teachers, however, have the same employment opportunities in these institutions. Consequently, the opportunity costs associated with teaching are not the same for all teachers.

Our results suggest that elementary and secondary school teachers, particularly those with technical training, do not face the same opportunity costs in terms of salary. For example, in 2000, the weighted competing hourly salary for secondary technical teachers was $21.89 versus $20.19 for elementary school teachers. Annualized based on a work year of 2000 hours, this works out to a differential of $3400. If one assumes that there are no systematic differences between elementary and secondary teachers in terms of preferences or the other characteristics of the jobs in which they are employed, we would therefore expect greater shortages or lower quality teachers at the secondary relative to the elementary level. This is in fact reflected to some degree in the areas that school systems report having hiring difficulties, high school math and science for instance (See Harrington, 2001; Hare and Nathan, 1999).

As it now stands, most school districts utilize the single salary schedule, whereby compensation levels and increases are linked directly to teacher degree and experience levels alone. Though there are some arguments, such as equity, collegiality, and transparency there is a downside.[25] All else equal, school systems using the single salary schedule have more difficulty recruiting and/or have to settle for lower quality teachers with skills that are in higher demand in the labor market as a whole. Likewise, systems that are having little difficulty recruiting high demand teachers are likely paying those teachers less in demand outside the teacher labor market more than is required to entice them to teach in those school systems. For these reasons, we would argue that it is worth experimenting with other salary structure designs to better afford

districts an opportunity to address the labor market reality that individuals with different skills face different opportunity costs in the teaching profession.

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Endnotes

[1] For example, National Commission on Excellence in Education, 1983; Carnegie Forum on Education and the Economy, 1986; National Commission on Teaching and America's Future, 1996

[2] Opportunity costs are defined as "that which we give up, or forgo, when we make a choice or decision" (Case and Fair, 1996). Therefore, if someone decides to enter teaching his or her opportunity cost is the salary s/he forgoes by choosing teaching rather than his or her next best alternative. For example, if someone trained as a surgeon decides to undertake teaching, the opportunity cost she faces is the salary she could have made as a surgeon had she not entered teaching.

[3] Due to data limitations, we focus only on salaries and not on other benefits received.

[4] This problem appears to be particularly acute for some subject areas, such as math, science, and special education and for schools serving disadvantaged students (Hirsch, 2001; Education Commission of the States, 2002).

[5] Working conditions for prospective teachers vary in terms of the ability and behavior of the students they would teach and the environment of the community in which they might live. Environmental factors such as the price of housing and crime, and school factors such as the student population and the difficulty of the job are lost in averaged data but surely influence teachers' decisions. Schools may need to provide different salaries, called *compensating wage differentials*, to recruit the same caliber of teachers as other districts. These differences may explain why some schools are able to attract high quality teachers despite offering lower salaries. Chambers (1998), Goldhaber et al (1999), and Fowler and Monk (2001) outline potential models that attempt to capture these differences among districts and schools.

[6] For example, we would expect that, all else equal, teachers would prefer to teach in schools that have smaller class sizes.

[7] One study that does find a relationship between salaries and student outcomes (Loeb and Page, 2000), finds this link only after carefully controlling for compensating differentials (e.g. non-pecuniary job characteristics). They find a 10% increase in salary is predicted to decrease the number of dropouts by three percent.

[8] More formally, individuals will seek to maximize utility. The assumption is that, all else equal, higher salaries result in higher utility levels.

[9] A tenth factor, Supervisory Duties, was used experimentally through the 2001 survey, but is no longer being used.

[10] Communication via e-mail with Ms. Natalie Kramer, NCS, October 11 – November 21, 2002; and telephone interview with Mr. Robert VanGiezen, NCS, November 20, 2002.

[11] The NCS includes data for teachers for skill levels 6 through 11. A majority of teachers, however, are in levels 7 through 9. Communication via e-mail from N. Kramer, NCS, October 22, 2002.

[12] This data set is primarily used to provide prospective workers with information about related occupations similar to those in which they are employed in terms of the skill and preparation required for employment (www.onetcenter.org).

[13] A complete list of Level Four jobs is available at www.onetcenter.org/database.html

[14] This is available through the O*NET database (a database compiled by U.S. Department of Labor, Employment and Training Administration).

[15] The 5/6 is to account for the 5/6 of a full year they work. Even this measure may inflate teacher salaries slightly because some teachers may only be paid for 6-7 hours of work per day during the ten months they work. The required work hours vary across states and districts so it is impossible to get a more accurate measure.

[16] An alternative way to think about this is to divide a teacher's annual salary by the number of hours that a non-teacher works (typically assumed to be 2000).

[17] Individuals may place more weight on starting salaries either because of information costs (Betts, 1996) or because of time preference (Munasinghe and Sincherman, 2000).

[18] For the occupations examined by the AFT salary comparisons, the occupation categories are derived by the AFT from two sources: 1) Salary data from all years examined through 1996 is constructed from various editions of the U.S. Department of Labor, National Survey of Professional, Administrative, Technical and Clerical Pay; 2) Data from years 1997-2001 are constructed from time series data from the average weekly wage rate for each occupation in the March issues of U.S. Department of Labor, Employment and Earnings. The construction of the occupation categories, e.g. "Accountant III" includes only those workers whose salaries fall in the middle of the income distribution for all people classified under each broad occupation category. Some of the decline in earnings in other occupations during the 1980s relative to teachers can be traced to changes in the sample design in 1986 and 1989 that incorporated smaller firms into the sample. (AFT: Survey and Analysis of Teacher Salary Trends 2001, Technical Notes).

[19] The comparison group excludes teachers to avoid any bias teacher salaries may introduce.

[20] Any number of other categorizations could be used. We chose these based on existing studies showing differences in opportunity costs for these groups of teachers (Murnane & Olsen, 1989, 1990).

[21] SASS is not a random sample of teachers so it was necessary to weight the percentages of teachers moving to specific occupations.

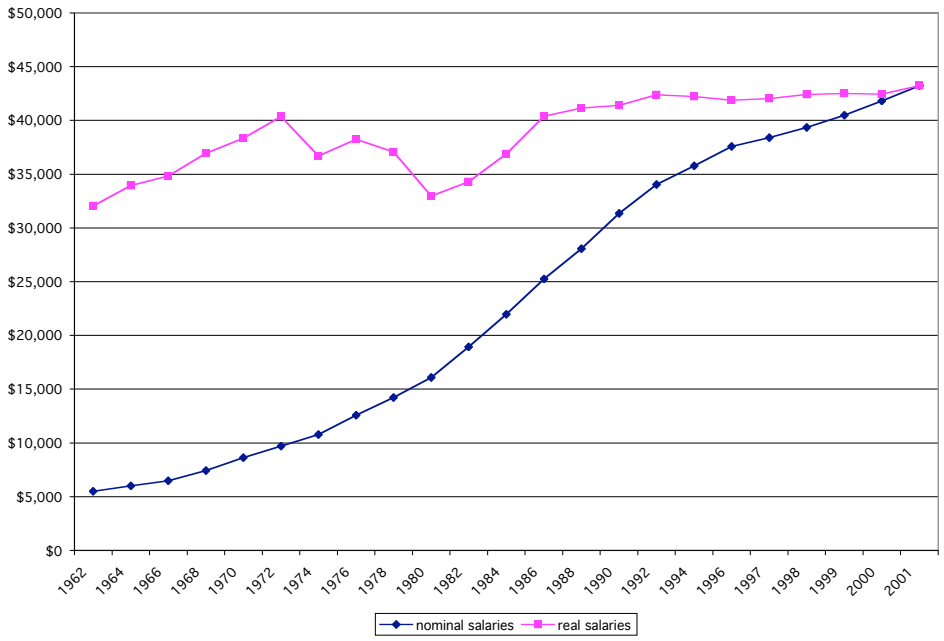
[22] For this analysis we use data grouped together from three waves of the SASS and TFS. All teachers were grouped into one pool for the attrition information. This was done to increase the sample size, however, an examination of the individual years revealed no significant differences in the *industries* chosen by teachers. As a result of small sample sizes, it was not possible to discern whether significant differences existed in the specific *occupations* chosen.

[23] Other teaching (non-college) jobs include pre-school, special education, alternative schools, etc.

[24] For the calculations we used the average teacher salaries as reported by the AFT Salary Survey 1997-2000 and we estimated the annual opportunity cost by multiplying the opportunity wages in Table 4 by 2000 hours. It is a common practice in economic literature to use 2000 hours is the number of hours worked by full-time workers on a 12-month contract (For example, see Flyer and Rosen, 1997).

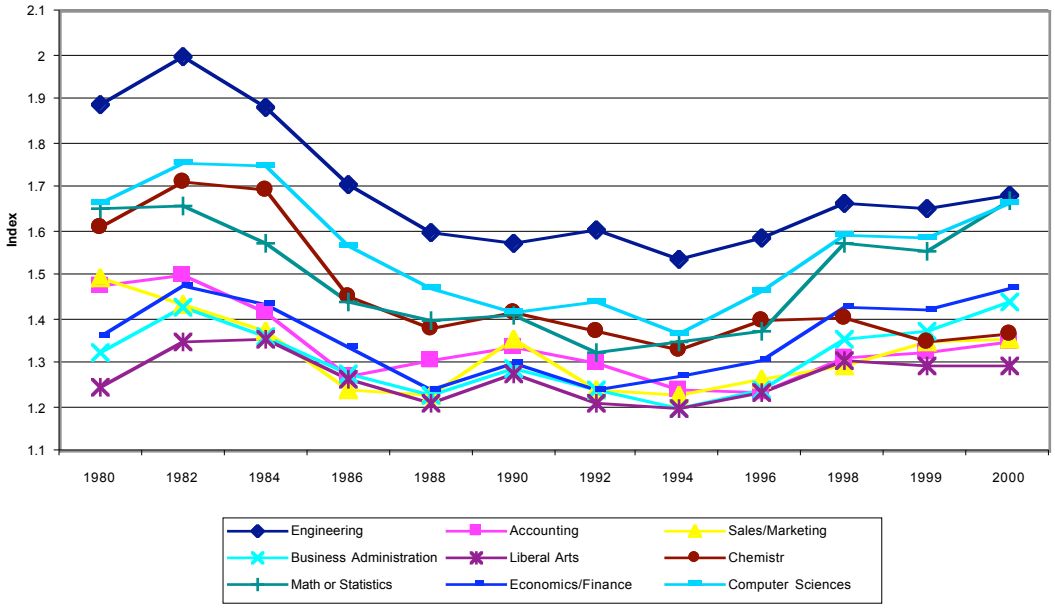
[25] For a discussion of some of the issues that arise with alternatives to the single salary schedule, see Goldhaber (2002b), Goldhaber et al. (2003), and Murnane and Cohen (1986).

FIGURE 1
Average teachers' salaries, both unadjusted and adjusted for inflation



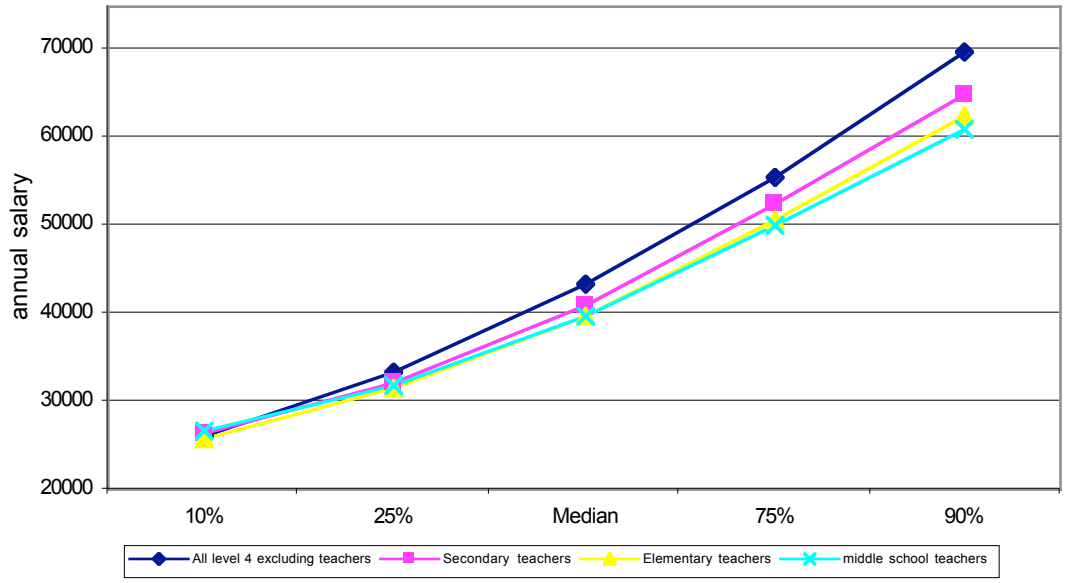
Source: ***AFT Survey and Analysis of Teacher SalaryTrends 2001***

FIGURE 2
Ratios Of Starting Salaries in Several Occupations To Teaching



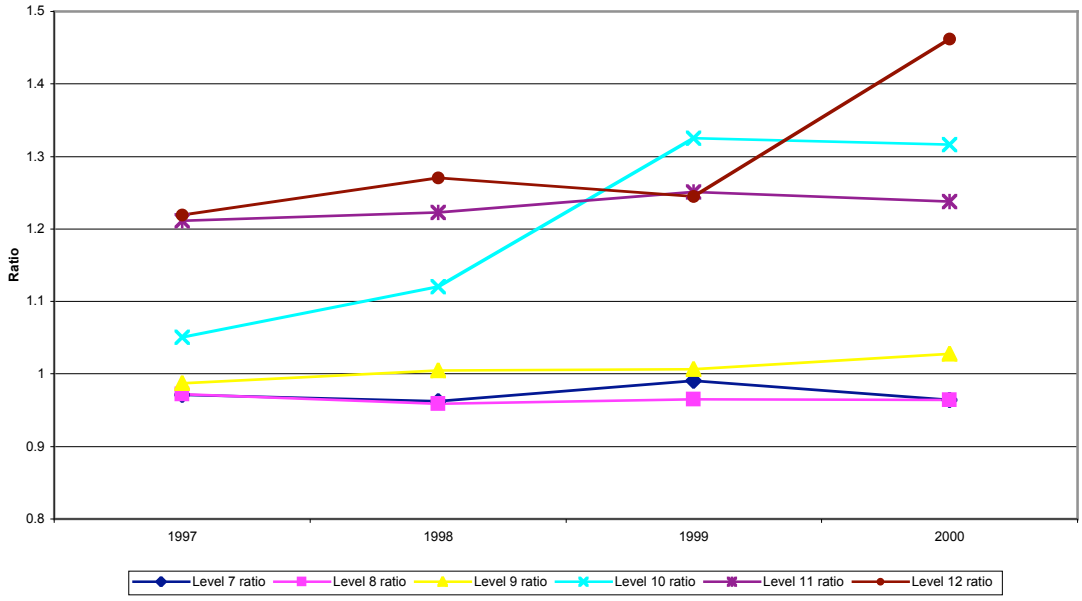
Source: *AFT Salary Survey 2001*

FIGURE 3
Salaries in Job Zone Four Compared with Teacher's Salaries



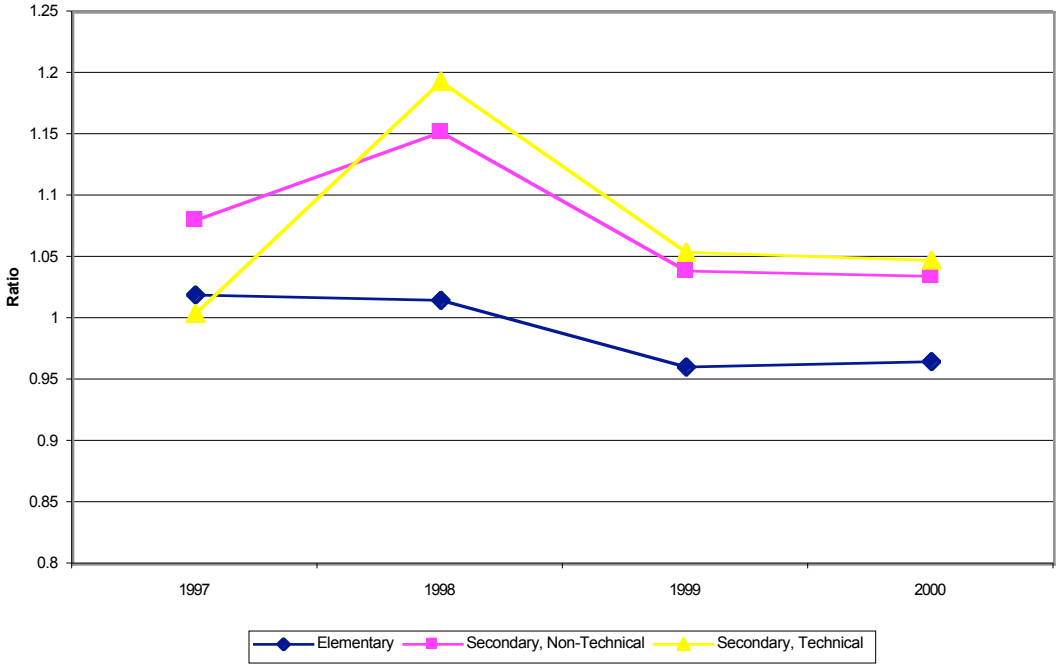
Source: *O*NET, OES 2001, author's calculation*

FIGURE 4
Ratios of Salaries in White-Collar Occupations to Teaching in Skill Levels 7-12



Source: *NCS 1997-2000, author's calculation*

FIGURE 5
Ratio of Weighted Average Wages of Competing Occupations to Average Teachers Wages



Source: *AFT Salary Survey 1997-2001, author's calculations*

TABLE 1
Descriptive Statistics for Teachers in the Sample*

Type of Teacher	Number in Sample	Number that Left	Number that Stayed
Elementary	6811	1795 (19%)	5016 (81%)
Secondary, Non-Technical	5834	2354 (30%)	3480 (70%)
Secondary, Technical	1456	593 (30%)	863 (70%)

* The numbers that left and stayed are the actual numbers in the sample. The percentages in parentheses represent the weighted percentages of teachers that are represented in SASS. For this reason, they do not coincide directly to the numbers given.

TABLE 2
Reasons that Teachers Left*.

Type of Teacher	Retired**	Different Occupation	Other
Elementary	577 (34%)	331 (18%)	887 (48%)
Secondary, Non-Technical	751 (32%)	638 (27%)	965 (41%)
Secondary, Technical	197 (30%)	179 (30%)	217 (37%)

* Percentages represent the percentage of the teachers who left teaching.

** The numbers for each movement represent actual numbers in the sample. The percentages in parentheses represent the weighted percentages of teachers that are represented in SASS. For this reason, they do not coincide directly to the numbers given.

TABLE 3
Movements of Teachers to Other Occupations*

Type of Teacher	Other Teaching	College Teaching	Administrative and Managerial	Sales Occupations	Other
Elementary	18.0%	5.3%	14.6%	15.0%	47.0%
Secondary, Non-Technical	10.3%	8.2%	17.5%	16.8%	47.2%
Secondary, Technical	6.6%	12.3%	20.5%	8.3%	52.3%

*Percentages represent the weighted percentage of the teachers who left teaching to pursue a different occupation

TABLE 4
Weighted Averages of Wages of Competing Occupations

	1997	1998	1999	2000
Elementary	$19.58	$19.97	$19.43	$20.19
Secondary, Non-Technical	$20.77	$22.67	$21.00	$21.63
Secondary, Technical	$19.28	$23.47	$21.31	$21.89