Factors in Teacher Supply and Demand

David W. Grissmer

As advances in technology provide us ready access to increasing amounts of information, we often resort to "sound bites" as a method of managing what might otherwise be an overwhelming amount of data. In a similar spirit, I intend to provide a "sound bite" overview of the issue of teacher supply and demand. It is a very complex issue, one that I believe is more complex now than when we last experienced a similar situation, back in the 1960s. Today we are confronted with factors ranging from increasing attrition as baby boomers reach retirement age to the increasing demographic diversity of our student population. In this paper I present some "sound bites"—graphs, charts, and summarizations—that examine some of the factors that influence supply and demand, provide some perspective on the subject of minority teachers, and draw some preliminary conclusions.

Before I present these "sound bites," however, I would like to explore in more depth one particular aspect—the role of money in education. Common sense would suggest that money would cure a number of ailments in our educational systems. However, there was previously no hard evidence that this theory was true. The recent research suggesting a positive correlation between educational expenditures and academic performance represents an important factor to be considered in addressing the impending nationwide teacher shortage.
Section I:
Tracking the Relationship Between Educational Expenditures and Outcomes

In the last five years, there has been a dramatic change in what I would call the sense of research in education. Until about five years ago, it was very difficult to find any solid body of evidence to indicate that if you spend more money in education, you get better outcomes. This difficulty was largely due to the lack of consistent results in the non-experimental literature. It was impossible to find a consistent set of indications that increasing expenditures would result in higher test scores or high school graduation rates. The second difficulty was that it looked as though our national test score trends were fairly flat at a time when we were supposedly doubling expenditures. In the last five years, however, this situation has turned around very dramatically. The first set of results that showed a shift came from some additional literature reviews that looked at different expenditures and found indications of an overall positive relationship between expenditures and outcomes. Still, the consistency was just not there; there was a very wide divergence in results, so policymakers really could not affect policy based on them. Researchers investigated this particular body of evidence, which had included approximately 300 measurements, and tried to identify some subset of measurements that were different and that would show consistency between spending money and educational outcomes.

Unfortunately, that search was mostly fruitless as well. Still, we persevered. We thought that more recent studies would show different results, but they did not. Perhaps, we postulated, if we focused on achievement outcomes, we would
find a correlation, but it did not happen. Then we looked only at elementary schools or only at secondary schools, thinking we might get some results, but nothing positive showed up there either. We even tried taking the studies that were considered the best, hoping we would find consistent results. The answer was still no.

No matter how much we wanted to believe otherwise, the outcome of the research offered no solid empirical evidence to do so. There was one clue, though: when we looked at the research that had been done at the state level, i.e., expenditures across states, we did find very positive, consistent results—results we were unable to find in research based on expenditure differences within states across schools or school districts. This result, however, was usually explained away by economists who dismissed state results as unreliable because they are usually based on fewer data points.

Recently, however, that explanation and the conclusion that money does not matter has run into a lot of problems, not the least of which is the evidence that at the state level it appears as though investing more money in education does result in higher outcomes. We have just completed a study that will be published in a couple of months that uses the National Assessment of Educational Progress (NAEP) scores and really supports that conclusion. The factor that ultimately started to prove our theory was the experimental evidence. The earlier literature, which used nonexperimental data, relied on a number of statistical assumptions. We never knew if those assumptions were accurate, and now we know they were not. When you actually conduct experiments, you find that resources do seem to matter, at least in the limited number of experiments we have done. In particular, we found some very large gains in scores for minority and disadvantaged students in the 1970s and 1980s that did not
support this notion that money does not matter. In addition, some new state results that will be coming out in a couple of months also indicate that money does matter in education.

With some conclusive evidence, finally, perhaps these findings will pave the way for policymakers. While money is not a panacea, and the issue of teacher supply and demand is too complex to be resolved by a single solution, proof that increased expenditures do yield very real and very positive results may affect some of the approaches we take to address the current teacher shortage.
Section II: Outlining the Problem and Research Agenda

The following set of slides develops a framework for thinking about the approaching gap between the demand for certified teachers and the supply of such teachers. It describes the current policy environment that will influence supply and demand, identifies the major factors that will influence future supply and demand both nationally and at the state level, provides data and comments on these factors, and outlines a research agenda for better assessing the scope of the problem and the effect that new policies might have on mitigating the problem. Little of this research is currently underway.
We first provide an overview of relevant research and current policy directions that will influence both the supply and demand for teachers.

Next we look at the history of teacher supply and demand conditions in order to place the approaching issue in context and determine some lessons learned.

We then identify and provide some data on the factors likely to affect the supply and demand for teachers in the next ten years and some likely responses to tight labor markets for teachers.

We then look at the quite different situations developing in different regions of the country. We expect major differences in the tightness of labor markets by region and sometimes by state.

The proportion of minority students will be increasing in the next ten years, likely expanding the current gap between the proportion of minority teachers and the proportion of minority students in the public schools.

We develop some preliminary conclusions and identify research needed to gain more understanding of this problem, anticipate its magnitude, measure differences across regions/states, and finally evaluate policy options for addressing the problem.
It is important to understand how the results from research are changing, because policy is now more closely linked to research than at any time in the past. Research is shifting away from an earlier paradigm that alleged that additional resources did not affect achievement. Newer research is finding that targeting resources toward certain programs and certain students can in fact result in significant achievement gains. In general, the research now supports lowering class size in grades K–3, investing in public pre-kindergarten programs, and targeting resources toward minority and/or disadvantaged students.
**Implications for Teacher Supply/Demand**

- K–3 Class size will decline
  - Increased demand for K–3 teachers
  - Primarily in schools with high percentage of minority/economically disadvantaged students
  - Demand for teachers much larger for states with current large class size
- Public pre-kindergarten may become universal
  - Large increase in demand for elementary teachers
  - Primarily for minority/disadvantaged students
  - Primarily in states with no public pre-K and large proportion of minority/disadvantaged students

Class size reductions targeted toward disadvantaged students are occurring and will likely continue to occur across many states and will be larger and more widespread in states with higher proportions of disadvantaged students and larger current class sizes. For instance, states such as Iowa and Maine currently have small class sizes and few disadvantaged students, so little class size reduction is expected. However, southern states and states such as New York, Illinois, and California may well experience significant class size reductions in lower grades, driven by federal and/or state policies.

Public pre-kindergarten is far from universal, and states differ considerably in the size of their public pre-kindergarten programs. Texas has the highest proportion of children in public pre-kindergarten—over 30 percent—while many states have less than 5 percent. No single factor might have as much impact on new teacher demand as expanding public pre-kindergarten. Universal public pre-kindergarten would substantially increase teacher demand, and it is one of the critical uncertainties in future projections. It would also land unevenly on states, primarily affecting states with no pre-kindergarten programs in place and a large proportion of minority/economically disadvantaged students.
### Historical Perspective

- **Supply/demand situation in baby boom**
  - Driven by enrollment increase
  - Driven by high attrition due to large proportion of young teachers
  - Declining pupil/teacher ratio
  - Responses
    - Large increase in education majors
    - Significant increase in real teacher salary

- **Supply/Demand during baby bust**
  - Enrollment decline
  - Decline in attrition rate
  - Responses
    - Decline in real salary
    - Significant reduction in number of new teachers hired
    - Large decline in education majors
    - Significant regional differences

Perhaps the most dramatic historical change in teacher supply/demand occurred in the 1960s and 1970s, when the baby boomers passed through schools. K–12 enrollments increased from 26 million to 46 million from 1950 to 1972, declined to 39 million by 1985, and then increased to around 48 million currently. The rising enrollments in the 1950s created a higher demand for teachers, which was partially satisfied by higher college attendance rates fueled partly by the GI Bill. The 1960s were characterized by further substantial enrollment growth and also by higher teacher retirement and a push to reduce pupil/teacher ratios. Demand for new teachers was so high that almost 1 in 11 teachers was in his or her first year of teaching. Attrition rates were also high in the 1960s due to the high proportion of young teachers (who are statistically more likely to leave the profession).

The enrollment declines in the 1970s and early 1980s drove down the demand for new teachers such that only 1 teacher in 30–40 was in his or her first year of teaching. Attrition rates declined in the late 1970s and 1980s as more teachers moved into mid-career and fewer were in the early years of teaching. There were also significant regional differences in how much the demand for teachers declined, as population shifts toward the south and west led to more rapid enrollment declines in the Northeast and Midwest.

The strong demand for teachers in the 1960s and early 1970s drove real teacher salaries upward as school districts tried to compete successfully in a tight labor market. The number of college students majoring in education also increased substantially in response to the near certainty of job offers. Both real salary increases and the number of education majors then declined significantly as the labor market reversed itself in the late 1970s and 1980s.

Although higher demand for teachers would be predicted to raise salaries and the number of education majors, the size of these market responses depends on several factors that are different today from in the 1960s. These factors include the competitiveness of the job market for occupations that are close substitutes for teaching, the salaries for teaching relative to salaries for these alternate jobs, and the propensity or “taste” of college students to teach independent of relative wage levels. These factors need research and careful evaluation to better estimate what might be expected in salary increases and response from college students.
K–12 enrollment is larger today than at any previous time, and it will continue to increase through 2008. Enrollment patterns show the strong rise due to the baby boom in the 1960s, declines from the baby bust in the later 1970s and 1980s, and increases again as the echo of the baby boom passes through. While enrollments will increase between 2000 and 2010, the rate of increase is not large. Unlike the baby boom enrollments, it will not be the dominant factor causing a higher demand for teachers; rather, it will be one of several factors pushing demand higher.
Policies aimed at lowering pupil/teacher ratios have been an important factor in generating demand for new teachers. The pupil/teacher ratio declined significantly from the 1950s to 1990. The period of steepest decline was in the mid to late 1960s and 1970s. From 1965 to 1980, the ratio fell from approximately 25 students per teacher to 18 students per teacher. It fell at a slower rate in the 1980s, and has fallen only slightly in the 1990s. Part of this leveling off is due to the increase in special education teachers. Thus, not all the reduction is associated with smaller class sizes for regular students.

Part of the strong demand for new teachers in the 1960s came not only from baby boom enrollments, but also from interventions to lower pupil/teacher ratios. Selective reductions in pupil/teacher ratios are likely in future years in schools with more disadvantaged students.
When the baby boom created a strong demand for newly prepared teachers in the 1960s, the number of college graduates majoring in education increased dramatically. As the baby boom passed into the baby bust in the 1970s and demand for new teachers plummeted, the number of college education majors declined as well. In the 1960s and 1970s, college students were very responsive to the availability of teaching jobs when choosing their majors. Students with uncertainty about their majors tend to respond to the perceived job prospects in each field. The perception of the ready availability of jobs can be an important factor for many in deciding on a major.

A critical question is how responsive college students will be in the next ten years to the increased demand for teachers. A similar responsiveness may be unlikely for several reasons. For instance, the job market for college graduates today is very strong and job alternatives to teaching are plentiful.
This chart shows the proportion of the teaching force in the first year of teaching. It is also a measure of the
demand for inexperienced teachers. About 9 percent of the teaching force were teachers in their first year
of teaching in the mid 1960s. More recently, only 2–3 percent of teachers were in their first year.
The hiring of inexperienced teachers is expected to increase due to both the increasing demand for
teachers and the increasing scarcity of experienced teachers returning from the "reserve pool." The
reserve pool of experienced teachers who are not currently teaching has been declining as the teaching
force ages. Experienced teachers are much more likely to leave teaching and return if they are younger and
without family demands. Older teachers are much less likely to interrupt their careers.
This chart illustrates the strong hiring that occurred in response to the baby boom and the relatively weak hiring during the baby bust. In 1966, about 30 percent of teachers were in their first or second year of teaching. This declined to around 12 percent after the baby boom passed. As of 1996 (the year of the National Education Association [NEA] survey), there is little evidence of increased hiring from enrollment increases.
The School and Staffing Survey (SASS) followed up teachers who left teaching. The percentages in this chart reflect the numbers of teachers who taught in 1993–1994 but not in the following year. As such, it does not distinguish between those who left teaching permanently and those who will return.

Young, less-experienced teachers are more likely to leave teaching than those in mid-career. About 8 percent of teachers with 1–3 years of experience left teaching, compared to 4–5 percent of teachers with 10–24 years of experience. About 11 percent of teachers with more than 25 years of experience left teaching—mainly to retire.

The overall annual attrition rate of teachers is very dependent on the distribution of teachers by years of experience. In the 1960s, a high proportion of teachers had fewer than 5 years of experience, so overall attrition was high. In recent years, attrition rates have been low because a high proportion of teachers are in mid-career and not yet eligible for retirement. As more teachers move into retirement eligibility, attrition rates will rise both because of retirements and because retiring teachers will be replaced by younger teachers with little experience, who also have high attrition rates.
Teacher attrition has increased for every age group between 1987–1988 and 1993–1994. The increase is 10 percent or more for each age group—a significant increase in attrition. The percentage increase is highest for teachers who are eligible for retirement (years after age 60). The cause of the increased attrition in pre-retirement years is not known, but it may reflect the improved prospects for job opportunities outside teaching in 1993–1994 compared to 1987–1988 or changing working conditions within the field of teaching.
Average teacher salary patterns have partly mirrored the pattern of demand for new teachers. Salary in real terms rose in the 1960s through the early 1970s as school districts had to attract an unprecedented number of new teachers. Hiring plummeted in the later 1970s and early 1980s and salaries fell in real terms. Salaries rose again in real terms in the late 1980s partly in response to higher demand due to class size reductions. Since 1989, real salaries have remained stagnant.

It is important to note, however, that average salaries can be misleading indicators of teacher supply and demand factors, since they also reflect the experience and education of the teaching force. Part of the reason for rising salaries from the 1960s to 1990s is the greater age and experience of the teaching force.
This chart accounts for the portion of the increase in average salary due to increased experience and education of teachers and thus is a better measure of real salary increase for teachers at similar levels of education and experience. The data is the residual of a regression of average salary versus average experience and percentage with advanced degrees. While it shows a pattern similar to the previous chart, it shows a decline in recent years.
The number of public school teachers increased dramatically from 1955 to 1975—from approximately 1.2 million to 2.2 million. This increase was caused by increasing baby boom enrollments, declining pupil/teacher ratios, and increasing emphasis on special education. The number of teachers declined slightly from 1975 to 1983 as enrollments declined. However, the decline was much smaller than would be expected based on enrollment declines because pupil/teacher ratios continued to decline and there were large increases in special education teachers. The number of teachers increased again from 1983 to 1998—to about 2.7 million—as enrollments continued to increase to all-time highs and pupil/teacher ratios declined somewhat.
Future Demand Conditions

- Stable to slightly increasing enrollments
- Selected declines in pupil/teacher ratio
- Increasing attrition
  - Increasing retirements
    - Peak 6–10 years away
    - Higher in the Northeast and Midwest
  - Increasing proportion of young teachers
  - Attrition sensitive to economy and alternate wages
  - Changing environment for teaching?
- Output of "reserve pool" also needed to determine the demand for newly prepared teachers

The demand for teachers (i.e., how many teachers are needed that did not teach last year) is much easier to predict than teacher supply. Demand for teachers depends almost entirely on three factors: enrollments, teacher attrition, and pupil/teacher ratios. Each of these factors can be reasonably predictable for the next ten years with appropriate models and data, and data on these factors can generate reasonable estimates of future teacher demand. These factors are also fairly predictable at a state level, and the range of differences in demand across states can be reasonably predicted. One uncertainty is whether the wave of recent systemic reforms that have changed the teaching environment will affect teacher attrition.

While the total demand for teachers is fairly predictable, it is somewhat harder to predict how many newly prepared teachers are needed each year. Part of the demand for teachers is satisfied by returning "reserve pool" teachers (those who taught previously, but did not teach last year). The proportion of teacher demand satisfied by returning teachers has been over 60 percent but has declined steadily as the reserve pool has declined.
Factors in Teacher Supply and Demand

The pupil/teacher ratio has declined marginally in the last few years, but selective declines are likely to occur in lower elementary grades, especially for schools with higher proportions of disadvantaged students. The push to reduce class size in lower elementary grades has been spurred by the Tennessee experiment showing significant achievement gains. Research also shows that gains from class size reduction are greater for disadvantaged students and may be very small for more advantaged students.
This chart shows the shifting age distribution of the teaching force from 1987–1988 to 1993–1994. The data shows that teachers between the ages of 30 and 39 made up the largest proportion of the teaching force in 1987–1988, but that shifted to the 40–49 group by 1993–1994. Surprisingly, this chart shows a smaller proportion of the teaching force over age 50 in 1993–1994 than in 1987–1988. This may indicate that teachers are retiring earlier today. However, the large group of teachers who were between the ages of 40 and 49 in 1993–1994 is the cause of the increasing retirements today.
This chart shows the changes in the distribution of teachers by years of experience from 1987–88 to 1993–94. The group with over 20 years of experience is the fastest growing group.
Retirements are Increasing

The School and Staffing Surveys (SASS) for 1988–1989, 1991–1992, and 1994–1995 all showed an increasing proportion of teacher retirements. Retirement rates have risen from 1.25 percent to 1.75 percent of the teaching force—an increase of over 40 percent. The teacher retirement rate will continue to rise and is likely to reach 3 percent or higher in the coming years.
Compared to younger teachers, the teachers approaching retirement are disproportionately male. Thus, the increased retirements in the next ten years will be disproportionately male and will make the teaching force even more female.

One possible reason for this distribution is that the increased demand in the 1960s brought more males into teaching.
This chart shows teachers' responses to the NEA survey question about when they are planning to retire. In 1996 (the year of the survey), the largest proportion of teachers indicated that they were 5–14 years from retirement. Based on this data, the peak retirement years will be 2001–2010. Of course, many factors determine the actual timing of teacher retirements. One area of needed research is to create a model for the teacher retirement decision. Such a model would identify the factors that determine whether teachers typically retire at age 55, 60, 62, or 65, as well as what factors would make them stay longer.
Factors in Teacher Supply and Demand

### Future Supply Conditions

- Supply response from college students
  - Probably different than in the 1960s and 1970s
  - Tight labor market
  - Changing teaching environment
  - Jobs may be disproportionately in schools with disadvantaged students
- Reserve pool
  - Significant number of education majors do not currently teach
  - Many college graduates express interest in teaching
  - Declining pool of experienced teachers who left teaching in their 20s and 30s
  - Retired teachers
  - Alternative certification
  - Military
- Tightening certification standards
- Teacher salary, benefits, and working conditions

The future supply of certified teachers depends on more factors than future teacher demand does, and the factors are harder to predict. Part of the reason is that it is difficult to predict both college majors and what portion of college graduates will seek teaching jobs. Both choice of college major and choice of job after college are highly dependent on the perception of future wages and working conditions as well as on the relative wages and working conditions of teaching in comparison to other occupations.

The teaching environment is also changing due to national trends toward standards adoption with an increased focus on assessment and accountability, and what impact this will have on students' choice of career is not yet known. In addition, a disproportionate share of available jobs may be in schools with disadvantaged students—usually a more challenging environment.

It is also very difficult to predict how many of those who have taught previously but have since left the profession will return to teaching. The reserve pool of teachers is smaller today than in previous years for two reasons. First, teachers with children leave teaching less often than in previous years because of their dependence on two incomes. Second, those who leave usually do so before age 35, and there are fewer young teachers today than in previous years. So an increasing part of the demand is falling on inexperienced or "newly minted" teachers instead of the reserve pool.

Newly minted teachers today are more diverse than in prior years. An increasing proportion of newly prepared teachers are in their 30s rather than in their 20s, in part because many women are returning to school for college degrees or teacher certification after their children are older. In addition, some newly minted teachers have turned to teaching after military careers, but this source will be declining in future years due to smaller military forces.

Current retirees may increasingly be seen as a source of teachers. Programs that would provide incentives to delay retirement and programs aimed at attracting recent retirees back to teaching will probably gain prominence if labor markets become very tight.

The supply of teachers would likely decline if there were to be a real tightening of certification standards. Making passing a teacher exam a requirement for certification may screen out candidates who would have entered in previous years. It may also delay entry of some candidates. It is unclear how many candidates would be screened out and how many would just delay entry as a result of testing.

Finally, the supply of teachers is moderately responsive to the increases in salary levels that have occurred historically in times of increased demand. However, such raises depend on the fiscal capacity of states and school districts and the extent of such raises is difficult to predict.
A longitudinal survey of college graduates in 1992–1993 shows that 7–8 percent of graduates were teaching. About 4 percent of graduates prepared for a teaching career (i.e., they were education majors or had done student teaching) but were not teaching. About 14 percent of graduates considered teaching when in college, according to their survey question responses.

It is not clear how many of those who prepared for teaching actually pursued teaching opportunities but could not find employment in teaching and how many simply did not pursue teaching after graduation.

Analysis of this survey data and subsequent data will be an important part of future teacher supply projections.
This chart shows the proportion of college graduates that scored in the top quartile on college entrance exams. It divides graduates into four groups: those teaching, those who prepared for teaching, those who expressed interest in teaching, and the remaining graduates. The data show that those teaching or prepared to teach were less likely to be in the top quartile of college entrants. About 17 percent of those teaching or prepared to teach were in the top quartile, compared to 26–27 percent of the remaining students.
While the previous chart showed that those who teach were less likely to be in the top quartile of college entrance scores, this chart reveals that the difference is entirely due to the low scores of elementary teachers. In fact, middle school and secondary teachers were slightly more likely than other nonteaching students to be in the top quartile.
Factors in Teacher Supply and Demand

Pool of Teachers by Major from 1992–1993 College Graduates

This chart shows the proportion of college graduates in 1992–1993 in each major who actually taught, prepared for teaching but did not teach, and considered teaching. It shows that only about 42 percent of education majors were actually teaching.
In recent years, many new teachers entered teaching for the first time when in their 30s. These teachers have somewhat different behavior since they entered at an older age. Many finished their college degree only after age 30, while others worked in nonteaching jobs before deciding to teach. Several studies have shown that these late-entering teachers—other things being equal—have lower attrition rates. This chart shows that these late-entering teachers express a high probability of staying in teaching for the long term.
Factors in Teacher Supply and Demand

Minority Teachers

- Significant and widening gap between proportions of minority students and minority teachers
  - Increasing proportion of minority students
  - Stable-to-declining proportion of minority teachers
- Declining pipeline due to demise of affirmative action programs
- Attractive alternatives for graduates
- Demand for new teachers probably will be higher in minority schools

Without significant policy initiatives, the already wide gap between the racial/ethnic composition of students and teachers will likely grow larger as the student population becomes more diverse with the minority teaching population stable or declining.

If affirmative action programs are discontinued, it is likely that minorities will find it harder to enter college, and those entering may have extremely good job prospects outside education. It is hard to see how there would be any significant increase in minority teachers under such policies.
This chart shows how the proportion of minority teachers has changed from 1987–1988 to 1993–1994. The proportion of Black teachers has declined slightly, from over 8 percent to 7.5 percent, while the proportion of Hispanic teachers has increased from 5 percent to 7.5 percent. The proportion of minority teachers remained significantly below the proportion of minority students in all years.
This chart shows that over 10 percent of Hispanic graduates from the college graduating class of 1992–1993 were actually teaching, compared to 8 percent of White graduates and 6 percent of Black graduates. However, it also shows that minorities who prepare for teaching more often actually teach than do White graduates. It could be either that minority graduates are more likely to receive offers to teach or that they more often pursue teaching jobs than White graduates.
The percentage of education majors who are Black has declined from almost 9 percent in 1981 to about 7 percent in 1996. The percentage of education majors who are Hispanic has increased somewhat, from 2.7 percent to 3.6 percent. Still, the proportion of minority students is far greater than the proportion of minority teachers, and current evidence indicates that this gap will only increase.
Schools With Higher Minority Percentage Have Higher Teacher Attrition

This chart shows teacher attrition rates for schools with different minority proportions. These attrition rates include both attrition out of teaching as well as migration to other schools. Annual attrition rates are around 15 percent for schools having over 50 percent minority students, while they are around 12 percent for schools with less than 5 percent minority students.

The higher attrition cannot be attributed to different salary levels but probably arises from the challenges of poorer working conditions and more at-risk children. If demand for new teachers will occur disproportionately in schools with high numbers of minority and at-risk children, attrition rates can be expected to increase as well.
Supply/Demand Conditions May Differ Dramatically Across States

- Retirements higher in the Northeast and Midwest
- Enrollment growth higher in the South and West
- Demand higher in certain states
  - Large class size
  - High proportion of minority/disadvantaged students
- New teaching certification requirements differ by state
- State reforms are changing the teaching environment in ways that could have an impact on attrition and supply
- Capacity to raise salaries may differ by state
- Strength of economy may differ by state
- Competition across states for teachers will likely intensify

The demand for new teachers in each state will depend on enrollment growth, pupil/teacher ratio reductions, pre-retirement teacher attrition, and teacher retirement rates. Each of these factors will vary by region and state. We know that retirement rates will be higher in the Northeast and Midwest, but enrollment growth will continue to be stronger in the South and West. Pupil/teacher ratio reductions may well be focused on states that currently have larger class size or a higher proportion of disadvantaged students. Although in general the southern states have a higher proportion of disadvantaged students, California, Ohio, Illinois, and New York also have significant populations of disadvantaged students. A significant unknown is how the recent wave of systemic reforms that change the environment for teaching will affect both teacher attrition and recruitment in different states.

The supply of teachers will also vary by state. The movement toward teacher testing and provisional certification may well reduce teacher supply if it is going to be effective. States are generally raising certification standards for teachers but there are significant differences among states.

The states will also have different capacities to raise teacher salaries to increase supply, and competition from alternate job opportunities will also differ by state. If labor market conditions for teachers tighten considerably, interstate competition may intensify, leaving lower-paying states at a disadvantage. However, it may be the states with lower salaries that experience higher enrollment growth and the need to reduce class size.
Enrollment Decline in North in 1980s Cut Off Hiring and Shaped an Older Teaching Force

This chart illustrates the student population dynamics that account for the large number of older and more experienced teachers in the Northeast and Midwest. It shows that enrollment declines were concentrated in the Northeast and Midwest, while southern and western states were characterized by enrollment growth or stability.
The states vary considerably in the proportion of their teachers nearing retirement. Some states have over 40 percent of their teachers with more than 20 years of experience, while some have only 20 percent. Generally, the northeastern and midwestern states have a much higher proportion of teachers nearing retirement than do southern or western states.

One of the main reasons that northern states have older and more experienced teachers is that little hiring was done in the 1970s in the northern states compared to southern states. Although all regions experienced enrollment declines in the 1970s due to the baby bust, declines in the North and Midwest were much steeper due to net population shifts from the Northeast and Midwest to the South and West. The enrollment increases in schools in southern and some western states were further fueled by a new wave of Hispanic immigration.

Thus, the South and some western states continued to hire significant numbers of teachers in the 1970s and 1980s, while hiring was sparse in the Northeast and Midwest. The lack of hiring in the Northeast and Midwest in the 1970s and 1980s, combined with the strong hiring in the 1960s, has left an imprint on today's teaching force in the form of a disproportionate share of older and experienced teachers. It also means a greater number of teachers are approaching retirement age in these regions.
This chart shows that in 1988–1989 and 1991–1992, teacher attrition rates were lowest in the Northeast and Midwest. These lower rates are likely due to having a greater proportion of the teaching force in mid to late career. In the South and West, the teaching force is generally younger and has fewer years of experience. However, attrition increased significantly in 1994–1995 in the Northeast and Midwest—perhaps reflecting the beginning of increased retirement rates in these regions.
Reserve Pool Probably Declining, So Increased Demand Falls on Newly Minted Teachers

- Fewer young teachers in teaching to drop out
- Women less frequently take leave; take leave for shorter time
- Strong economy has provided jobs outside teaching for part of reserve pool
- Pool of previous education majors who have not taught
  - Jobs may not have been available
  - Preference may be for not teaching

An important dynamic among newly hired teachers is the increasing dependence over the last 15 years on newly minted teachers. The cause of this is the declining number of reserve pool teachers who are returning to teaching. The reserve pool is made up of teachers who have left teaching—usually for family reasons, but also in some cases to try other jobs. Former teachers returning to teaching used to constitute over 50 percent of teachers hired every year, but this proportion has been declining. The primary reason is that due to family dependence on two incomes teachers are dropping out of teaching less often. Also, younger teachers have the highest probability of dropping out and there are fewer younger teachers in the workforce. Since the number of teachers in the reserve pool has been declining, hiring has become more dependent on newly prepared teachers.
Responses to Increased Demand for Teachers

- Real increases in teacher salaries
  - Reduce demand by lowering attrition
  - Increase supply
  - Money may be available because the lower average salary is lower due to younger teachers
- Programs to lower attrition in early years
  - Student loan forgiveness
  - GI Bill–type programs for graduate school
  - Bonuses for shortage specialties
  - Undergraduate scholarships
  - Induction programs

Market responses to the tight labor market for teachers will occur automatically. Teacher salaries and/or benefits will likely increase. These increases will increase supply and lower attrition—both of which will ease shortages. Some of the funding for teacher salary increases may come from the accrued savings resulting from the replacement of retiring teachers at the top of the pay scale with young teachers. Another likely response is to effectively boost the salaries of younger teachers through selective policies. Such policies include bonus payments, loan forgiveness, and GI Bill–type programs to build funds for graduate school. Undergraduate scholarships also effectively increase teacher salary levels for younger teachers.
This chart shows the commonly cited increases in per-pupil spending in 1997–1998 dollars (adjusted for inflation by the Consumer Price Index [CPI]) from 1950 to 1998. However, the CPI overestimates the growth in real spending because it does not reflect how schools spend money. Compared to consumers, K–12 education spends a disproportionate amount on labor, and labor costs have risen faster than the cost of consumer goods. One study (Rothstein and Miles, 1995) estimated that "real" education expenditures only rose by 60 percent—rather than 100 percent—from 1967 to 1991 when calculated using a "labor intensive" inflation adjustment.

While "real" expenditures for schools have grown much slower than this commonly cited data shows, per-pupil expenditures have grown over most of this period. The fastest rate of growth occurred from 1983 to 1990—perhaps partly triggered by the National Commission on Excellence in Education’s 1983 report, *A Nation at Risk*. In the 1990s, CPI-adjusted expenditures have increased only slightly, and use of an appropriate inflation adjustment would probably show stable or slightly declining expenditures.
Factors in Teacher Supply and Demand

Preliminary Conclusions

• Many factors will drive teacher supply and demand equation, making it more complex than in the 1960s
  – Increasing retirements will not dominate
  – Pre-kindergarten expansion and class size reduction will be important
  – Demand may occur disproportionately in disadvantaged schools and school districts
  – Responsiveness of college students a major uncertainty
  – Smaller reserve pool available
• Retirement peak is 4–8 years away
• Regional/state differences will be significant
• Teachers will likely be even less ethnically/racially representative of K–12 students

The last time that meeting the demand for teachers was a major concern was in the 1960s and 1970s, and demand then was primarily driven by two predictable factors—student enrollment and pupil/teacher ratio. Both teacher salary levels and college students were responsive to the higher demand, allowing an adequate supply of teachers.

The approaching teacher shortage problem is multifaceted. Although increasing teacher demand is often assumed to be driven primarily by increasing retirements, other factors may be as important or even more important in determining the demand increase. Rising pre-retirement attrition, class size reduction, and expanded pre-kindergarten programs may also increase demand. On the supply side, response to this demand is less certain now due to the strong job market outside education, the tightening of certification standards in teaching, the changing environment for teaching, and the primary availability of jobs in disadvantaged areas.

The peak for teacher retirements is still 4–8 years away, but retirements will be increasing and will remain at high levels for at least ten years.

It is also important to note that there will be significant differences in supply and demand across regions and states, although many of these differences can be predicted.

Finally, the already wide gap between the proportion of minority students and the proportion of minority teachers will probably continue to increase unless significant policy initiatives are introduced.