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The impact of baby boomer retirements on teacher labor markets

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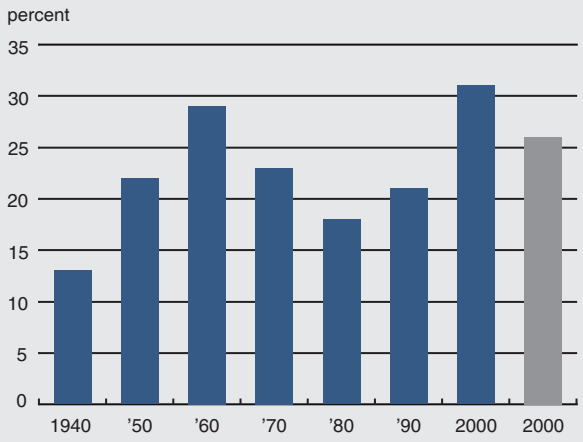
This article explores the future of teacher labor markets. The authors find that teacher hiring needs will rise over the coming decade largely because of retirements. However, this increase will not be significantly different from that of past decades.

One important consequence of the ongoing baby boom retirement is an unprecedented loss in work experience. An aging work force has caused particular unease in elementary and secondary education; some school districts envision repercussions from increases in retirement, as well as other forms of turnover.[1] Figure 1 uses the 1940–2000 U.S. *Decennial Censuses* to plot one measure of expected retirement—the fraction of teachers 50 years and over. That share rose from 18% in 1980 to 31% in 2000. While the 2000 level is comparable to the 1960 level, the teacher work force became notably younger in the 1960s and 1970s. By contrast, it is quite reasonable to expect that the current teacher age distribution will remain intact in the near term. Moreover, the teacher age distribution is more skewed toward older employees than the college educated work force in general (compare the last two bars in figure 1).

1. Share of teachers aged 50 and older, 1940–2000



NOTE: The final bar shows the share of all college educated workers (not just teachers) aged 50 and older in 2000.

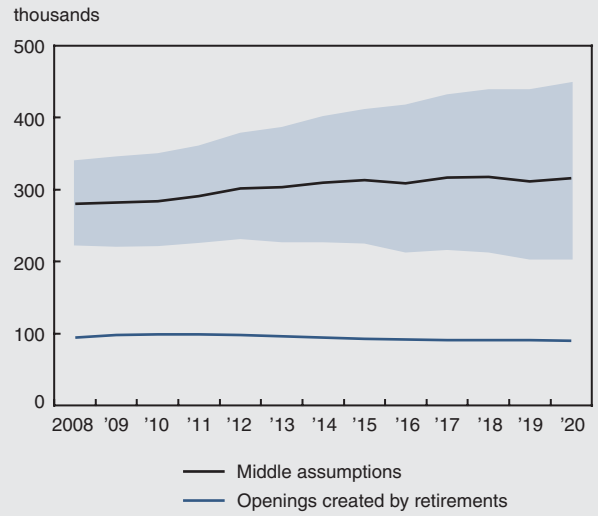
SOURCE: U.S. Census Bureau, 1940–2000, U.S. *Decennial Census*.

While turnover will remain on the high side of historical norms partly because of an aging teacher work force, this in itself is not cause for alarm. The question is whether an increase in future turnover has negative implications for student performance. Some evidence suggests it might, particularly in the common scenario where an experienced teacher is replaced with an inexperienced one.[2]

In this *Chicago Fed Letter*, we discuss several aspects of teacher labor markets in the coming decade. First and foremost, we introduce our forecast of full-time (defined as at least 35 hours) teacher hiring needs.[3] Our forecast links estimates of demand for classrooms (or equivalently teachers), obtained primarily through U.S. Census projections of school-age children, with the expected supply of teachers returning from previous years. We derive the latter from estimates of turnover among full-time elementary and secondary public school teachers, by age, experience, and gender, using the most comprehensive data source on the occupational structure of schools—the U.S. Department of Education's 2003–04 *Schools and Staffing Survey* (SASS) and its accompanying 2004–05 *Teacher Follow-up Survey* (TFS).

We estimate the number of new full-time hires needed from 2008 through 2020 at between 2.9 million and 5.1 million, with the range encompassing reasonable assumptions about fertility rates, student–teacher ratios, and turnover propensity. Our preferred calculations predict 280,000 new teachers in 2008–09, but

2. New hires, full-time public school teachers, 2008–20



NOTES: New hires were estimated for 2004–07 (not shown), since actual hiring data for those years are not available, and then carried through 2020. The shaded region represents the range of estimates for hiring. See the text for further details.

rise to 320,000 new hires by 2020–21, or 3.9 million for school years 2008–09 through 2020–21.

These estimates are of total turnover, regardless of whether it is caused by retirement or not. Turnover specifically arising from retirement currently makes up roughly 30% of annual exits, or 95,000 teachers per year. This number will peak at about 100,000 in 2011 and then remain between 90,000 and 100,000 through the rest of the decade.

To put these numbers in context, we provide rough estimates of net hiring over the past six decades, using teacher counts from the U.S. Census, as well as hiring projections for the years 2010 and 2020. We find that the number of teachers retiring over the decade 2010–20 will be the largest in any decade post-World War II. But because of relatively slower growth in the school-age population going forward, the total number of new hires needed for all reasons is not far from historical norms. And, in fact, normalized by the size of the aggregate labor force (i.e., one rough measure of the potential teacher work force), the number of new hires in the coming decade will be similar in magnitude to the number of new hires needed in some past decades. Therefore, we would not expect the increase in forthcoming retirements to have an impact much beyond the variation in teacher hiring needed in the past.[4]

Demand for teachers

To compute future demand for teachers, we use U.S. Census projections of the five-year-old population, estimates of the propensity to attend public school kindergarten, and estimated grade progression rates to project the population of students through 2020. We then apply a projected student–teacher ratio to get the total number of teachers needed to accommodate these students.

We begin with a baseline of the most recent count of students, broken down by grade, compiled by the U.S. Department of Education for the 2003–04 school year. Each of these students is assumed to progress through the public school system based on estimated grade-specific progression rates for the school years 1999–2000 through 2002–03. For example, we assume, based on recent patterns, that for every 1,000 seventh grade public school students, there will be 997 eighth grade public school students the following year. Cohorts are followed through twelfth grade, while new cohorts are added each year to kindergarten, based on U.S. Census projections of five year olds corresponding to that school year.

To get a final count of classrooms, we apply student–teacher ratios to our student totals in each year based on forecasts from the U.S. Department of Education's National Center for Education Statistics (NCES). We provide some perspective on the uncertainty of our forecasts by allowing for a range of plausible assumptions about future student–teacher ratios and five-year-old population growth.

Supply of teachers

The latest detailed accounting of the teacher work force is available from the 2003–04 SASS, a survey that was designed to emphasize, among other things, the potential for teacher shortages.

That survey tells us there were just under 3 million full-time public school teachers during the 2003–04 school year. Of these, 7.6% had left the teacher work force by 2004–05, a turnover rate that has risen noticeably over the last 15–20 years as teacher retirements have become more prevalent. We isolate three characteristics that influence turnover—age, work experience, and gender—in order to predict how many teachers will remain the following year. After replacing the exiting teachers in our simulations with new teachers (i.e., those who did not teach in a public school in the previous year), we redo the turnover simulation for the following year, and so forth, to generate teacher supply through 2020.

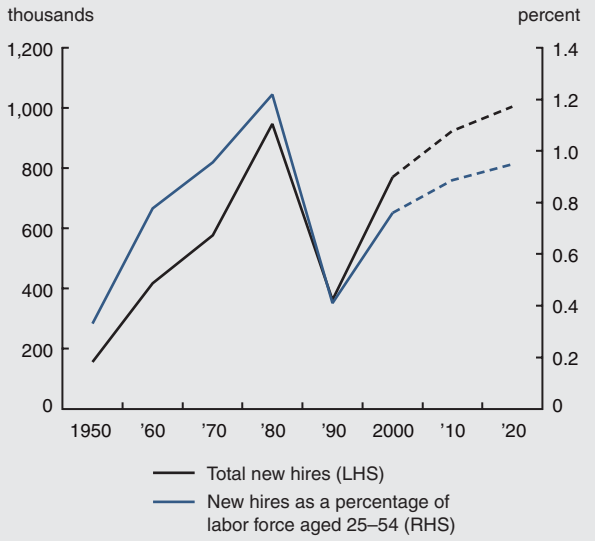
We can ascertain the importance of teacher retirement in two ways. First, the follow-up survey asks why teachers exit the profession. Retirement is listed in roughly 32% of cases in 2003–04. Second, we can look at age-specific exits from the teaching profession. Turnover rises by 2.2% per year after age 50, with overall turnover rates hitting close to 30% shortly after age 60. Note that turnover is also high among young and inexperienced teachers.[5] Because we typically exchange exiting teachers with these high-turnover replacements, retirements further amplify net hiring needs by temporarily introducing high-turnover employees into the system.

Net hiring

Lastly, for each year, we equate teacher supply to demand. After turnover has been factored in, the additional number of teachers needed to fill this gap is what we call net hiring.

To be clear, our estimates are based on a mechanical model of teacher labor markets that assumes some key factors related to the propensity to enter and exit the teaching profession are similar to those in the recent past. These include compensation, pension packages, certification requirements, tenure decisions, and variability in the business cycle. Difficulty in hiring or retaining teachers could lead local communities to change

3. New hires, full-time public school teachers, 1940–2020



NOTES: Dashed lines indicate forecasts. LHS means left-hand scale. RHS means right-hand scale. See the text for the definition of new hires.

SOURCES: Authors' calculations based on data from the University of Minnesota, Minnesota Population Center, Integrated Public Use Microdata Series; and Mitra Toossi, 2006, "A new look at long-term labor force projections to 2050," *Monthly Labor Review*, Vol. 129, No. 11, November, pp. 19–39.

policies in a way that influences the supply of available teachers. We abstract from those important considerations here.

That said, figure 2 provides several estimates of new full-time hires through 2020. First, the solid black line, labeled "middle assumptions," is based on our best estimate of future teacher turnover rates. In this scenario, roughly 280,000 new hires are added in 2008–09, or roughly 9.3% of the projected 3 million teacher work force. For the coming decade, the total number of new hires needed to fill growth in demand, as well as replace exiting teachers, rises by roughly 3,000 per year, hitting 316,000 new hires by 2020. For 2008–20, net new hiring totals 3.9 million.

The shaded region provides alternative estimates, with plausible upper and lower bounds of hiring when we adjust three key factors: the U.S. Census's assumed fertility rate, the estimated teacher turnover rate, and the estimated student–teacher ratio. The fertility and turnover rates are allowed to vary by plus or minus 1 percentage point from our estimated rates, with this range determined by the U.S. Census's high and low population projections and various estimates of teacher turnover. The bounds on the student–teacher ratio are based on NCES projections (upper bound) and a constant ratio (lower bound). These adjustments broaden the range of plausible net hiring to between 2.9 million and 5.1 million over the period 2008–20.

The blue line shows the number of new hires directly due to retirements each year. We find that roughly 30% of the new hires needed during 2008–20 are due to openings created by retirements.

Are these numbers historically high?

Of course, there are always retirements. The key question is how much *unusual* hiring would be needed to deal with the baby boomers' retirements. Retirements rise from about 76,000 in 2003–04 to nearly 95,000 in 2008–09, and average 90,000 to 100,000 per year over the next decade.

We can put our forecasts in some historical context by comparing our estimates with past changes in full-time public school net hiring from the U.S. Census. Because of data limitations, we provide very rough approximations of hiring during a decade by adding growth in the full-time public school teacher labor force to the number of teachers who retire. The idea behind this calculation, which clearly understates year-to-year hiring, is that it consistently measures all well-observed hires that fill newly created positions and replace retirees. The number of retirees is conservatively estimated as those who are at least age 55 at the beginning of the decade (and thus retire by 65). "New hires" are plotted in figure 3. We make comparable projections for 2010 and 2020; they vary from our more detailed projections reported previously but are consistent with the historical data.

In figure 3, the black line again shows the rise in new hires in the coming decade. But it also shows that the 1970s was a time when hiring was brisk. The reasons, of course, differ. In the 1970s, 72% of our new hire measure is from expansion in the teacher work force, necessitated by growing populations of school-age children. By contrast, during the years 2010–20, we expect that only about 31% of this measure of new hires will be due to teacher labor force expansion, and the remainder will be due to retirements.

We recognize that comparing absolute numbers is misleading because the size of the aggregate population—and consequently the potential and actual teacher work pool—has grown over time. Therefore, we normalize our new hire numbers by the population aged 25–54 (blue line). Here, we find that this ratio is not unusually high right now, nor do we expect it to become unusually high over the next decade.[6]

Conclusion

We find teacher hiring needs will rise over the coming decade, and a good portion of this will be due to retirements. That said, we do not expect this increase will be significantly different from that of some past decades, especially relative

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to the size of the aggregate labor force. However, this will play out over a longer horizon than it has in the past, and it undoubtedly will not be equally dispersed across the nation. In particular, there should be more research into which communities might be most in need, especially if the burden falls on schools that traditionally have had the most difficulty recruiting and retaining teachers.[7]

[1] See, e.g., Sam Dillon, 2007, "Schools scramble for teachers because of spreading turnover," *New York Times*, August 27.

[2] Most studies find the experience effect disappears after a few years of teaching, however. See Daniel Aaronson, Lisa Barrow, and William Sander, 2007, "Teachers and student achievement in the Chicago public high schools," *Journal of Labor Economics*, Vol. 25, No. 1, pp. 95–135, and Steven Rivkin, Eric Hanushek, and John Kain, 2005, "Teachers, schools, and academic achievement," *Econometrica*, Vol. 73, No. 2, pp. 417–458.

[3] The results are similar if we account for part-time teachers.

[4] A working paper that provides more details on the calculations reported here will be available soon; contact Daniel Aaronson at daaronson@frbchi.org.

[5] Turnover is 9% for those under age 30 and 20% for teachers with no full-time teaching experience.

[6] Full-time public school hires as a percentage of the population aged 25–54 are expected to average 0.91% in 2010 and 2020, just above the 0.83% average between 1960 and 2000 (and below the 0.96% and 1.20% levels reached in 1970 and 1980, respectively).

[7] Schools with a significant share of at-risk students might be of particular concern. We find some evidence that a disproportionate percentage of the future hiring needs will be in these schools. Although the teacher age distribution in such schools duplicates the distributions in other schools, turnover is one-third higher in general and 40% higher for newly hired teachers. As retirees are replaced by new teachers, these schools' higher turnover rates will exacerbate their already elevated hiring needs.