

2018

Lynn Steen's Imprint on *Demographic Change and the Demand for Higher Education*

Nathan D. Grawe

Carleton College, ngrawe@carleton.edu

Follow this and additional works at: <https://scholarcommons.usf.edu/numeracy>

 Part of the [Education Economics Commons](#), [Higher Education Commons](#), [Higher Education Administration Commons](#), and the [Labor Economics Commons](#)

Recommended Citation

Grawe, Nathan D.. "Lynn Steen's Imprint on *Demographic Change and the Demand for Higher Education*." *Numeracy* 11, Iss. 2 (2018): Article 9. DOI: <https://doi.org/10.5038/1936-4660.11.2.9>

Authors retain copyright of their material under a [Creative Commons Non-Commercial Attribution 4.0 License](#).

Lynn Steen's Imprint on *Demographic Change and the Demand for Higher Education*

Abstract

Nathan D. Grawe. 2018. *Demographic Change and the Demand for Higher Education* (Baltimore, MD: Johns Hopkins University Press) 192 pp. ISBN 978-1421424132.

This essay introduces and excerpts my *Demographic Change and the Demand for Higher Education*, published by Johns Hopkins University Press. The book reflects Lynn Steen's vision of quantitative reasoning as more to do with the quality of thought than the impressiveness of the mathematical tools involved. The excerpt lays out the basic demographic challenge facing higher education and how a refinement of simple headcount forecasts can support institutions of higher education as they make preparations.

Keywords

Higher Education Demand Index, demographic change, enrollment demand

Creative Commons License



This work is licensed under a [Creative Commons Attribution-Noncommercial 4.0 License](https://creativecommons.org/licenses/by-nc/4.0/)

Cover Page Footnote

Nathan D. Grawe is Professor of Economics and former director of the Quantitative Inquiry, Reasoning, and Knowledge (QuIRK) initiative at Carleton College.

Overview

I recall Lynn Steen’s description of Quantitative Reasoning (QR): “sophisticated reasoning with elementary mathematics rather than elementary reasoning with sophisticated mathematics” (Steen 2004, 9). It’s not that some problems don’t require sophisticated math or that you can’t make sophisticated points with advanced tools, but often we can make significant progress with very basic mathematics. It is my hope that my fellow Northfielder Steen would see the problem addressed in my new book, *Demographics and the Demand for Higher Education*, as a case in point.

The Financial Crisis had long-lasting effects. Starting in spring 2008, economic output in the United States fell by almost 5%, pushing unemployment to 10% in late 2009. Over the same time, equities markets (as measured by the S&P 500) lost more than half of their value. The effects of such a deep slump extend years into the future. For instance, output didn’t reach pre-recession levels until the second quarter of 2011, three years after the downturn began. The stock market took 16 months more to erase recessionary losses, and the unemployment rate did not fall back to early-2008 levels until March, 2017.

Throughout this time, the economy’s weakness has put pressure on college budgets, and it is understandable that many campus leaders would now be eager to return to normal. However, a new and significant consequence of the Financial Crisis looms over the horizon. Unsurprisingly, young people coming of age during the economic uncertainty of the last decade have been less willing to have children. (See Fig. 1.) In just three years, the total fertility rate fell by 9% before continuing a downward slide which resulted in a 14% decline through 2016 (Centers for Disease Control [CDC] 2018a).¹ (Provisional CDC reports suggest a continued decline in fertility through at least the third quarter of 2017 [CDC 2018b].) Moreover, the fertility rate is particularly low in the northeastern quadrant of the country—the region with a disproportionate share of college students and institutions of higher education (CDC 2018a). As a consequence, beginning in the mid-2020s we should expect a dramatic decrease in the number of college-aged students with drops of more than 20% in New England. The potential effect of such

¹ The total fertility rate for year t ($TFR(t)$) measures the number of children who would be born to a woman who, across the years of her life, experienced average fertility observed for each age in year t :

$$TFR(t) = \sum_{a=\underline{a}}^{\bar{a}} r_{at}$$

Where r_{at} is the average number of births observed at time t to women of age a and \underline{a} and \bar{a} represent the youngest and oldest ages of fecundity. It is a common summary statistic for the general level of fertility at a given point in time.

a large and swift reduction in demand could be devastating to higher education institutions. Combined with longstanding trends that have nudged the US population toward the Hispanic Southwest, the fallout in 2026—18 years following the onset of the Great Recession—could be disruptive, to say the least.



Figure 1. Total fertility rate per 1000 women, 1989 to 2016.

The higher education press has not missed this story. For example, the *Chronicle of Higher Education* has published annual warnings, many on the front page and complete with maps dripping in red ink. And yet institutions have been slow to act. Some institutional inertia may simply reflect the deliberate pace of decision-making on most college campuses. Colleges are not generally known for their agility, after all.

Perhaps some of this inertia may reflect myopic leaders who know that they will move on to new posts long before we feel the effects of the present birth dearth, but I wonder if a more excusable explanation is relevant. Forecasts which apply equally to a member of the Ivy League as to the local community college are too crude for serious use by any institution. Would it really be responsible for a university president to propose significant changes in practice based on such data? Perhaps the national trend is not relevant for a given institution, and so acting on that information would be worse than doing nothing until more and better evidence is available.

The basic problem is that existing forecasts look at headcounts, but not every head counts equally. For example, an Asian American 18-year-old living in Boston with both parents who have BAs and earn \$125,000 is more than 10 times as likely

to attend a four-year college than an Hispanic male peer living in rural California with his mother who has not completed high school and earns \$40,000. If we consider the market for colleges or universities ranked among the top 50, our hypothetical Asian American woman is 35 times as likely to attend as our Hispanic man. Given such disparate rates of attendance, relying on headcount data may easily be worse than ignoring data altogether.

My solution to this problem is mathematically very elementary: An expected value. The restricted portion of the Education Longitudinal Study includes observations of basic demographic information—sex, race/ethnicity, geographical location, family income, parental education, family structure, and nativity—along with specific higher education institutions attended. Using these data, we can predict the probability of attending colleges of a range of types conditional on demographic characteristics. These estimated probabilities can then adjust the headcount data to form demand forecasts (for major cities and states) that are far more pertinent to an individual institution. In addition, we can then ask the model hypothetical questions like, “What would the alternative future look like if recruiting and/or public policy changes mitigated attendance gaps across race/ethnicity?” It turns out that the simple concepts of raw counts and expected values can take you in many different and nuanced directions.

Sadly, this QR approach to the problem can’t eliminate the birth dearth. But it does give us a better sense of the future. For example, we learn:

- Even massive moves toward equality in college attendance across race/ethnicity or income won’t be enough to spare most institutions from deep cuts in demand
- Racial/ethnic diversity will likely increase at all campuses, but at elite institutions this trend will be driven more by Asian-Americans than Hispanics
- The increase in college attendance in recently completed decades means that first-generation students will be less common rather than more.

Critically, the resulting model for the first time provides forecasts that are disaggregated by institution type.

I hope my work embodies Steen’s QR ideal of sophisticating thinking with elementary tools. What is more, I hope that the forecasts in the book are catalysts for even more sophisticated thinking as campuses make plans to navigate the coming demographic storm.

EXCERPT²

In recent years, pessimistic forecasters have made a cottage industry telling stories of higher education's impending collapse under the weight of looming demographic change. As if it were not enough that demographic trends have steadily nudged the population toward subgroups with weak attachments to higher education, the Great Recession caused birth rates to plummet almost 13 percent in just five years. (Chapters 1 and 2 document the trends most relevant for higher education demand.) In light of these intense pressures, the dominant narrative offers up fear. For example, the front page of the January 2014 *Chronicle of Higher Education* bore the headline "The Class of 2030" in reference to the issue's feature article on demographic effects on future classes of college entrants (Lipka 2014). Accompanied by a map showing the number of 4-year-olds relative to 18-year-olds by county (a map dripping with deep-red ink), the article reached a broad and devastating conclusion: "Until just a few years ago, colleges could anticipate classes of high-school graduates each bigger than the last. . . . But those days are over" (A24).

When, as an administrator, I first saw these forecasts, my initial response was something like, "I'd better keep my résumé up to date in case I need to find a different line of work!" But whether through disciplinary training or simple survival instinct, a second thought soon dominated the first: "What, if anything, do these figures say about *my* institution's future?" After all, for better and worse, not all young people are equally likely to attend college, much less college of a particular type or in a particular region. As I looked for better data to help me understand the challenges ahead, the best I could find were forecasts of high school graduates made by the Western Interstate Commission for Higher Education (WICHE). While WICHE's adjustments for high school completion are a step in the right direction, if these are the only data available, then administrators and policymakers alike are heading toward the heart of a demographic tempest without a map or a compass.

This book fills that gap with the Higher Education Demand Index (HEDI). Described in detail in chapter 3 and the methodological appendix, the HEDI uses data from the 2002 Education Longitudinal Study (ELS) to estimate the probability of college-going conditional on basic demographic variables: sex, race/ethnicity, parent education, geographic location, family income, family composition, and nativity. Depending on demographic characteristics, young people experience vastly different likelihoods of college attendance. The extraordinary range in college-going probabilities can be seen by comparing a pair of hypothetical children. The first is a native-born Asian American woman living in Boston with both parents. Each parent acquired education beyond a bachelor's degree, and their

² pp. 1-4

family income totals \$125,000. The second student is a native-born, Hispanic man living in rural California with his single mother, who does not have a high school diploma. Their family income is only \$40,000. Based on experiences reported in the ELS, the probability that the former student will attend a four-year college exceeds 95 percent. By contrast, the likelihood of four-year college attendance for the latter student is less than 10 percent. If we instead consider attendance at an institution ranked among the top 50 colleges or universities, the former probability still exceeds 70 percent while the latter falls to just 2 percent.

When demographic groups differ 10- or 30-fold in the probability of college attendance, it is clear that reliable estimates of the future demand for higher education require more than forecasts of headcounts or even high school graduates. Expected fluctuations in total populations simply do not contain sufficient information, particularly for more selective forms of education, which by definition have low attendance rates. Accounting for differences in the probability of college attendance across demographic groups doesn't simply modify the picture painted by the dominant narrative. Depending on the type of institution considered, it entirely reverses the storyline from one of plummeting populations to robust growth.

With the HEDI model in hand, chapters 4 through 6 explore anticipated shifts in demand within higher education as a whole and by institution type. Chapters 4 and 5 show that college attendance and attendance at two-year schools look like a slightly exaggerated version of the pessimistic forecasts of population and high school graduates. Adjustments for the probability of college matriculation are simply too small to overcome the forces of demography. By contrast, in chapter 6 we see that demand for four-year schools will outperform population forecasts such that some subportions of higher education can expect booming future demand. Reflecting increasing numbers of Asian Americans and children with BA-holding parents, the model predicts particularly robust growth in the pool of students whose demographic markers suggest that they will attend top-ranked schools. Within this rosy outlook lies an important challenge for elite institutions: the collapse of markets in New England and the eastern half of the Midwest. Even before the effects of the birth dearth are felt, schools drawing students from these regions will need to find new recruitment pools to offset falling prospective student pools.

While colleges clearly worry about shrinking numbers of students, the rapid expansion of high-tuition/high-aid financial models means that the economic health of many institutions increasingly depends on full-pay students. Chapter 7 applies the HEDI to this important subgroup, projecting numbers of students whose family income and parental education suggest an ability and willingness to pay expensive tuition bills. Fortunately for colleges, the trend toward greater higher education among parents suggests growth in this important subpopulation. That said, nearly all of the anticipated growth will be found west of the Mississippi River, with

essentially no expansion expected in the traditional northeastern market. Schools in this traditional center of higher education should not expect to be given relief by falling discount rates.

As important as the HEDI forecasts may be, it is even more important for institutions and policymakers to consider how best to react to changes ahead. Drawing on the existing literature, it is possible to identify a wide range of potential responses, including changes to tenure, recruitment strategies, the use of technology in teaching, and public subsidies to increase attendance among groups with lower matriculation rates. Chapter 8 puts the HEDI to use by modeling how future demand might change if recruitment efforts and policy innovations halved gaps in college-going across dimensions of race/ethnicity and income. For two-year and regional four-year institutions, the results are sobering: even under very optimistic assumptions, the number of college students will contract throughout much of the country, including the high-attendance Midwest and Northeast regions. At more selective schools, the picture is more sanguine, though the model still foresees contraction in those traditionally strong markets.

Chapters 9 and 10 continue to study the “what if” analysis but from the perspective of policymakers. Rather than exploring the composition of the college-going, these chapters look at how alternations to public policy might affect the rate of attendance with a focus on enrollment gaps across income and race/ethnicity groups. While economic research suggests that efforts to expand access can be effective when properly designed, even aggressive changes will be leaning into a strong demographic headwind. Even halving income and race effects won’t substantially reduce current attendance gaps.

The final chapter closes with a look into the 2030s, beyond the model’s forecast horizon. While savvy policy should anticipate the changes that demography has already set in motion, the most sophisticated decision makers will go beyond that, considering where trends will head next. While the model’s design limits its projections to children who are already born, the lessons from the analysis in preceding chapters point to key trends that will foretell what happens next. Critical among these is the birth rate, which currently sits at historic lows. While the most recent data suggest we may have found a bottom, higher education decision makers can take note of shifts in this key variable to anticipate future reversals in enrollment trends.

In my experience as an administrator, I witnessed firsthand the effects of the Great Recession on college and university decision making. As never before, administrators and trustees understand that major decisions must be grounded in hard data. While doing research for this project, every administrator I spoke with was aware that we are flying blind into a dangerous period for higher education. Yet, just 10 years before the brunt of the current birth dearth is abruptly felt in admissions offices across the country, we still lack demand forecasts that treat

selective, national schools as distinct from the local community college. Decisions in the next five years will be critical in determining whether institutions thrive or flounder. By informing those choices with nuanced forecasts, the analysis of this book promises to be an important guide for those responsible for leading institutions of higher education through the storm.

Reprinted with permission.

References

- Centers for Disease Control. 2018a. *National Vital Statistics Reports*, 67:1.
- Centers for Disease Control. 2018b. "Quarterly Provisional Estimates for Selected Birth Indicators, 2015-Quarter 3, 2017," *NVSS Vital Statistics Rapid Release*. <https://www.cdc.gov/nchs/nvss/vsrr/natality.htm>
- Lipka, Sara. 2014. "Colleges, Here Is Your Future." *Chronicle of Higher Education*, January 24, A24-A27.
- Steen, Lynn Arthur. 2004. *Achieving Quantitative Literacy: An Urgent Challenge for Higher Education*. Washington, DC: The Mathematical Association of America.