Dysfunctions in the Federal Financing of Higher Education

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ABSTRACT

Tuition, in real terms and across American universities, has roughly tripled over the past four decades. Through a review of the literature and the collection of basic data, we find support for the theory that the increases in federal financial support (loans and grants) for students have led to a significant share of these increases in tuition. We also find evidence against the assertion by some prominent researchers—used as support for devoting more federal resources to higher education—that in recent decades the wage premium for college education has increased, the supply of college-educated workers has been relatively weak, and wage inequality has increased as a result. Finally, we report data about the massive increase in the volume of federal student loans and about rising default rates on average and in particular among nontraditional students. The concomitant increase in tuition, increase in student loan defaults, and decline in average student quality, along with the unclear economic benefits to significant segments of former students and the current workforce, lead one to question whether the massive increase in federal support for higher education is achieving its goals.

Recently, public interest in and political attention to the financing of higher education has been growing. The public sees the costs of attending college increasing rapidly, even after accounting for general price inflation. The media, policymakers, and advocates have noted that the effective default rate on federal student loans has risen in the past decade. Moreover, in the recent presidential election campaign, candidates have offered policy proposals to create a middle-class entitlement to public higher education—that is, to substantially increase the already large federal role in supporting students who attend college and graduate school. Indeed, these proposals come after several recent rounds of legislation that massively increased the amounts of loans and grants the federal government gives to students in higher education.

It is appropriate, therefore, even before assessing the new policy proposals, to consider carefully the current broad state of affairs in higher education, the impact of current federal financial aid policies, and their relationships with the outcomes for former students in the labor market. In particular, through a literature review and the collection of basic data, we evaluate in this paper the hypothesis that increases in federal financial support for students actually lead to increases in tuition prices rather than to a decrease in costs for students and their families. We also examine whether there has been any increase in the wage premium for college education, that is, the return to getting a four-year college degree, with any resulting increases in wage inequality, as some prominent researchers have claimed.

We also look into whether any evidence indicates that the supply of college-educated workers has declined and whether such a decline would have a positive relationship with the wage premium, as also is claimed. We finally consider the situation with federal student loans—that is, how much they have expanded in both amounts and numbers as the federal rules have made loans more generous and accessible, whether defaults have increased as a result, and, if so, for which types of students and institutions.

LITERATURE REVIEW

In this section, we review the literature about the effects of providing federal aid to college students and about the status of college graduates. First, we consider the effects of federal financial aid on college tuition. This discussion is followed by a review of the literature about college enrollment and earnings differentials for graduates. The section ends with a discussion of the effects of student loans on borrowers and the resulting increase in loan defaults.

Federal Financial Aid and College Tuition

A major strand of the economic literature about higher education examines whether increases in federal financial aid cause more students to attend college or at least reduce the cost of attending for the students who do. Alternatively, aid increases may lead colleges to (1) raise tuition or reduce institutional aid, (2) sop up the federal largesse, and (3) spend the money elsewhere (for example, on higher salaries, bigger staffs, more grandiose buildings or athletic facilities, and so on).

William J. Bennett, a secretary of education in the Reagan administration, posited that colleges will raise tuition when federal financial aid to students (e.g., loans, grants, tax incentives) is increased, to the point that increases in federal financial aid will not improve college affordability. He reasoned that most colleges continually try to improve their prestige, and more revenue furthers this process. An increase in financial aid enables colleges to raise tuition and hence revenue without harming the demand for their product; competitive pressures will cause even the less ambitious colleges to use this strategy.

Indeed, in a simple model of supply and demand, unless supply is perfectly elastic (i.e., there is an infinite supply of spots for students at colleges), an increase in federal financial aid will lead to an increase in tuition. If supply is perfectly inelastic (i.e., the supply of spots for students is fixed), the increase in tuition will be dollar-for-dollar, and

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there will be no increase in enrollment. Bennett's contentions, stated in a 1987 *New York Times* op-ed, have been repeatedly tested using various methodologies and datasets.[1]

In 2001, the National Center for Education Statistics (NCES) examined the Bennett hypothesis using tuition and financial aid data from the Institutional Prices and Student Financial Aid Survey (IPSFA), an annual web-based survey that was administered to colleges and universities and that was later included in the Integrated Postsecondary Education Data System (IPEDS). Controlling for type of institution, average attendance, and location, the year-over-year change in undergraduate tuition over the 1997–1999 period is regressed on variables measuring average federal, state, and institutional aid disbursements. Although no statistically significant association was found between the tuition change and the aid variables, the study is limited by the small number of years studied. Additionally, the researchers are unable to examine year-over-year changes in average aid disbursements and must use static numbers based on data from either the 1997/98 or 1999/00 school year. This cross-sectional, institution-level analysis is thus quite weak methodologically in examining the impact of change in policy on student demand for higher education and tuition.

Harvard economist Bridget Terry Long analyzes IPEDS data over a longer time period (1993–1999) for tuition to explore whether the introduction of the Hope and Lifetime Learning tax credits increased university prices.[2] She finds that, although small statistically significant average price increases occurred among two-year public institutions associated with the federal credits, four-year public institutions did not raise prices. However, given that the credits narrowly targeted middle-income households (i.e., were nonrefundable) and that the tax credit take-up was relatively low among the eligible population, at least initially, the analysis has less relevance to the inquiry about how other forms of aid (grants and loans) affect tuition. Moreover, the need to pay the full price for university attendance before deducting one's expenses through the tax code may make postsecondary institutions reluctant to capture the increased subsidies. Even though eligible students and their families would eventually recoup tuition expenses, they might not be able to afford the intitial tuition expense, and, as a result, demand might still shift to the left if universities raised prices.

1. William J. Bennett, "Our Greedy Colleges," *New York Times*, February 18, 1987.
2. Bridget Terry Long, "The Impact of Federal Tax Credits for Higher Education Expenses," in *College Choices: The Economics of Which College, When College, and How to Pay for It*, ed. Caroline M. Hoxby (Chicago: University of Chicago Press and the National Bureau of Economic Research, 2004).

Indeed, when Long examines a grant-based program, she finds greater Bennett effects.[3] Long exploits a natural experiment in which Georgia introduced a merit-based program known as the HOPE scholarship in 1993. Students eligible for the scholarship are able to apply an annual award to the public, private, or technical university of their choosing in Georgia. Long uses a difference-in-differences approach to compare "high-aid" Georgia universities to universities with similar characteristics in other southeastern states in the four years before and after the introduction of the program.

As in her previous study, Long used IPEDS tuition data. High-aid four-year private institutions partially captured the aid through tuition hikes and institutional aid decreases. As Long reports, "Some private colleges recouped as much as 30 cents" for each dollar of scholarship money. High-aid four-year public institutions are shown to partially capture the increased aid through increases in room-and-board charges; high-aid two-year public institutions did not increase charges. These somewhat mixed results, though, are limited by the methodology of the study. Long excludes non-Georgia schools with significant Georgian attendance (greater than 5 percent of the student body) to avoid capturing competition effects among schools. Excluding these schools, however, may skew the comparison group in a way that biases the results. Furthermore, the "economic" controls used to compare Georgia schools with non-Georgia institutions are statewide (i.e., per capita income, unemployment rate), possibly resulting in a crude comparison of institutions or student composition effects.

Higher education analyst Andrew Gillen reviews previous empirical work that explores the relationship between government aid and tuition changes, and he describes how the results can be reconciled with basic economic theory.[4] According to Gillen, past empirical evidence about the hypothesis (from studies in the 1990s and the first few years of the 21st century) was mixed, with differing results, depending on the type of aid and type of institution. This lack of full support for the Bennett hypothesis is somewhat surprising, given that supply in the higher education sector is thought to be largely inelastic, even over the medium term, because the storied focus of leading colleges is on prestige, excellence, and influence, not on volume. (As we will show, more recent empirical studies are more favorable to the Bennett hypothesis.)

3. Bridget Terry Long, "How Do Financial Aid Policies Affect Colleges? The Institutional Impact of the Georgia HOPE Scholarship," *Journal of Human Resources* 39, no. 4 (2004).
4. Andrew Gillen, "Introducing Bennett Hypothesis 2.0" (Policy Paper, Center for College Affordability and Productivity, Washington, DC, February 2012).

But Gillen notes three refinements that reconcile the hypothesis with the mixed evidence: (1) Some federal aid, such as Pell Grants, effectively target the poor, so that most colleges really are not given the opportunity to raise tuition. (2) Many public universities operate under legislated tuition caps or restrictions that mean that increases in general federal aid, which increase demand but not supply, may lead those universities to improve the quality of their student body by becoming more selective, or alternatively to lower institutional aid. (3) Most private and some public universities price discriminate—that is, by varying institutional aid according to parental means (which they learn about through federal financial aid applications called "FAFSAs"), they charge students from richer families more. As a result, increases in federal financial aid will lead to increased demand, which, in turn, could cause higher tuition, lower institutional aid, or greater selectivity of students.

Gillen also notes the widely accepted view that (1) nonprofit colleges and universities are revenue maximizers driven by the desire to excel in all areas of academic activity and (2) they essentially compete in a zero-sum game for relative standing in research, student selectivity, athletics, and so on. This drive will cause even colleges that are not capacity constrained to compete with colleges that are constrained, so that even the colleges that could increase enrollment and maintain tuition levels in response to an increase in federal financial aid will instead increase tuition to pay for the increased costs that arise from competitive pressures.

Gillen finds some empirical support for the Bennett hypothesis about the simple observation that tuition has increased significantly while federal financial aid has mushroomed over the past 20 years. He also cites the particular case of law schools, where dollar limits on federal subsidized loans are much higher than for undergraduate education and where from 1988 to 2008, tuition increases were higher.

Regarding college selectivity of students, labor economist Caroline M. Hoxby finds that the average college has become somewhat less selective since 1962, and at least 50 percent of colleges are substantially less selective, while the top 10 percent are substantially more selective.[5] As noted later in this analysis, private four-year colleges are particularly supply constrained.

Financial economist Nicholas Turner examines the question of whether universities make any offsetting price changes in response to changes in tax-based

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5. Caroline M. Hoxby, "The Changing Selectivity of American Colleges," *Journal of Economic Perspectives* 23, no. 4 (2009).

federal student aid.[6] In particular, he investigates whether schools appropriate the benefits of increases in federal student aid by reducing institutional grant aid. Universities may find the aid reduction preferable to tuition increases because the schools are enabled to do more effective targeting and price discrimination. Moreover, the universities could avoid the visible and unpopular process of tuition increases, and some public universities could get around legislatively imposed tuition caps.

Using student-level data gathered periodically and focusing on large four-year public and private colleges and universities, Turner exploits policy-induced variation in three tax-based aid programs: (1) the Hope tax credit (introduced in 1998), (2) the lifetime learning tax credit (also introduced in 1998 and then increased in 2003), and (3) the tuition deduction (introduced in 2002).[7] These tax-based aid programs are costly to the federal government and are claimed by many households. Further, they target middle- and upper-middle-class families, unlike federal grant programs, such as Pell Grants, which target poor families.

Turner estimates the impact of tax-based aid on institutional grant aid using instrumental variables (to avoid the endogeneity of education spending, which affects both tax-based aid and grants) and controlling for school fixed effects. In particular, he generates instruments by calculating the value of the tax-based aid while using a plausibly exogenous value of education spending in order to isolate policy-induced variation in tax-based aid eligibility and amounts. Turner calculates the value of tax-based aid at the programs' spending limits, because the value of tax-based aid remains constant for qualified spending that exceeds such limits. Therefore, an institutional decision to increase spending leaves the instrument unaffected.

Turner finds that institutional reductions in grants substantially counteract the intended cost savings of tax-based aid. In particular, using student-level data about financial aid, student and parent characteristics, and institutional detail, he consistently shows in many sets of regressions—strongly checked for robustness across a large variety of factors—a nearly dollar-for-dollar decrease in institutional grant aid by both public and private universities for students likely eligible for and realizing an increase in tax-based aid.

6. Nicholas Turner, "Who Benefits from Student Aid? The Economic Incidence of Tax-Based Federal Student Aid," *Economics of Education Review* 31 (2012).
7. For a fuller description of these and the many other tax benefits given to the higher education sector, see Mark J. Warshawsky, "Federal Tax Expenditures for Higher Education," *Tax Notes*, October 20, 2014.

This result suggests that students are not the economic beneficiaries of federal aid. Turner, however, is not able to determine whether the extra resources go into capital improvements such as high-end sports facilities and resort-like accommodations, into higher faculty and staff salaries or less required teaching time, into more administrators, or into other areas. He is able to show that universities do not redirect grant aid to students who are ineligible for federal tax-based aid. He notes that universities are able to capture this benefit because they have considerable market power: the institutions are differentiated products (e.g., compare Princeton to City College), they select their purchasers, their continuing students find transferring difficult, and their aid formulas are not fully understood. Moreover, universities have detailed information about student family finances through the FAFSA to enable them to price-discriminate.

The nearly complete crowd-out of institutional aid in response to tax-based aid would be thought to imply that the tax programs would not increase college enrollment. Other evidence, however, shows that enrollment did increase over time because of the programs.[8] Turner reconciles these results by hypothesizing that the increase in enrollment occurs mainly at two-year schools (community colleges), where institutional aid is not as large a factor. Moreover, decreases in aid are largely not transparent to new students just entering college.

In a more recent study somewhat similar to Turner's, Federal Reserve research officer David Lucca and his coauthors, Taylor Nadauld and Karen Shen, note the rapid growth of aggregate student loan originations through government-sponsored programs over the period 2001 through 2012 (loan originations more than doubled), and the concomitant 46 percent rise in "sticker" tuition in inflation-adjusted terms over the same period.[9] They ask whether there is a causal link to confirm the Bennett hypothesis, as stated by then–Secretary of Education William Bennett in 1987, that "increases in financial aid in recent years have enabled colleges and universities blithely to raise their tuitions."[10] The main analytical challenge to testing this hypothesis is simultaneity. That is, a positive correlation between student funding and tuition costs may indicate that an increase in the availability of student credit

8. Nicholas Turner, "The Effect of Tax-Based Federal Student Aid on College Enrollment," *National Tax Journal* 64, no. 3 (2011).
9. David O. Lucca, Taylor Nadauld, and Karen Shen, "Credit Supply and the Rise in College Tuition: Evidence from the Expansion in Federal Student Aid Programs" (Staff Report No. 733, Federal Reserve Bank of New York, July 2015).
10. Bennett, "Our Greedy Colleges."

has caused increases in tuition, that increases in tuition costs have caused increases in student loan balances, or that some other variable has caused an increase in both.

Lucca and his coauthors' innovation was to exploit (1) discrete legislated changes in the annual maximum disbursable amounts of per-student federal student aid programs from 2007 through 2010 and (2) knowledge of the specific colleges and universities that had proportionately more students eligible to take advantage of those programs as a result of variations in eligibility and participation.[11] The researchers create an interaction variable based on the shift in federal aid supply and ex-ante fraction of students at the institution borrowing at a particular policy cap, and they examine the impact on tuition at those colleges. Lucca, Nadauld, and Shen use institutional data from 790 colleges and universities and student-level data from 2004 to document prepolicy cross-sectional variation in the number of students constrained by each of the policy maximums.[12]

Pell Grants are direct grants awarded through participating institutions to low-income undergraduates. The grant amount is based on the student's financial need and tuition cost but is capped at a program maximum, which has changed over time. The Federal Direct Loan program provides loans funded by the federal government to give both undergraduate and graduate students financing for their education. These loans offer a fixed interest rate that is typically lower than the interest rates of private loans, and they do not require a credit record or cosigner. Subsidized loans have the government pay interest while the student is enrolled and are awarded on the basis of financial need, while unsubsidized loans require the borrower to pay all the interest and are not usually contigent on income. The loan amounts, both annual and aggregate, for individuals are capped by federal legislation; large increases were passed in 2008 and 2010. Thus, Lucca and his coauthors investigate these aid programs and policy changes.

Lucca, Nadauld, and Shen find that loan and grant cap increases cause dollar-for-dollar rises in the amount of loans or grants disbursed to students who are exposed to a policy cap change. They find that institutions more exposed to changes in the subsidized federal loan program increased their tuition disproportionately around these policy changes, with a pass-through effect on tuition of about 70 percent. Pell Grant aid and the unsubsidized fed-

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11. Lucca, Nadauld, and Shen, "Credit Supply and the Rise in College Tuition."
12. Ibid.

eral loan program also have pass-through effects, although not as large (55 percent and 30 percent, respectively).

Lucca and his coauthors control for changes in other external revenue sources, such as state government funding and the possibility that certain institutional characteristics may be correlated with the revenue and tuition changes, but they still find support for the Bennett hypothesis. The subsidized loan effect on tuition is most pronounced for expensive private institutions that are somewhat, but not the most, selective in accepting student applicants.

Unlike Turner, Lucca and his coauthors focus on sticker tuition rather than net tuition (that is, less institutional aid) because data about sticker tuition are available annually, and the authors believe sticker tuition to be more reliable than data about institutional grants, information that is available only every four years at the student level.[13] But they do find that changes in sticker tuition are largely reflected in the net tuition of all students in the 2009–2012 period. Lucca, Nadauld, and Shen find a positive impact on enrollment only from the Pell Grant program.

Another recent study, by economists Grey Gordon and Aaron Hedlund, develops a quantitative structural model of higher education to test explanations for the steep rise in college tuition between 1987 and 2010.[14] In particular, the authors note that sticker tuition and fees ballooned from $6,600 in 1987 (in 2010 dollars) to $14,500 in 2010. Moreover, subtracting institutional aid, net tuition and fees grew by 78 percent, from $5,790 to $10,290. Even if real net tuition had risen at the relatively fast rate of healthcare costs, it would have been only $8,700 in 2010.

In a major innovation, their model includes the college earnings premium as part of the demand side, as well as federal aid programs and underlying costs of production

"Lucca, Nadauld, and Shen find that loan and grant cap increases cause dollar-for-dollar rises in the amount of loans or grants disbursed to students who are exposed to a policy cap change."

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13. Ibid., in contrast to Turner, "Who Benefits from Student Aid?"
14. Grey Gordon and Aaron Hedlund, "Accounting for the Rise in College Tuition" (NBER Working
Paper No. 21967, National Bureau of Economic Research, Cambridge, MA, February 2016).

and nontuition revenues. In particular, Gordon and Hedlund consider many factors in their multifaceted estimated and calibrated model: (1) endogenous tuition and exogenous nontuition college revenue (endowment income and state funding), (2) endogenous investments that enhance the quality of education (which is also dependent on student ability) and non-quality-enhancing custodial costs (arising, for example, from the greater provision of student amenities or more administrators), (3) heterogeneous student ability and parental income and their correlation, (4) college attendance and financing decisions by students, (5) college drop-out risk, and (6) student loan repayment decisions.

In turn, the college attendance decision depends on—among other factors—the college earnings premium. That premium, as used by Gordon and Hedlund, is estimated by economists David H. Autor, Lawrence F. Katz, and Melissa S. Kearney to have increased from 58 percent in the mid-1980s to 93 percent in 2005.[15] The financing decision is strongly influenced by the parameters and levels of the federal financial aid programs.

Gordon and Hedlund calibrate the model to replicate key features of the US economy and the higher education sector. They then feed in the observed changes between 1987 and 2010 to assess the impact of the features on equilibrium tuition. The authors use many sources of data, including (1) the distribution of parental income by student ability, (2) an approximation of the statutory formula for the expected family contribution to the costs of college attendance (dependent on family income, assets, number of children, and other student-specific considerations), (3) student earnings while in college, (4) federal aid grants, (5) college fees, (6) annual student retention rates, (7) earnings functions related to random shocks and college attendance, (8) maximum duration of loan repayment in 1987 (statutory then at 10 years, since lengthened substantially), (9) student loan delinquency penalties and wage garnishment rules, (10) college custodial costs (function estimated), and (11) terms of the federal loans programs.

The authors state that the model calibration works fairly well in terms of tuition and college investment and graduate earnings but generates somewhat too little enrollment and too many students with loans.

Gordon and Hedlund compare the model's initial and terminal steady states with the data from 1987 and 2010. They then undertake a number of experiments to quantify the explanatory power of each major hypothesis about the

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15. David H. Autor, Lawrence F. Katz, and Melissa S. Kearney, "Trends in U.S. Wage Inequality: Revising the Revisionists," *Review of Economics and Statistics* 90, no. 2 (2008).

rise in college tuition. These hypotheses are (1) increased federal student aid causes the increase in tuition (as previously explained); (2) the "cost disease"—which posits that colleges, like other service industries, are price takers in the increasingly expensive labor market with little or no ability to substitute capital; (3) exogenous changes to nontuition revenue (in particular, lower state government funding) and custodial costs; and (4) increased demand for higher education arising from a higher college wage premium.

The model generates a 106 percent increase in average net tuition between the initial and terminal steady states; that increase compares with an actual increase of 78 percent. The model generates an increase in enrollment from 33 percent to 48 percent across steady states, while the data show a more modest rise from 38 percent to 41 percent. The model's surge in enrollment comes from high-ability, middle-income youths who take advantage of the increased limits in and availability of federal student loan programs.

The model has all students taking a loan, while the actual increase was from 35.7 percent to 52.9 percent. Also, the model produces a small decline in the student loan default rate, from 17.1 percent to 16.7 percent, whereas in reality, the actual rate decline—from 17.6 percent to 9.1 percent—was much larger, because federal standards were tightened early in the time period.

The model results show that demand shocks (mostly consisting of increases in federal financial aid programs) cause equilibrium tuition to rise by 102 percent, almost fully matching the 106 percent from the benchmark. Focusing in the model on the demand shocks alone reveals that enrollment declines and loan amounts increase, whereas student quality increases along with college investment expenditures and student loan defaults.

By contrast, with all other factors present (supply-side factors and a higher college wage premium), but without the demand shocks, net tuition rises by only 16 percent. These results strongly support the Bennett hypothesis. In fact, when Gordon and Hedlund feed in the empirical estimates for the changes in custodial costs and nontuition revenue sources but leave out all other factors, equilibrium tuition decreases modestly and enrollment increases significantly. This result occurs because higher custodial costs cause colleges to cut back on investments (including hiring nontenured faculty to replace tenured faculty), thereby lowering both tuition and student quality.

Also of some relevance here, public policy professor Christopher Avery and economist Caroline M. Hoxby find evidence that a substantial percentage of even high-aptitude high school students are excessively responsive to loans relative to grants, possibly indicating some confusion about the (then) severe

repayment responsibilities for student loans, contrasted, for example, with the easy default conditions they find and know with credit cards.[16]

Finally, a study by economists Stephanie Riegg Cellini and Claudia Goldin also supports the Bennett hypothesis.[17] Cellini and Goldin focus on for-profit postsecondary schools that offer degrees and certificates. That segment of the higher education sector has experienced rapid growth in the past decade. Some of these institutions are eligible to participate in federal financial aid programs while others, mainly smaller nondegree institutions, are not. Cellini and Goldin compare the tuition charged by noneligible institutions with the tuition charged for similar programs at eligible institutions. They find that—controlling for program length, enrollment, number of years of operation, and a set of program, county, and year fixed effects—eligible institutions raised tuition by about 78 percent compared with noneligible institutions over the 2005–2009 period. The dollar difference is generally equal to average student grant awards and an estimate of the loan subsidy. The authors also try to control for possible quality differences by considering occupational licensing exam pass rates and school fixed effects among programs that are potentially all eligible for federal student financial aid.

Trends in College Enrollment and Earnings Differentials

An influential recent strand of research in the labor economics literature has tied trends in college enrollment to changes in wage inequality. A study by Claudia Goldin and

> "An influential recent strand of research in the labor economics literature has tied trends in college enrollment to changes in wage inequality."

16. Christopher Avery and Caroline M. Hoxby, "Do and Should Financial Aid Packages Affect Students' College Choice?," in *College Choices: The Economics of Which College, When College, and How to Pay for It*, ed. Caroline M. Hoxby (Chicago: University of Chicago Press and the National Bureau of Economic Research, 2004).

17. Stephanie Riegg Cellini and Claudia Goldin, "Does Federal Student Aid Raise Tuition? New Evidence on For-Profit Colleges," *American Economic Journal: Economic Policy* 6, no. 4 (2014).

Lawrence F. Katz is most representative of such literature.[18] Goldin and Katz have put forward the following hypothesis: the apparent slowdown in the growth of the relative supply of college-educated workers starting around 1980 was a major reason for the apparent surge in the college wage premium from 1980 to 2005. Furthermore, they state that according to the literature most of the increase in overall wage inequality in this time period is accounted for by the expansion in educational wage differentials, especially the rise in the return to postsecondary schooling.

These viewpoints, in turn, lead to a strong policy stance in favor of higher education. They assert in a different paper, "The bottom line here is that labor-market-based efforts to reduce inequality depend on increasing the supply of educated workers. The big questions, then, are why the rise in educational attainment has slowed and what policies could reverse the trend."[19]

This research has been used to support the strong thrust in recent years in public policy to subsidize—through loans and grants—college and graduate school education, as we will show below. Here we will critically review the first part of their research claim, that there is a logical and empirical tie between educational wage differentials and college enrollment trends. In the next section, we will evaluate whether the trends they claim to see recently—that wage differentials have increased and college enrollment growth has lagged—are reasonable descriptions of reality.

Goldin and Katz use a basic economic framework to explain the returns to education from 1915 through 2005. The framework involves (1) the fluctuating change in the relative supply of more-educated workers (mainly through changes in schooling) and (2) the change in the relative demand for more-educated workers (driven by steady and rapid skill-based technological change), which is combined with alterations in institutional factors, such as immigration. They set up an aggregate production function whose factors are particular specifications of the labor services of skilled and unskilled workers. They define skilled workers as those with some college education and unskilled workers as those with no college education. The latter group is, in turn, composed of two subgroups: those with a high school education and those who dropped out.

18. Claudia Goldin and Lawrence F. Katz, "The Race between Education and Technology: The Evolution of U.S. Educational Wage Differentials, 1890 to 2005" (NBER Working Paper No. 12984, National Bureau of Economic Research, Cambridge, MA, March 2007), chapter 8 in *The Race between Education and Technology* (Cambridge, MA: Belknap, 2008).
19. Claudia Goldin and Lawrence F. Katz, "The Future of Inequality: The Other Reason Education Matters So Much," *Milken Institute Review*, Third Quarter 2009, 33.

Goldin and Katz estimate an equation where the dependent variable is the wage premium of those with at least a college degree (16 or more years of schooling) to those with exactly a high school degree (12 years of schooling). The relative supply measure is the supply of college equivalents (those with a college degree plus half of those with some college education) to high school equivalents (those with 12 or fewer years of schooling plus half of those with some college education). The log relative supply measure is the log relative wage bill share of college equivalents less the log relative wages (composition-adjusted). Goldin and Katz add a linear time trend to allow for secular growth in the relative demand for skilled (i.e., college-educated) workers and terms to allow this demand trend to change with 1959 and 1992 as well as a dummy for 1949. Data for Iowa are available for 1915 and 1940; national data are available for 1940, 1950, 1960, and annually from 1963 through 2005. Together, these constitute a total of 47 observations drawn from three datasets.

Goldin and Katz find that changes in the relative supply of college-educated workers had a substantial and significant negative impact on the college wage premium across the entire period. In particular, a 10 percent increase in the relative supply of college-eductated (or equivalent) workers reduces the college wage premium by 6.1 percent. The rapid growth of the supply of these skilled workers from 1915 to 1980 depressed the college wage premium despite strong growth in relative demand, while the "slowdown in the growth in the relative supply of college workers starting around 1980 was a major reason for the surge in the college wage premium from 1980 to 2005."[20]

In particular, they state that had the relative supply of college-educated workers from 1980 to 2005 expanded at the rate it did from 1960 to 1980 (3.77 percent per year rather than 2 percent), the relative wage of college-educated workers would have fallen rather than increased, as it did at 0.9 percent per year.

Goldin and Katz are troubled by the estimated slowing in the demand growth for college workers in the 1990s, despite the contemporaneous rapid spread of information technology and workplace reorganizations. But they cite work in the literature that states that as the broad college worker group has become a larger share of the labor force, it has been differentially affected by technological changes. They say that demand is soaring for those graduates who have both technical and "people" skills, as well as for those without a college education who have lower-skilled jobs in the service sector. Meanwhile, the middle group—made up of those who have no advanced degrees, who graduated from

20. Goldin and Katz, "Race between Education and Technology," abstract.

nonselective colleges, and who would ordinarily do routine manual and cognitive tasks—has not been doing well recently.

The model Goldin and Katz estimate and its interpretation have an air of being ad hoc. The various "add" variables and interpretations related to various time periods seem arbitrary and do not test preestablished hypotheses or theories. The underlying data are drawn together from disparate sources, and "stitching" is needed to get consistent data definitions, particularly in the early part of the period analyzed. The design of some of the variables is also not internally consistent or necessarily logical.

In the aggregate production function, the division of workers by educational level into three groups seems arbitrary. Why, for example, should those who dropped out of college, college graduates who did not proceed to graduate school, and those who went to various levels of graduate school with varied levels of completion be lumped together, while high school graduates and high school dropouts are taken separately? Moreover, this particular division by education level is not the same as that used in the definition of the wage premium, and neither is it the same as that underlying the derivation of the relative supply measure. Also, considering the long time period and the change in standards and meaning for various educational levels—particularly for high school—simple combinations of education levels rather than direct measures of technical knowledge or job skills seem wrong.

Goldin and Katz estimate the relative supply measure indirectly as the log of wage share less the log of wages.[21] Indirect estimation increases the possibility of measurement errors and data issues, and thus is inferior to a more direct measure, such as the number of workers with various educational attainments.

Finally, use of the same relative supply measure when college attendance was quite rare as when it was becoming common seems to be a misspecification. Why should the same increase have the same effect on wages when few were college educated as when many are? Surely there is some differential implication for the relative quality of workers by education levels across time periods, as is assumed and found in the literature we cited previously on the effects of varying tuition levels and financial aid on the average quality of the student body at colleges.

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21. Because Goldin and Katz were unable to obtain direct labor supply figures for early years of their study, they relied on wage shares for all years. A change in wage share over time is an indirect way of measuring the change in labor supply, because dividing the wage share figure by wages will yield a total of workers for each relevant education bracket. When calculating the change, aggregate wages from period 0 and period 1 cancel out, yielding the change in labor supply.

Despite these significant methodological problems, *The Race between Education and Technology*, Goldin and Katz's 2008 book that expanded on their analysis, apparently played a large role in shaping the Obama administration's higher education policy.[22] *New York Times* columnist David Leonhardt claims that "the roots of President Obama's ambitious proposal for free community college can be found in a 2008 book by economists Claudia Goldin and Lawrence Katz." He continues, "It was a sensation among many researchers, journalists and policy makers, including some close to Mr. Obama and including both liberals and conservatives."[23] One such member of the president's inner circle was former National Economic Council director and Harvard president Lawrence Summers, who praised—on the book jacket—Goldin and Katz's work as "empirical economic scholarship at its finest" that "will stand as the definitive treatment of changes in income distribution and their causes, as well as of possible countervailing policies towards rising inequality." Alan Krueger, the chairperson of the White House Council of Economic Advisers during the Obama administration's early years and a Princeton professor, similarly praised the book—on the jacket—as "the best of what economics has to offer."

By contrast, in 2004 Caroline M. Hoxby, then a professor at Harvard, had already concluded on the basis of several research papers that "opportunities to attend college have sufficiently expanded so that almost every young person who is eligible and likely to benefit from college does try it at some time, in some form."[24] Hoxby added, "Again and again, we learn that a new or important policy has little effect on attendance."[25]

A related study of wage inequality and educational attainment was produced by Autor, Katz, and Kearney.[26] They find that inequality in the upper half of the male wage distribution grew rapidly and continuously from 1980 to 2005, even after adjusting for labor force compositional changes (e.g., experience). By contrast, inequality in the lower half of the distribution expanded rapidly in the 1980s and then reversed course.

This polarization of the earnings distribution is seen in the rapid, ongoing rise of the relative earnings of workers with post-college education (those with

22. Claudia Goldin and Lawrence Katz, *The Race Between Education and Technology* (Cambridge, MA: Belknap Press, 2008).
23. David Leonhardt, "The Roots of Obama's Ambitious College Plan," *New York Times*, January 8, 2015.
24. Caroline M. Hoxby, introduction to *College Choices: The Economics of Where to Go, When to Go, and How to Pay for It*, ed. Caroline M. Hoxby (Chicago: University of Chicago Press and the National Bureau of Economic Research, 2004), 3.
25. Ibid., 2.
26. Autor, Katz, and Kearney, "Trends in U.S. Wage Inequality."

graduate and professional degrees), whereas the earnings of college-only workers relative to high school graduates have plateaued since 1987.[27] Autor, Katz and Kearney, in contrast to Goldin and Katz, explain that factors of demand, and not supply, are mainly to blame. They say that information technology, which exploded in the 1990s and in the first decade after 2000, complements highly educated workers engaged in abstract tasks, substitutes for moderately educated workers performing routine tasks, and has less impact on low-skilled workers performing manual tasks.

For the workers who graduated from college but did not obtain graduate degrees, plateauing wages over a three-decade period—coupled with a large rise in net tuition—have led to financial difficulties, subtracting from any earnings "premium" gained from attending college. As we will explain, for all college attendees, whether graduates or not, student loan two-year default rates have doubled over the past decade and lifetime default rates have increased significantly, as have loan burdens, at least from 1999 through 2011.

Student Borrowers and Rising Loan Defaults

In a recent study by economists Adam Looney and Constantine Yannelis, the authors construct a large and detailed database from government administrative records to examine the characteristics of the borrowers who default on their higher education (undergraduate and graduate) student loans.[28] They do this to better understand the underlying aspects of the increase in the default rate in recent years and, more generally, worrisome trends in the features of the federal student loan program, such as more forbearance, deferments, and longer repayment periods.

In particular, Looney and Yannelis form their new database by merging federal administrative records on student loans (including information from the aid applications) with earnings information from tax records. The data on student characteristics, school features, and loans cover the years 1970 through 2014, while the labor market outcomes are from 1999 to 2013 for a 4 percent

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27. It is worth noting that the emphasis of Autor, Katz, and Kearney on male wage inequality does exaggerate the reported extent of the increase in inequality for the overall labor force. Female wage inequality changes were less pronounced than male inequality changes by most measures, including by educational levels, and there has been a significant narrowing of gender wage differentials since 1980.
28. Adam Looney and Constantine Yannelis, "A Crisis in Student Loans? How Changes in the Characteristics of Borrowers and in the Institutions They Attended Contributed to Rising Loan Defaults" (Brookings Papers on Economic Activity, Fall 2015).

sample of all federal student borrowers. The authors calculate that in 2014, aggregate student loan balances outstanding were $1.13 trillion and the total number of borrowers was 42.76 million.

Looney and Yannelis focus on a group of students that they call "nontraditional"—those who enroll in for-profit schools, two-year public institutions, and certain nonselective four-year colleges. They note that these students tend to be older, often enroll less than full time, are more likely to live independently of their parents (and therefore have higher federal borrowing limits), and are likely to be first-generation college attendees. The number of nontraditional students increased rapidly in the first decade after 2000, apparently in response to the weak labor market and easier and more available federal financing. Enrollment of such students rose from 5.7 million in 2000 to 7.1 million in 2011 for public two-year colleges and from 0.4 million in 2000 to 1.7 million in 2011 for the for-profit schools, compared with an increase from 4.8 million to 6.6 million for public four-year colleges and from 2.2 million to 2.7 million for private nonprofit schools (clearly private nonprofit institutions are the most supply-constrained in higher education).

Rates and amounts of borrowing by nontraditional students increased relatively more rapidly among for-profit and two-year school enrollees. For example, the percentage of students borrowing rose from 7 percent in 2000 to 20 percent in 2011 and from $4,194 (2014 dollars) to $6,121 per loan origination among two-year schools compared with increases from 52 percent in 2000 to 63 percent in 2011 and from $6,641 to $7,998 among private nonprofits. From 2009 to 2011, almost half of all new federal borrowers were students at either for-profit or two-year schools.

According to Looney and Yannelis's analysis, the nontraditional borrowers attend programs they are less likely to complete and, after enrollment, these borrowers are more likely to live in or near poverty and to experience weak labor market outcomes. While some of these bad results are no doubt due to the 2008–2009 recession, the outcomes are concentrated among nontraditional students.

Traditional students did not see much of a drop in employment, and they maintained high earnings during the recession. The loan burdens of nontraditional students, though smaller on average both in absolute terms and relative to their earnings, have tended to increase faster over time. Over all types of students, the median debt service payment divided by median earnings of employed borrowers two years after entering repayment—calculated on a consistent basis—increased from 5.3 percent in 1999 to 5.5 percent in 2007 to 7.1 percent in 2011. (Thus most of the increase came during the time of higher loan

limits and recession.) This overall ratio is composed of the following components: from 3.8 percent in 1999 to 6.9 percent in 2011 for the for-profits, from 3.5 to 5.5 percent for two-year schools, from 5.3 to 8.3 percent for nonselective four-year colleges, from 6.4 to 8.3 percent for somewhat selective four-year colleges, from 6.5 to 7.5 percent for selective four-year colleges, and from 8.4 percent to 9.9 percent for graduate students.

About 30 percent of nontraditional borrowers required to start repayment on loans in 2011 defaulted within three years, compared with 13 percent among traditional undergraduate borrowers and 3 percent among graduate student borrowers. Many more have avoided default through forbearance, deferment, and income-based repayment programs, which allow borrowers to suspend or reduce payments during times of hardship and, more broadly, may stretch repayment over much longer time periods. According to Looney and Yannelis's calculations, the two-year cohort default rate increased from a low of about 3 percent in 2003 to a high of about 12.5 percent in 2011 before declining to about 11 percent in 2012. Separating out this rate by type of institution and student, the largest increases occurred, in declining order, among for-profit, two-year, nonselective four-year, and somewhat selective four-year schools. Moreover, alternative measures of loan performance—longer-term default rates, rates of negative amortization, and repayments rates—all point to deteriorating repayment outcomes overall, and more severely among nontraditional borrowers.

Looney and Yannelis find that changes in the background of students, their labor market outcomes, and the schools they attend can explain between half and two-thirds of the overall increase in defaults between 2000 and 2011. They state, moreover, that nonobservable characteristics specific to nontraditional borrowers, such as the quality of their education, their preparedness for college, and their willingness to repay loans, may also be driving up default rates.

"Nontraditional borrowers attend programs they are less likely to complete and, after enrollment, these borrowers are more likely to live in or near poverty and to experience weak labor market outcomes."

BASIC DATA ON COLLEGE ENROLLMENT, FINANCING, AND OUTCOMES

In this section, we present basic data about the important questions posed in this paper: What are the trends in college enrollment? How fast has tuition increased? What is the extent of federal financial aid? How much more do college graduates earn than high school graduates earn? What is going on with student loan defaults? What nontuition resources are available to colleges?
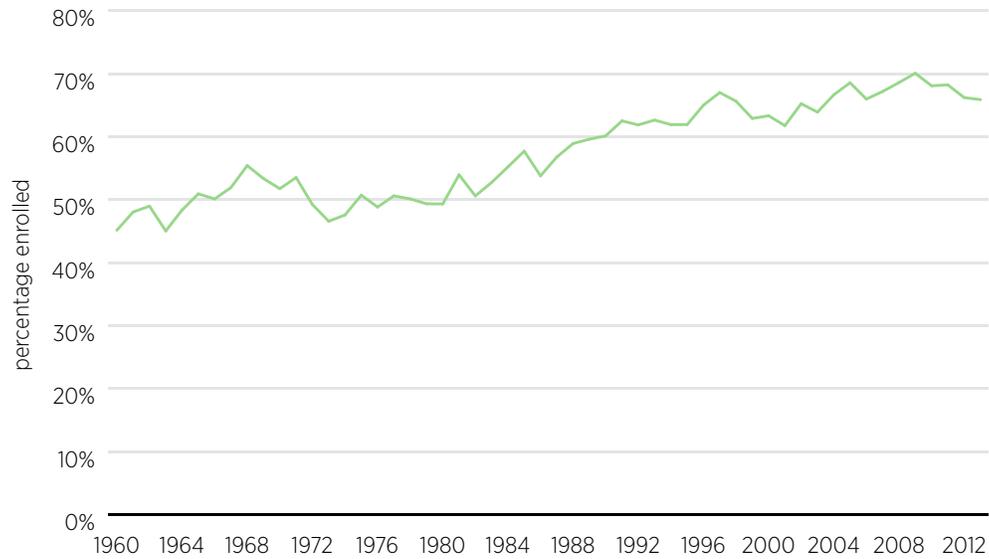
By examining this information, we hope to get a sense, at high and broad levels, of whether the considerable resources expended by the federal government in helping to finance higher education are achieving their intended goals. The data can help determine whether federal assistance has enabled broader access to higher education and long-term achievement for the young generation of workers by lowering costs without undue future burdens and without wasting families' and society's resources.

Figures 1 and 2 show trends in college enrollment as percentages of the relevant populations. In figure 1, the percentage of recent high school graduates (excluding military inductees and volunteers) enrolled in higher education institutions is given over the period 1960 to 2013. The data, collected annually by the National Center of Education Statistics (NCES), give a percentage of spring high school graduates enrolled in postsecondary institutions by fall of the same year. The secular trend has clearly been steadily upward, from 50 percent to almost 70 percent, with some fluctuations for the clearly observed bump-up of the military draft and draft avoidance in the Vietnam era, and perhaps some slight reflections of labor market tightness and slack, as well as of broader macroeconomic conditions. In the most recent observations—from 2009 to 2013—there has been a slight decline, from 70 percent to 66 percent. That decline may reflect the improving job market competing with college for high school graduates.

Figure 2 gives the same impression, with some more detail on two- and four-year college enrollments for the period 1973 to 2013. Clearly, both types of institutions have experienced growth, with a somewhat larger proportional increase in two-year college enrollments. For example, in 1975, 18 percent of recent high school graduates were enrolled in two-year colleges while 33 percent of graduates were enrolled in four-year colleges. In 2012, 29 percent of recent high school graduates were enrolled in two-year colleges while 37 percent were enrolled in four-year colleges. Of course, at least some of the two-year college enrollees move on to four-year colleges in their third year.
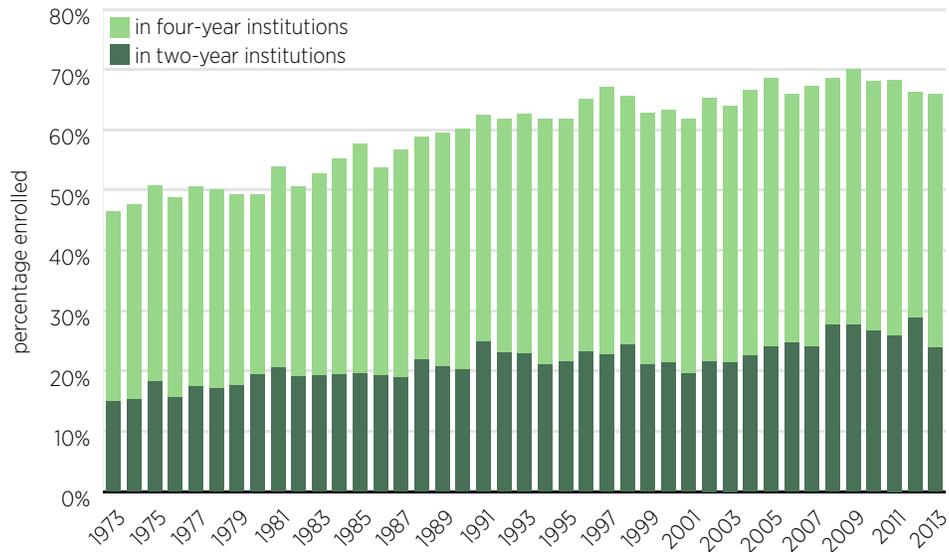
Another measure to gauge the growth in college attendance is the overall percentage of 18- to 24-year-olds enrolled in postsecondary institutions. Figure 3

FIGURE 1. PERCENTAGE OF RECENT HIGH SCHOOL GRADUATES ENROLLED IN TWO- AND FOUR-YEAR HIGHER EDUCATION INSTITUTIONS, 1960–2013
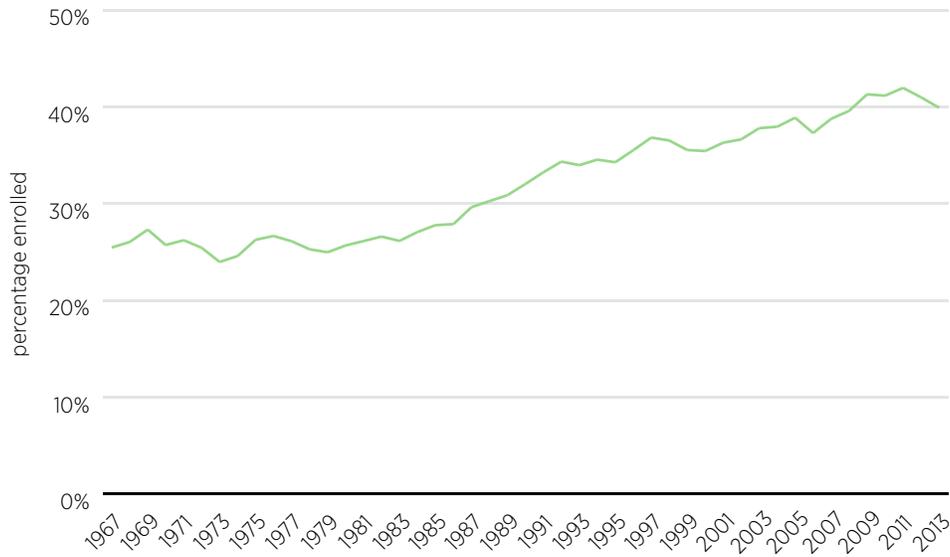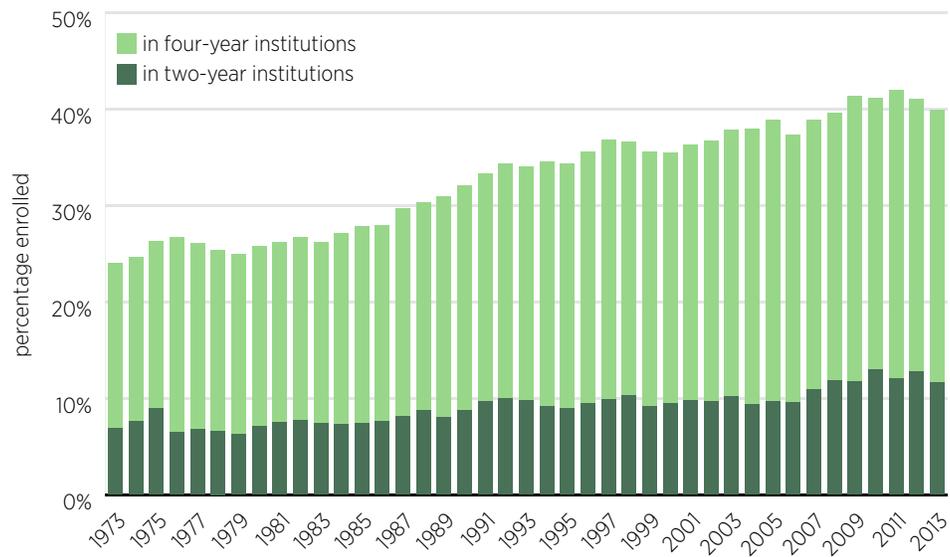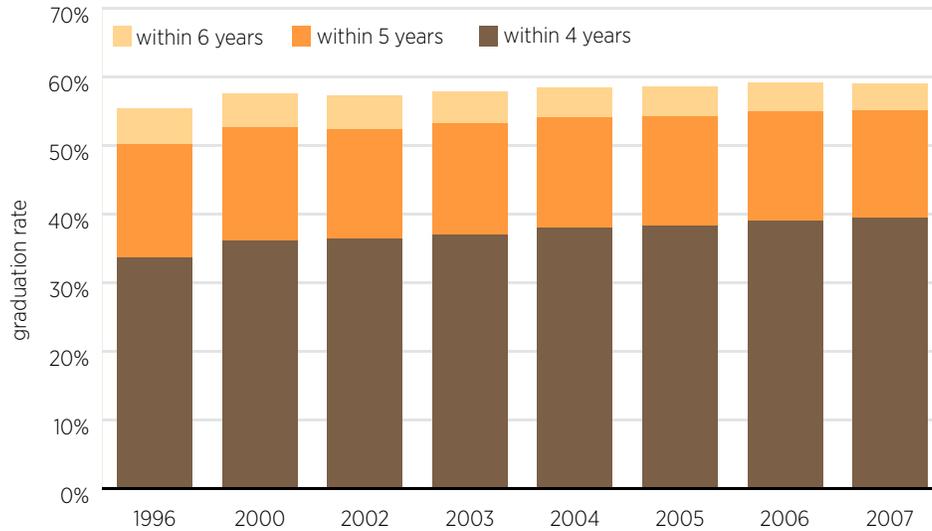

Source: US Department of Education, *Digest of Education Statistics: 2014*, Table 302.10. Numbers include only civilian population, including those incarcerated.

FIGURE 2. PERCENTAGE OF RECENT HIGH SCHOOL GRADUATES ENROLLED IN TWO- AND FOUR-YEAR HIGHER EDUCATION INSTITUTIONS, 1973–2013

Source: US Department of Education, *Digest of Education Statistics: 2014*, Table 302.10. Numbers include only civilian population, including those incarcerated.

FIGURE 3. PERCENTAGE OF 18- TO 24-YEAR-OLDS ENROLLED IN TWO- AND FOUR-YEAR HIGHER EDUCATION INSTITUTIONS, 1967–2013

Source: US Department of Education, *Digest of Education Statistics: 2014*, Table 302.60. Numbers include only civilian, noninstitutionalized population.

FIGURE 4. PERCENTAGE OF 18- TO 24-YEAR-OLDS ENROLLED IN TWO- AND FOUR-YEAR HIGHER EDUCATION INSTITUTIONS, 1973–2013

Source: US Department of Education, *Digest of Education Statistics: 2014*, Table 302.60. Numbers include only civilian, noninstitutionalized population.

Source: US Department of Education, *Digest of Education Statistics: 2014*, Table 326.10.

shows the data for all institutions for the 1967–2013 period, while figure 4 shows those attending two-year and four-year institutions separately for the 1973–2013 period. Enrollment overall increased from about 25 percent to more than 40 percent of this age group, from 7 percent to 12 percent for two-year institutions, and from 17 percent to 28 percent for four-year institutions.

Upward trends in enrollment, however, may not have been accompanied by a large increase in college-educated workers if college completion rates declined. As figure 5 shows, the rate of four-year college completion increased moderately, from 56 percent to 59 percent, over the 1996–2007 period.

If the primary value of a postsecondary education lies in the enrollee's improvement in human capital (i.e., enhanced productivity), then noncompletion is not necessarily problematic because even noncompleters will gain tremendously from attendance. If, however, higher education is valuable mainly because of the signal sent by degree completion, then federal and state funds are being inefficiently bestowed on noncompleters. Moreover, for many potential students, there are likely better and cheaper ways to signal desirable attitudinal qualities to employers than college attendance and completion.

Burning Glass, a firm that "delivers job market analytics . . . with data that identify the skill gaps that keep job seekers and employers apart," has documented the phenomenon of "upcredentialing," in which job listings are requiring higher levels of education over time, despite the same or similar expectations and responsibilities. For example, "Insurance Claims Clerks in their forties are only 60% as likely to have a bachelor's degree as newer entrants who are still in their twenties," and now "half of postings for Insurance Claims Clerks call for a bachelor's degree."[29]

While such analyses don't necessarily rule out a major role for the "human capital" explanation of higher education, they serve to emphasize the current importance of degree completion in procuring entry-level positions and subsequently climbing up the career ladder. Furthermore, such analyses indicate, for some, the desirability of taking paths other than college attendance and completion. Thus, the approximately 40 percent of the relevant people who do not graduate may see only a small increase in earnings as a result of partial degree completion. As pointed out by economist Bryan Caplan, the benefits of a college degree are "frontloaded": the earnings spike is greatest in percentage terms (compared with noncompletion) in the first few years after graduation.[30] Thus, the discounted present value of lifetime earnings is significantly higher for completers than for noncompleters. More broadly, society and government should begin to rethink whether college is universally the best and most efficient way to prepare young people to enter the workforce and adult life.
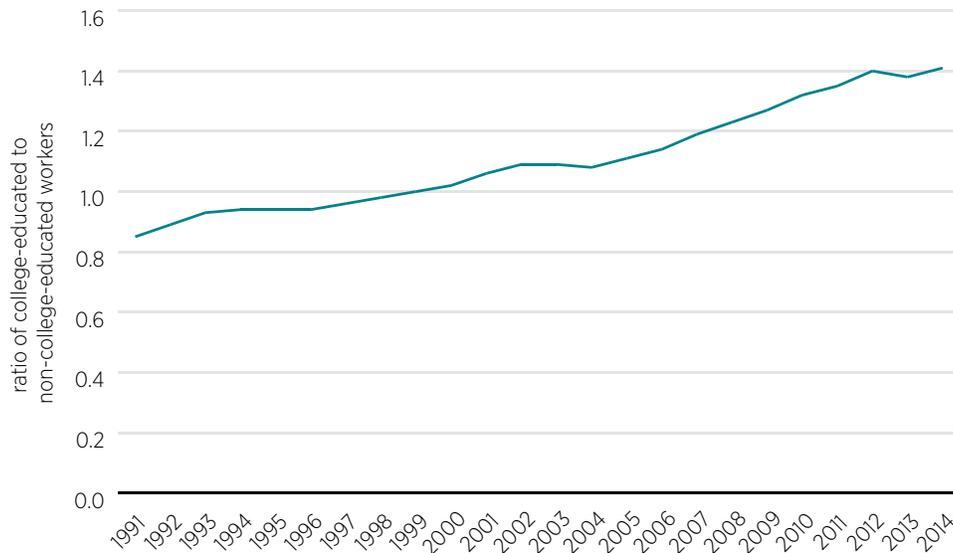
As the aforementioned labor market results suggest, completion of a four-year college degree financed by the student's household may have once been an effective signal of effort and preserverence. But as the bachelor's degree has become increasingly commonplace and subsidized by the government, its signaling value has declined and graduate education has become necessary to gain a competitive advantage. The resulting resources dedicated to attaining these supplementary degrees may then represent social waste.

To follow up on the work of Goldin and Katz, we use data from the US Census Bureau's Current Population Survey for full-time, year-round workers ages 25 and older to calculate the ratio of workers with *at least* bachelor's degrees to workers with only high school diplomas. Similar to Goldin and Katz's analysis, we take the population of workers who attended college but did not

29. Burning Glass, "Moving the Goalposts: How Demand for a Bachelor's Degree Is Reshaping the Workforce" (Analysis report, Burning Glass Technologies, Boston, September 2014).
30. Bryan Caplan, "The Present Value of a Sheepskin," *Library of Economics and Liberty*, January 20, 2012.

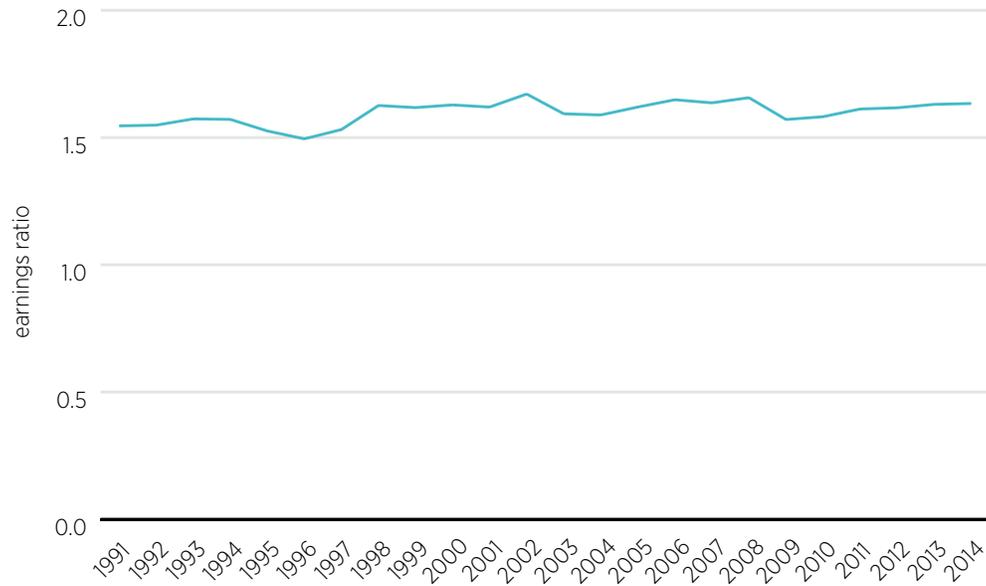FIGURE 6. RELATIVE SUPPLY OF COLLEGE-EDUCATED, FULL-TIME WORKERS, 1991–2014

Source: Authors' calculations, based on the US Census Bureau, Current Population Survey.

attain a bachelor's degree, divide the figure in half, and add each half to the numerator and denominator of the ratio, respectively. As seen in figure 6, this ratio increased from 0.85 in 1991 to 1.41 in 2014. It is hard to see from any of these statistics the recent weakness in the supply of college workers that Goldin and Katz claim to observe.

In addition to examining relative labor supply, we calculate relative wages. In figure 7, we show the ratio of the annual median earnings of full-time, year-round workers over age 25 who have a bachelor's degree only over the median earnings of workers who have only a high school diploma (or equivalent) for the period 1991 to 2014. This ratio should give some sense of the value of a college degree per se in the marketplace, without the confounding influence of those with graduate degrees or of high school dropouts. We pair this ratio with the relative supply ratio shown in figure 6 to determine whether the two measures move in the way consistent with Goldin and Katz's thesis. As figure 7 shows, the earnings ratio has held steady around 1.6, even as the relative supply of college workers increased. These basic data are inconsistent with the hypothesis put forward by Goldin and Katz; there is no evidence of an increase in the college wage premium in recent years.
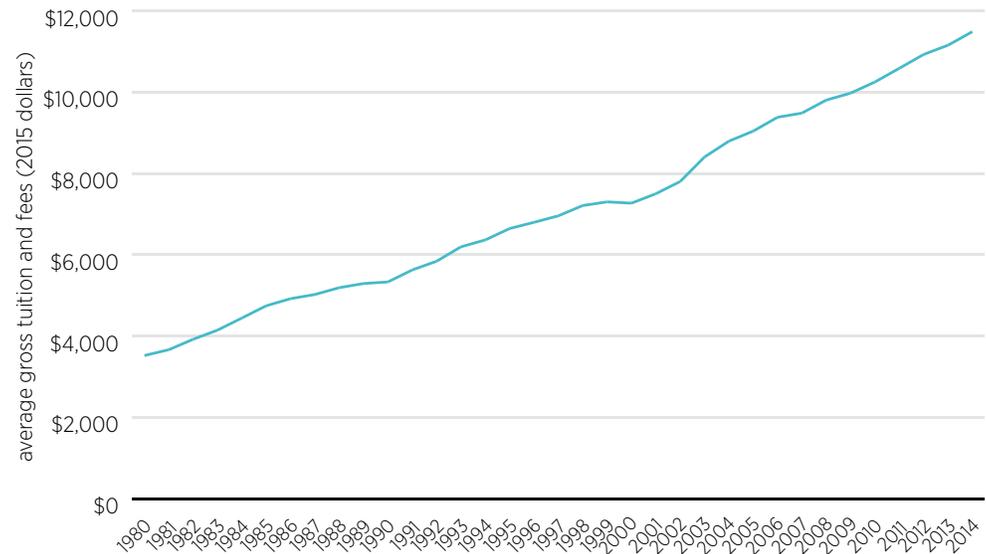
We now examine trends in tuition. The gross, or "sticker," price of attendance has significantly increased in real terms over the past 35 years, as figure 8

FIGURE 7. EARNINGS RATIO FOR COLLEGE AND HIGH SCHOOL WORKERS, 1991–2014

Source: Authors' calculations, based on the US Census Bureau, Current Population Survey. College workers are those who have graduated from college but have not received a higher degree from graduate or professional schools; high school workers are those who have graduated from high school but have not graduated from college.

FIGURE 8. AVERAGE GROSS TUITION AND FEES CHARGED TO AVERAGE FULL-TIME UNDERGRADUATE STUDENT, ACROSS ALL INSTITUTIONS, 1980–2014

Source: US Department of Education, *Digest of Education Statistics: 2014*, Table 330.10.

TABLE 1. REAL PERCENTAGE INCREASE FROM PRIOR YEAR IN AVERAGE GROSS TUITION AND FEES CHARGED TO AVERAGE FULL-TIME UNDERGRADUATE STUDENT, ACROSS ALL INSTITUTIONS, 1981–1995
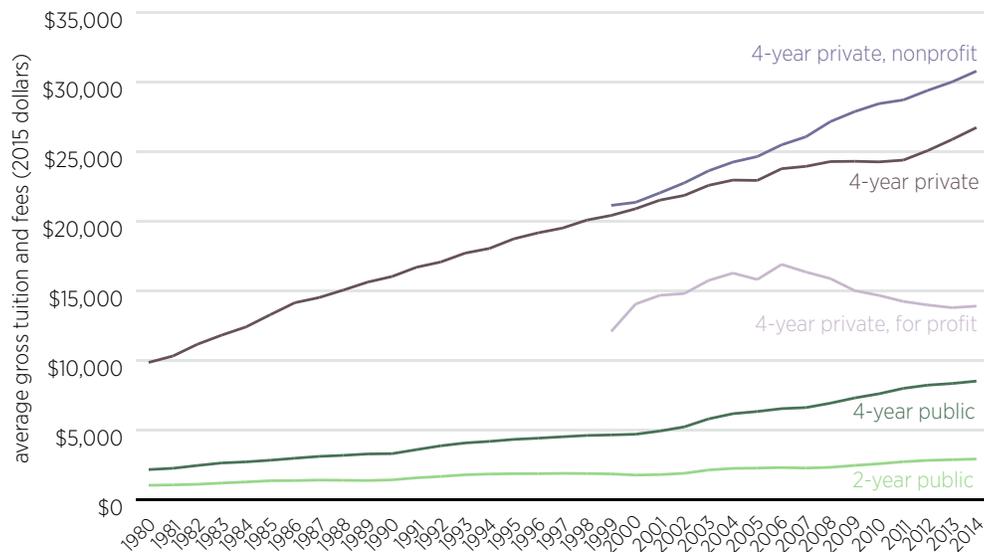
Year	Increase from prior year
1981	4.1%
1982	7.0%
1983	5.7%
1984	7.2%
1985	6.8%
1986	3.7%
1987	2.1%
1988	3.3%
1989	2.0%
1990	0.7%
1991	5.5%
1992	3.8%
1993	6.1%
1994	2.7%
1995	4.4%
Average % Increase	4.3%
Cumulative % Increase	88.7%

Source: Authors' calculations based on data from US Department of Education, *Digest of Education Statistics: 2014*, Table 330.10.

shows. From 1980 to 2014, average gross tuition and fees charged to the average full-time undergraduate student have increased from around $3,500 to $11,500 in constant dollars, a 229 percent increase in real terms. This significant increase in real prices, calculated by weighting tuition by undergraduate, full-time student attendance at each university, can also be observed at shorter intervals.

Tables 1 and 2 show year-over-year real percentage increases for the consecutive periods of 1981–1995 and 1996–2014. The average annual increase for the former period (4.3 percent) is larger than the average increase for the latter period (2.9 percent). The 1981–1995 period saw a cumulative tuition increase of 88.7 percent, while the subsequent period saw a bit lower increase of 70.0 percent. Moreover, decadal averages (not shown in table form) also show a declining rate of increase. While the average annual increase in tuition was 4.3 percent over the 1981–1990 period, the 1991–2000 and 2001–2010 periods show average increases of 3.2 percent and 3.5 percent, respectively. The cumulative percentage increases for these consecutive periods are 51.4 percent, 29.2 percent, and 36.7 percent, respectively.

TABLE 2. REAL PERCENTAGE INCREASE FROM PRIOR YEAR IN AVERAGE GROSS TUITION AND FEES CHARGED TO AVERAGE FULL-TIME UNDERGRADUATE STUDENT, ACROSS ALL INSTITUTIONS, 1996–2014

Year	Increase from prior year
1996	2.3%
1997	2.4%
1998	3.6%
1999	1.2%
2000	−0.4%
2001	3.2%
2002	4.0%
2003	7.7%
2004	4.6%
2005	2.8%
2006	3.8%
2007	1.1%
2008	3.4%
2009	1.7%
2010	2.8%
2011	3.3%
2012	3.2%
2013	2.1%
2014	3.0%
Average % Increase	2.9%
Cumulative % Increase	70.0%

Source: Authors' calculations based on data from US Department of Education, *Digest of Education Statistics: 2014*, Table 330.10.

Figure 9 breaks down the change in tuition by type of institution and shows that the real increase in gross tuition has occurred steadily in both public and private postsecondary sectors, albeit with larger percentage increases in the public sector. In real terms, average tuition for four-year public institutions has risen 274 percent, from $2,287 in 1980 to $8,543 in 2014. Average tuition for two-year public institutions has risen from $1,069 to $2,955, a 176 percent increase. Average four-year private-sector tuition has risen the slowest in real terms over the time period. The data show a 150 percent increase in that sector, from $10,345 in 1980 to $26,740 in 2014, albeit starting and ending at the highest levels.

Data that further break down the "private" category into nonprofit and proprietary have been collected since 1999, as reported in the Department of Education's *Digest of Education Statistics*. That information shows that four-year

FIGURE 9. AVERAGE GROSS TUITION AND FEES CHARGED TO FULL-TIME UNDERGRADUATE
STUDENT, BY TYPE OF INSTITUTION, 1980–2014

Source: US Department of Education, *Digest of Education Statistics: 2014*, Table 330.10.

for-profit institutions have not seen real, persistent tuition increases over the past 15 years, somewhat contrary to the claims of Cellini and Goldin.[31] Though these institutions saw an increase in the 1999–2006 period from $12,108 to $16,918, average tuition then fell to $13,925 by 2014. Among the other types of institutions, four-year private nonprofit schools posted an average cumulative increase over the 1999–2014 period (45.5 percent), an increase exceeded by two-year public schools (56.8 percent) and public four-year schools (82.4 percent).

While the NCES offers the most complete data series on gross average tuition, only the College Board presents multidecade data about net tuition. According to the College Board's definition, net tuition is the average gross tuition, net of federal Pell Grants, federal tax benefits, Federal Supplemental Educational Opportunity Grants, state grants, institutional grants, and private and employer grants, which are weighted by full-time enrollment. Large average real increases observed in tuition persist even after grant money (both governmental and institutional) is taken into account. The College Board's method of subtracting out government grants in addition to institutional aid, however,

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31. Stephanie Riegg Cellini and Claudia Goldin, "Does Federal Student Aid Raise Tuition? New Evidence on For-Profit Colleges," *American Economic Journal: Economic Policy* 6, no. 4 (2014).

obscures the true increase in the charge by higher education institutions to students, their families, and governments. By lumping together institutional and government dollars in the netting-out process, we cannot determine the real rate of increase in net tuition resources, regardless of ultimate source, going to colleges and universities.
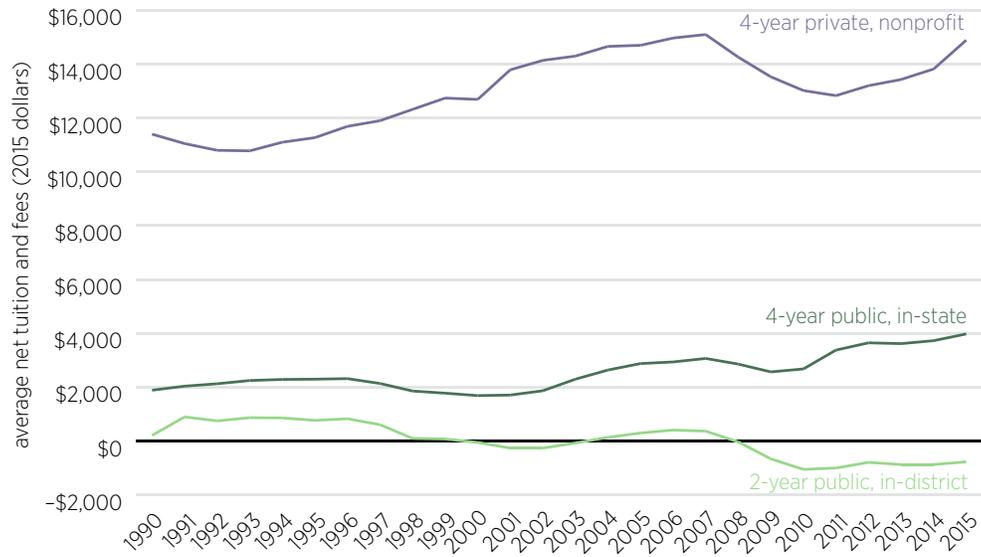
As figure 10 shows, increases in all financial aid to students have been more than offset by coincident increases in tuition for public and private four-year institutions. Net tuition at private, nonprofit four-year institutions has increased roughly 30 percent in real terms over the 1990–2015 period, rising from $11,400 to $14,890. The increase is more pronounced at public, in-state four-year institutions, where tuition rose 110 percent, from $1,890 to $3,980, albeit at much lower beginning and ending levels than private institutions. Net tuition at public two-year institutions, however, has been an exception to this trend. At these institutions, net tuition has declined in real terms, dipping from $210 in 1990 to −$770 in 2015. The recent negative figures result from provisions in federal student aid programs that cover education-related expenses such as room and board (including off campus) in addition to tuition expenses.

Figure 11 shows that when room and board are added to the calculation, net prices at public, two-year, in-district institutions have actually increased slightly over the 25-year period. Net tuition and fees and room and board went from $6,400 in 1990 to $7,230 in 2015, a 13 percent increase. The percentage changes for private, nonprofit four-year institutions and public four-year institutions, however, largely remain unchanged even after factoring in room and board.

We now present historical data about the amount of loans and grants from the federal and state governments given to postsecondary students. Figure 12 shows the government expenditures for higher education given to students in 2016 dollars in broad categories, such as federal grants, state loans, and so on, over the period 1970 through 2014. (The significant values of federal tax benefits for higher education and tax-favored private and employer grants are excluded.) The rapid growth in government spending—from $80 billion (2016 dollars) in 2000 to almost $200 billion (2016 dollars) in 2010—is remarkable. Of course, some of this growth represents the natural demographic increase in the number of students, but most is the result of changes in federal government policy that increased grant and loan amounts and expanded eligibility.
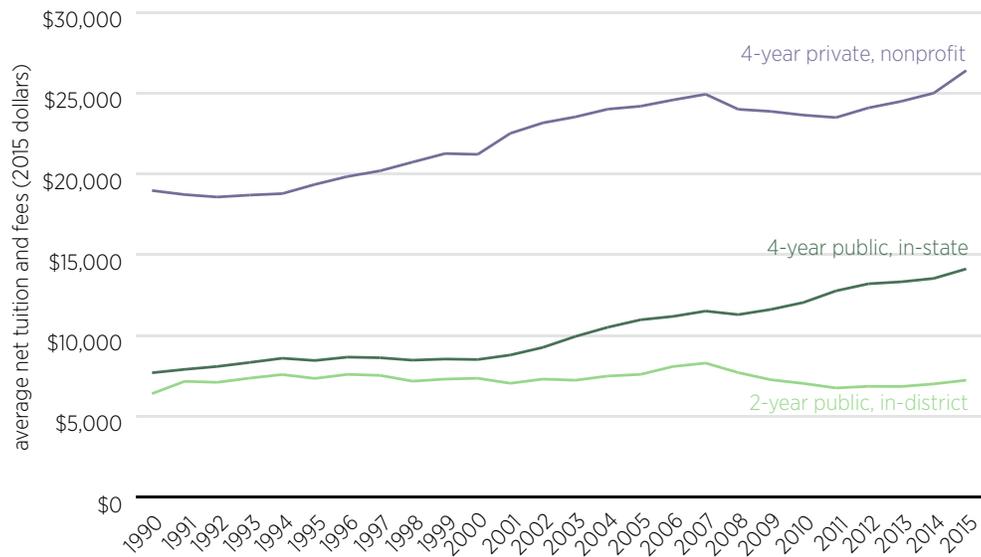
Overall, government resources devoted to higher education through students ballooned from $17.8 billion (2016 dollars) in 1970 to $166.2 billion (2016 dollars) in 2014, with a peak of $190.3 billion (2016 dollars) in 2010. Although all categories except Federal Work-Study have seen rapid growth, the biggest jumps

FIGURE 10. NET TUITION AND FEES PAID BY AVERAGE FULL-TIME UNDERGRADUATE STUDENT, BY TYPE OF INSTITUTION ATTENDED, 1990–2015
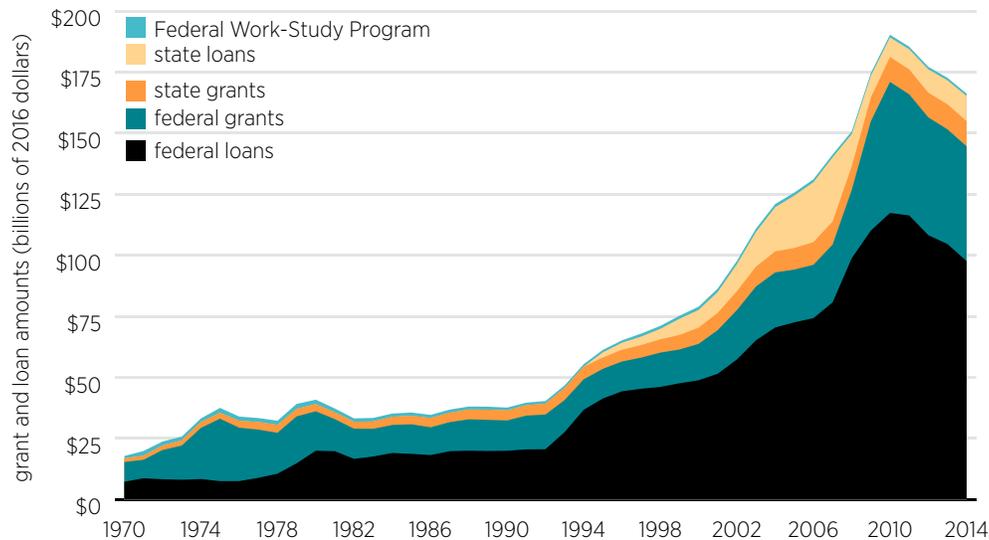

Source: College Board, *Trends in College Pricing 2015*, table 7.

FIGURE 11. NET TUITION AND FEES AND ROOM AND BOARD PAID BY AVERAGE FULL-TIME UNDERGRADUATE STUDENT, BY TYPE OF INSTITUTION ATTENDED, 1990–2015

Source: College Board, *Trends in College Pricing 2015*, table 7.

Source: College Board, *Trends in Student Aid 2015*, table 2.

come from federal loan and grant programs, especially for federal grants (mainly veterans) after 1972, federal loans (both subsidized and unsubsidized) after 1994, and federal grants (mainly Pell) and loans after 2008. Proportionately, loans have seen faster growth than grants have.

Figures 13 and 14 give more detail about the government grants and loans, respectively. The three largest types of grants are Pell, veterans, and state-sponsored—in that order. Grants for veterans reflect the ebbs and flows of military service caused by the nation's wars, as well as legislated increases in generosity, while the increases in Pell and state grants are steadier and larger, reflecting legislated changes. Some types of grants have been started and eliminated over time. In total, government grants to postsecondary students increased from $10.5 billion (2016 dollars) in 1970 to $58.3 billion (2016 dollars) in 2014. The three largest types of loans are unsubsidized and subsidized Stafford Loans and Parent PLUS Loans—in that order. Unsubsidized Stafford Loans have grown the fastest, from their inception in 1993. In total, government loans to postsecondary students increased from $7.3 billion (2016 dollars) in 1970 to $98.1 billion (2016 dollars) in 2014, with a peak of $118.0 billion (2016 dollars) in 2010.

It is important to next consider trends in student loan defaults because a significant increase in loan defaults would represent a critical failure according
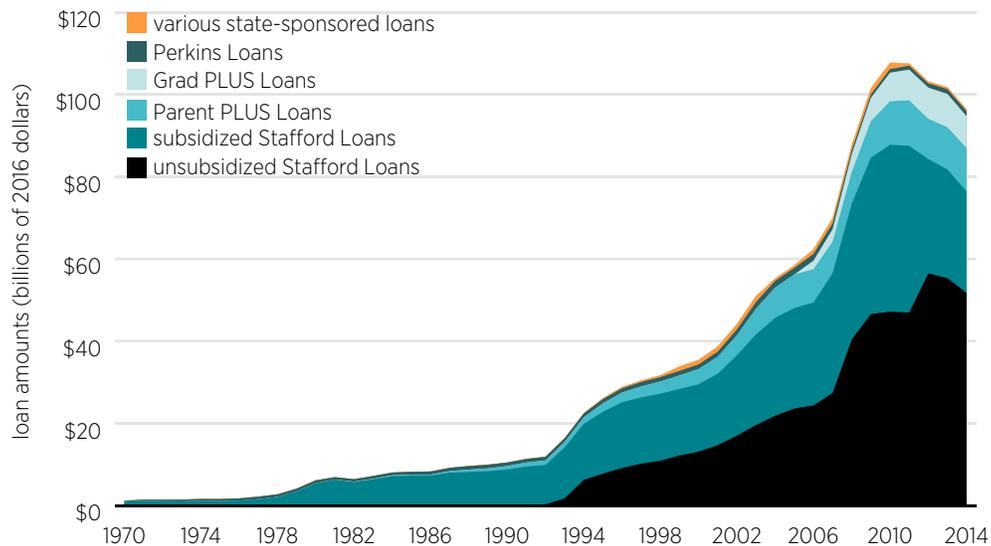
FIGURE 13. FEDERAL AND STATE GRANTS DISBURSED TO POSTSECONDARY STUDENTS BY TYPE OF GRANT, 1970–2014

Note: The "other federal grants" category includes Leveraging Educational Assistance Partnership (LEAP) grants, Science and Mathematics Access to Retain Talent (SMART) Grants, Academic Competitiveness Grants, and Federal Supplemental Educational Opportunity Grants (FSEOG).

Source: College Board, *Trends in Student Aid 2015*, table 2.

FIGURE 14. FEDERAL AND STATE FUNDS LENT TO POSTSECONDARY STUDENTS BY TYPE OF LOAN, 1970–2014

Source: College Board, *Trends in College Pricing 2015*, table 2.

"A quarter of 2005 graduates defaulted on their student loans by 2014. By 2014, 24 percent of 2007 graduates defaulted; the corresponding figure for 2009 graduates is 26 percent. More significantly, holding the number of years after graduation constant, the 2009 cohort has a significantly higher default rate than the 2005 cohort."

to the policy logic of federal support of higher education. That is, a college education is supposed to increase the wages and job-marketability of graduates, thus enabling them to pay back their loans over time with sufficient earnings left over to finance an improved standard of living. If former students defaulted, it would imply that job market improvements did not occur for many students, or at least not sufficiently to cover the added expenses of tuition and fees as well as the opportunity cost of missing out on on-the-job experience just after high school.

The federal government publishes two measures of student loan default. The first, from the Department of Education, is the two-year cohort default rate, defined as the number of students, former students, and graduates who default on their loans within one year of the loan payback start date as a percentage of all students beginning repayments that same year. This rate, calculated as an average across all types of students and institutions, was published until 2011, when it was replaced by the three-year cohort default rate.

As shown in figure 15, the short-term cohort default rate dropped rapidly after hitting a high of 22.4 percent in 1990 and stabilized in the 5 percent range after 2000. These changes were largely spurred by the Omnibus Budget Reconciliation Act of 1990. Within that legislation, Congress restricted federal funding to postsecondary institutions with two-year cohort default rates (for recently graduated students) below 30 percent for the prior fiscal year. This restriction was effective in closing many institutions with poor student outcomes and high resulting default rates. As education policy experts Erin Dillon and Robin Smiles note, in the 10-year period following the legislation's passage, "More than 1,000 schools have been denied participation in the federal student aid program and default rates have dropped precipitously."[32]

32. Erin Dillon and Robin Smiles, "Lowering Student Loan Default Rates: What One Consortium of Historically Black Institutions Did to Succeed" (Education Sector Report, Education Policy Center, February 2010), 2.
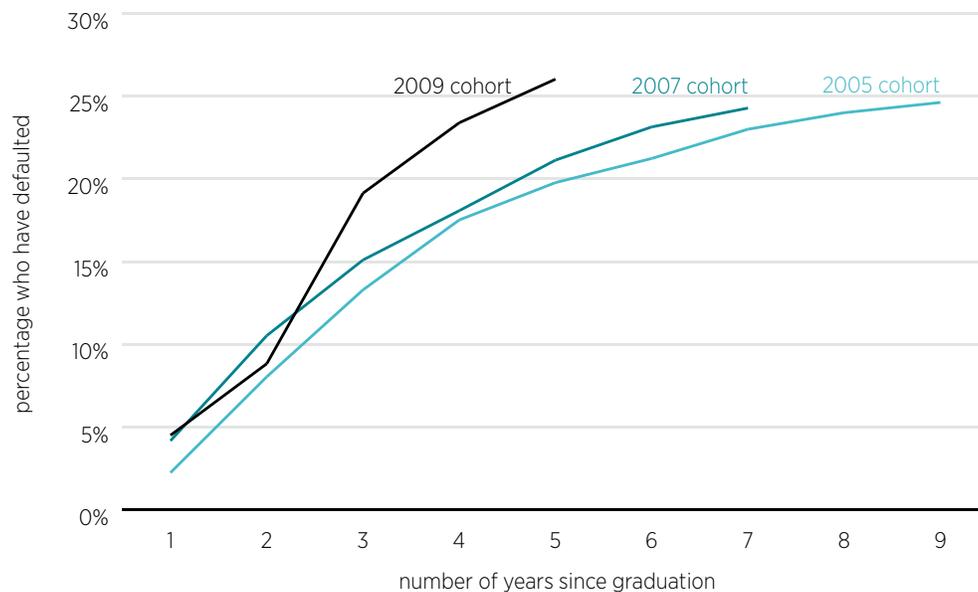
Source: US Department of Education, Office of Federal Student Aid.

From 2005 through 2011, however, the two-year default rate doubled from 5 percent to 10 percent, likely reflecting a weak economy and increased student borrowing. Most recently, three-year default rates show moderate improvement, dropping from 14.7 percent in 2010 to 11.8 percent in 2012, but some of that reduction may reflect easier and extended repayment terms. More dire trends, however, can be seen in cohort default data collected by the Federal Reserve Bank of New York. Researchers currently track three graduation cohorts to examine the cumulative default rate by the number of years since graduation. As figure 16 shows, a quarter of 2005 graduates defaulted on their student loans by 2014. By 2014, 24 percent of 2007 graduates defaulted; the corresponding figure for 2009 graduates is 26 percent. More significantly, holding the number of years after graduation constant, the 2009 cohort has a significantly higher default rate than the 2005 cohort.[33]

Default rates are also calculated by the federal government as a percentage of aggregate loan volume (in dollars) that is projected to go into default and will not be repaid over the 20-year period following the first year of repayment. These measurements are calculated separately for various types of students

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33. Meta Brown et al., "Looking at Student Loan Defaults through a Larger Window," *Liberty Street Economics* (Federal Reserve Bank of New York), February 19, 2015.

FIGURE 16. PERCENTAGE OF STUDENT LOAN BORROWERS WHO HAVE DEFAULTED, BY NUMBER OF YEARS SINCE GRADUATION
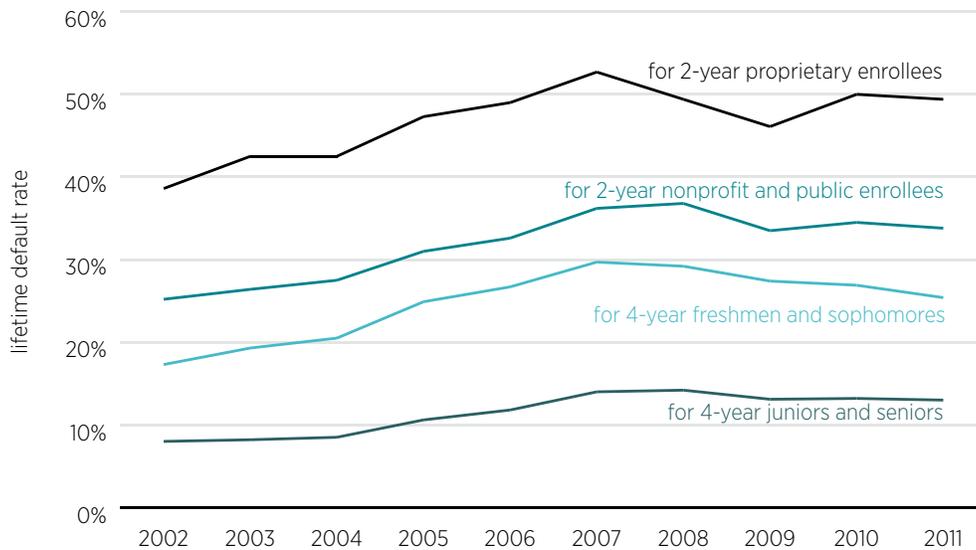

Source: Meta Brown et al., "Looking at Student Loan Defaults through a Larger Window," *Liberty Street Economics* (Federal Reserve Bank of New York), February 19, 2015.

and institutions. Figure 17 shows lifetime default rates for various grade-level cohorts and enrollees at various types of institutions. Across all types of students and institutions, lifetime default rates increased significantly from 2002 to 2011. Loans to students who attended for-profit (proprietary) institutions are the least likely to be repaid, followed by public two-year institutions.

Funds allocated to underclassmen (first- and second-year students) are less likely to be repaid than loans to upperclassmen (third-year students and above) because the former cohort has a greater proportion of eventual dropouts than does the latter. Over the 2002–2011 period, the default rate for funds allocated to two-year proprietary institution attendees saw the smallest rate of increase (25.6 percent). The respective increases in default for two-year public institution attendees, four-year institution freshmen and sophomores, and four-year juniors and seniors are 36.0 percent, 47.0 percent, and 62.5 percent, respectively. Enrollees at two-year proprietary and two-year nonprofit institutions, however, consistently have the highest rates of default and saw the largest percentage-point increase in defaults over the 2002–2011 period, consistent with Looney and Yannelis's emphasis on nontraditional borrowers who attend those institutions.

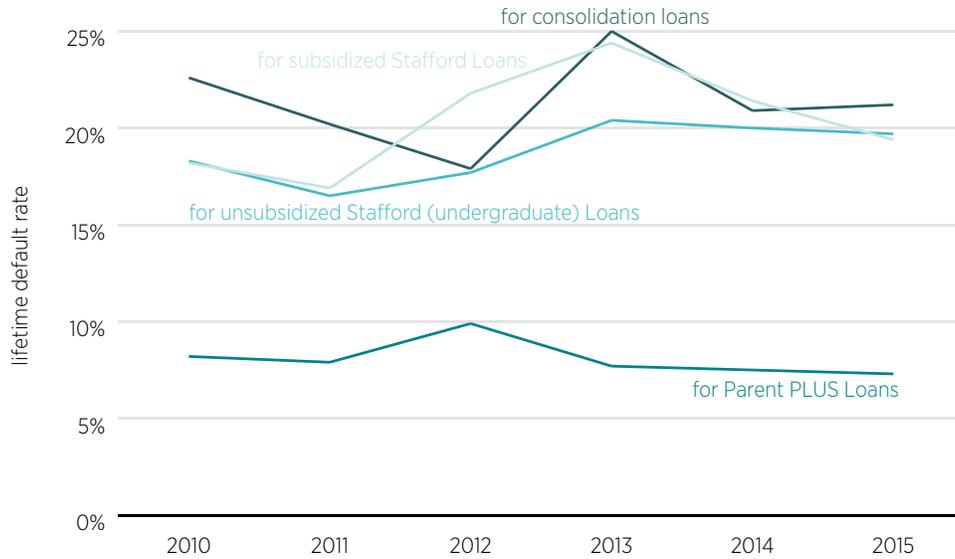Source: US Department of Education, Office of Federal Student Aid.

Over the previous few years, the federal government has calculated students' lifetime default rates on the basis of the type of loan taken out rather than by grade level and institution type. As figure 18 shows, there is no discernable trend for the different loan categories for the past five years. Predictably, however, loans taken out by parents are roughly half as likely to go into default as loans taken out by undergraduates.

As we have mentioned above, certain changes in repayment requirements may be accounting for (that is, hiding inherent weakness in) the recent steadiness of default rates. In particular, income-driven repayment plans, extending repayment periods from 10 to 25 years and allowing forgiveness at the end, have grown in popularity. The Government Accountability Office reports that of the $355 billion in direct loans made in the 1995–2017 period through income-based repayment plans, only $281 billion is expected to be repaid.[34] This implies a significant default rate not included in the conventional statistics.

In addition to tuition, state government appropriations to public higher education institutions (two- and four-year) and endowments of colleges and
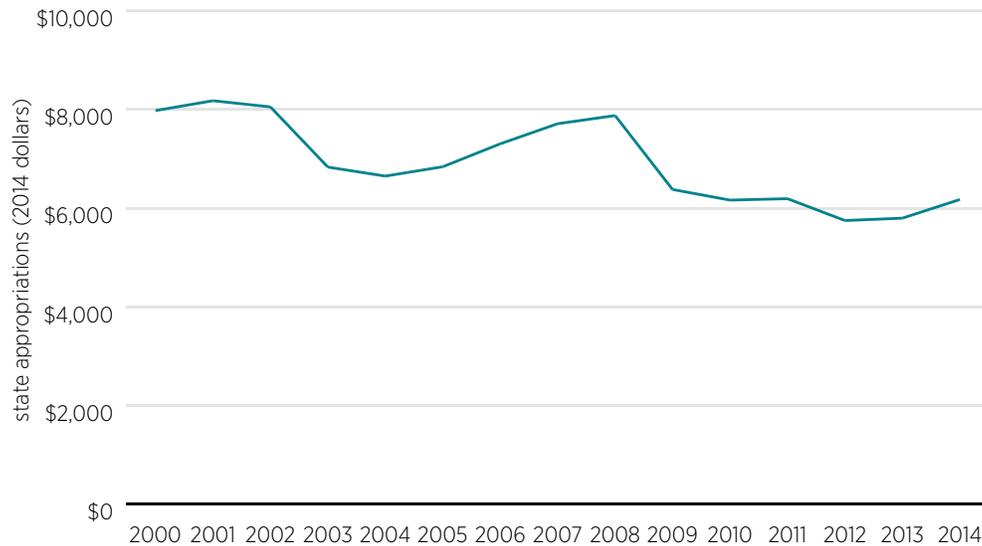
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34. US Government Accountability Office, "Federal Student Loans: Education Needs to Improve Its Income-Driven Repayment Plan Budget Estimates," GAO-17-22, November 2016.

FIGURE 18. LIFETIME DEFAULT RATES, BY LOAN TYPE AND YEAR OF ORIGINATION, 2010–2015

Source: US Department of Education, Office of Federal Student Aid.

FIGURE 19. STATE GOVERNMENT APPROPRIATIONS TO SUPPORT GENERAL OPERATING EXPENSES OF PUBLIC HIGHER EDUCATION INSTITUTIONS, PER FULL-TIME EQUIVALENT STUDENT, 2000–2014

Source: Authors' calculations based on data from the State Higher Education Executive Officers Association, "State Higher Education Finance," reports for fiscal years 2004–2014.

universities (private and public) compose significant shares of postsecondary institution revenue. As figure 19 shows, state government appropriations to support general operating expenses of public higher education institutions have declined on an inflation-adjusted, per capita basis over the 2000–2014 period. Appropriations fell from about $7,300 to about $5,100 per public, full-time equivalent student; the most significant drop occurred during and immediately after the Great Recession, a period marked by low state tax revenue and a diversion of existing resources toward rapidly growing state Medicaid programs and other assistance to the needy. At the same time that these state appropriations declined, federal financial aid to postsecondary students rose dramatically. Indeed, state legislators allocating resources are quite sensitive to the availability of outside funding to higher education institutions.[35] In Minnesota and Oregan, this sensitivity is actually embedded into state laws: as financial aid from the federal government increases, state aid declines.[36]

Moreover, a maintenance of effort provision with significant impact on both K–12 and higher education was included in the American Recovery and Reinvestment Act of 2009, which contained nearly $40 billion in State Fiscal Stabilization Funds to help states shore up their elementary, secondary, and postsecondary education budgets. The legislation required states to use those stabilization funds to minimally fund K–12 and higher education at their 2006 appropriated levels for fiscal years 2009, 2010, and 2011. Some say that, as a result, state officials became reluctant to substantially increase funding for higher education because of ensuing commitments to provide funding at higher future thresholds, as required by any current or future maintenance of effort provisions.[37]
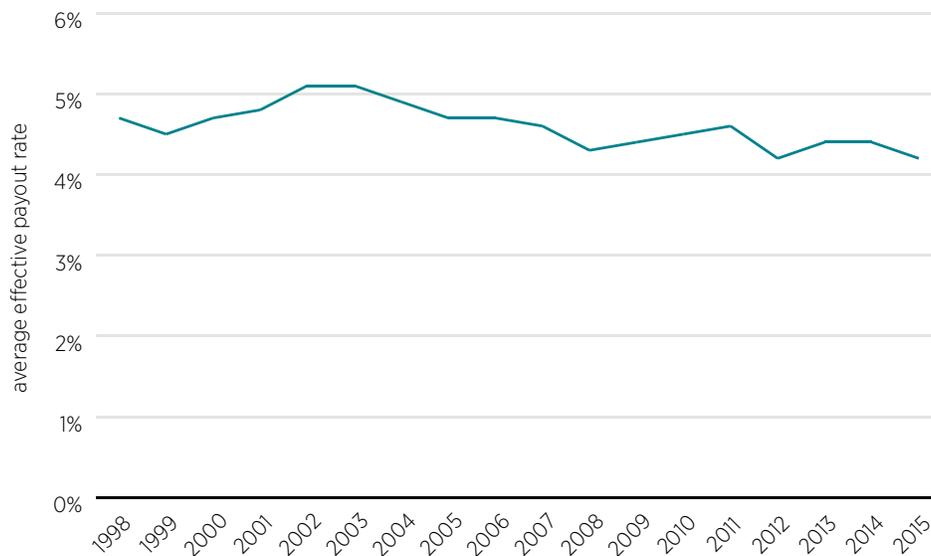
Universities have reduced their reliance on endowment funds to support institutional and educational functions. Although a statistic quantifying the amount of endowment funds spent per full-time student over time is not available, the State Higher Education Executive Officers Association annually estimates the endowment payout rate from a sample of more than 800 universities. Data on endowment payout rates for the 1998–2015 period show that the rate has steadily declined from around 5 percent in the late 1990s and the first

35. See Rick Seltzer, "What's the Matter with Kansas Budget Cuts?," *Inside Higher Ed*, May 23, 2016.
36. See Dustin Weeden, "Financial Aid" (Higher Education brief, National Conference of State Legislators, Washington, DC, 2015).
37. Alexander F. King et al., "'Maintenance of Effort': An Evolving Federal-State Policy Approach to Ensuring College Affordability" (Higher Education Policy Brief, American Association of State Colleges and Universities, Washington, DC, April 2010).

FIGURE 20. AVERAGE ANNUAL EFFECTIVE SPEND (PAYOUT) RATE ON UNIVERSITY ENDOWMENTS, 1998–2015

Source: National Association of College and University Business Officers, Endowment Studies from 2002 to 2015.

few years after 2000 to 4.2 percent in 2015 (see figure 20). This decline in universities' reliance on their own endowment funds may be the result of a view that future investment returns will be lower than experienced in the past (in line with exceptionally low real interest rates since 2009). However, it may also reflect that, like their counterparts at state institutions, officials at private institutions are displaying strategic behavior that arises from federal aid increases. The increase in opportunities to capture federal aid allows allows private universities to expend less of their own endowment resources.

SUMMARY AND CONCLUSIONS

The real cost of a college education, gross or net, has risen rapidly. Federal support to university students, in the form of both loans and grants, has also steadily increased, exploding in the past 20 years with major expansions in federal financing programs. According to the most recent empirical analyses, which exploit new datasets and better methodologies than do older studies, these two trends are closely related.

The findings of Turner; Cellini and Goldin; Gordon and Hedlund; and Lucca, Nadauld, and Shen show that tuition increases, institutional aid reduc-

tions, or both closely track federal aid increases, even after controlling for a myriad other factors, including state government appropriations to higher education.[38] In particular, federal financial support for students has led to (1) large-percentage, in some cases approaching dollar-for-dollar, tuition (price) increases in the four-year public and private, nonprofit sectors; (2) modest increases in enrollment, consistent with constrained supply and increased demand; and (3) in some instances more selectivity of students by these institutions.

Conversely, in other sectors of higher education—namely, two-year public and private for-profit institutions—tuition increases have been muted and enrollment has increased rapidly, in a manner consistent with an elastic supply. Indeed, as Hoxby has shown, over several decades average college selectivity has declined, while it increased substantially at the top 10 percent of colleges.[39]

As Looney and Yannelis convincingly show, it is largely in the two-year public and for-profit sectors and among nontraditional students that student loan defaults are the highest and have increased the most, even as more aggregated data indicate that loan burdens and loan default rates have been generally increasing over the past decade, on average and across all borrowers and institutions, and particularly for later cohorts of graduates.[40]

Clearly, the composition of borrowers has shifted toward higher-risk or more disadvantaged individuals, encouraged by the increasing availability of federal funds. This shift has echoes to the run-up to the recent financial crisis whereby housing credit was increasingly extended to riskier borrowers. Moreover, it would represent a harm done by federal policy to those defaulting disadvantaged

"The data clearly indicate that the wage premium for a college education has not increased, but rather has remained steady, even as the number of college-educated workers has been continuing a long-standing upward trend, and not experiencing a decline."

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38. Turner, "Who Benefits from Student Aid?"; Cellini and Goldin, "Does Federal Student Aid Raise Tuition?"; Gordon and Hedlund, "Accounting for the Rise in College Tuition"; Lucca, Nadauld, and Shen, "Credit Supply and the Rise in College Tuition."
39. Hoxby, "Changing Selectivity of American Colleges."
40. Looney and Yannelis, "Crisis in Student Loans?"

individuals. Besides getting a permanent stain on their credit records and wage garnishment and withholding of tax refunds and Social Security benefits, those former students may have missed out on other, more practical and beneficial job training or apprenticeship opportunities.

Also, despite claims and analysis by the noted economists Goldin and Katz, the data clearly indicate that the wage premium for a college education has not increased, but rather has remained steady, even as the number of college-educated workers has been continuing a long-standing upward trend, and not experiencing a decline.[41] Hence, the policy case for more federal support for higher education—based on the claimed results in Goldin and Katz that to lower the wage premium (and thereby reduce earnings inequality) the United States needs to increase the number of college-educated workers—is in strong doubt. Moreover, the decline of direct per-student state government support in real terms and in spend rates from endowments likely reflects poorer macroeconomic and financial conditions but may also indicate a strategic substitution of resources by state governments and private higher education institutions in response to increased support from the federal government.

These findings should be disappointing to policymakers and taxpayers; they are indicative of policy failures and dysfunctions. The increase in federal financial support for college and graduate school students was meant to reduce costs, not increase them. The increased support was also meant to lead to a widespread and equitable increase in wages for more productive college-educated workers, not the status quo, and certainly not to put strong pressure on many students to default on their loans when wage increases are not realized, nor to increase the deficit of the federal government.

Indeed, it is worrisome that the increase in financial aid seems to cause many individuals to waste the precious years of young adulthood in a largely unhelpful college education that results in a heavy debt burden rather than to take on-the-job training for a good career of high productivity, creativity, and financial independence. Clearly, there is no one-size-fits-all solution here, and likely some poor but talented students are helped by federal assistance. The important point, however, is that better-designed and more-targeted programs should be created and that massive, nontargeted increases in federal resources for higher education—per se and in the aggregate—may largely harm rather than help advance important public policy goals of prudent financing, access, efficiency, and enhanced productivity. In particular, further increases

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41. Goldin and Katz, "Future of Inequality."

in federal support for higher education are not needed and indeed are likely to be counterproductive because they lead to higher tuition for all students. It is quite likely that reducing the availability of subsidized student loans and tax benefits to upper-middle-income families could be beneficial to the system: it would lead to a general lowering of tuition, thus reducing the loan burden on future workers. In addition, the plethora of student loan repayment options (including income-based repayment) needs to be rationalized and redesigned; in particular, the salience of loan repayments to students needs to be strengthened and losses to taxpayers reduced.

Finally, there are many indications that a system of universal higher education, toward which the United States has been heading, would be wasteful—particularly if college completion functions mainly as a signal of perseverance and effort rather than as actual training. Instead, the United States needs a robust parallel system of on-the-job training, apprenticeships, and practical work experience. Changes in federal laws and regulations could encourage the creation of such a system.

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