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# Understanding Changes in the Distribution of Student Loan Debt over Time

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# **Student Loans and the Dynamics of Debt**

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# 5

## Understanding Changes in the Distribution of Student Loan Debt over Time

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When outstanding debt passed the \$1 trillion mark two years ago, it prompted many to question whether the student lending market is headed for a crisis, with many students unable to repay their loans and taxpayers being forced to foot the bill. Commentators have also expressed concerns that increasing education debt loads are making it more difficult for borrowers to start families, buy houses, and save for retirement (Brown and Caldwell 2013). There is clear evidence that the number of students taking on debt has been increasing and that debt burdens have been growing. However, the large and growing economic return to college education implies that many of these loans are financing sound investments. Consequently, it is not obvious that the growth in debt is problematic. Existing evidence is insufficient to determine what these changes mean for the financial well-being of borrowers and the health of the overall student lending market.

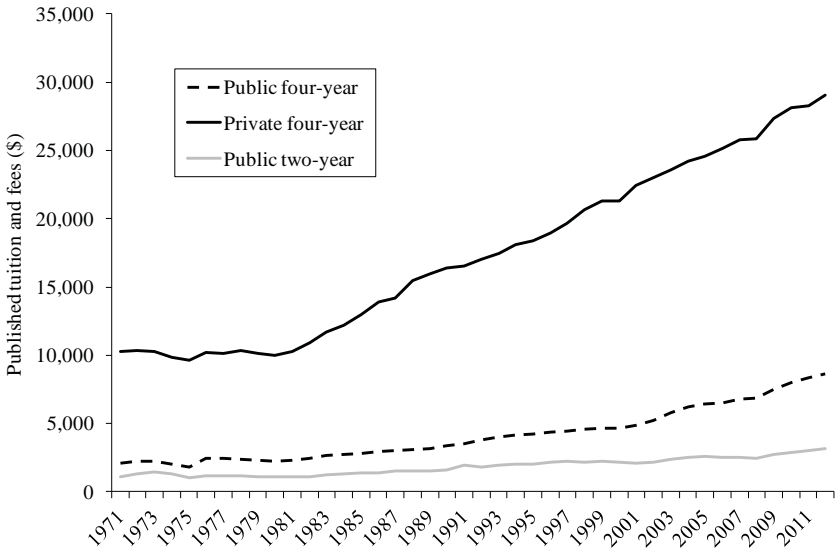
The returns to a college degree are higher than they have ever been. In 2011, college graduates aged 23–25 earned \$12,000 more per year on average than high school graduates in the same group, and they had employment rates 20 percentage points higher. Over the last 30 years, the increase in lifetime earnings associated with earning a college

degree has grown by 75 percent, whereas costs have grown by 50 percent (Greenstone and Looney 2012). These economic benefits accrue to individuals, but also to society in the form of increased tax revenue, improved health, and higher levels of civic participation (Baum, Ma, and Payea 2013).

Today's students are more likely than their predecessors to borrow and to take out larger loans to pay for tuition, fees, and living expenses while in college. Over the last 20 years, inflation-adjusted published tuition and fees have more than doubled at four-year public institutions and have increased by more than 70 percent at private four-year and public two-year colleges (Figure 5.1). The fact that the total outstanding balance on student loans recently passed \$1 trillion, combined with media reports of students with large debts—often in excess of \$100,000—have garnered a great deal of public attention. However, the debt picture for the typical college graduate is not so dire. For example, bachelor's degree recipients in 2011–2012 who took on student loan debt accumulated approximately \$26,000 in student loan debt (\$25,000 at public institutions, and \$29,900 at private, nonprofit institutions) (College Board 2013). Debt per borrower is growing rapidly (at an annual rate of 1.2 percent above inflation at nonprofit institutions and 2.1 percent at public institutions), but it is still a manageable burden if the graduate is able to find gainful employment. Extremely high debt levels remain quite rare: in 2012, only 5 percent of borrowers with education debt owed more than \$100,000 (College Board 2013).

In the United States, student lending takes place through two channels, the federal lending programs and the private market for student loans. The federal lending program exists because, in the absence of government intervention, the private market would provide too few students access to loans, which would result in underinvestment in education at the national level. The basis for this theory is that, unlike physical capital, human capital—or the skills that one obtains through education—cannot effectively serve as collateral for a loan. This makes student lending inherently risky, because a lender cannot foreclose on a student's education the same way it can foreclose on a home if the borrower goes into default. More generally, the federal loan program ensures that all students have access to higher education, regardless of their ability to pay.

**Figure 5.1 Trends in Published Tuition and Fees, 1971–2012**



SOURCE: National Center for Education Statistics (2012, Table 381).

Most student lending takes place through the federal government because the interest rates offered in federal lending programs are below those typically offered by private lenders. Interest rates on federal loans are set by legislation and do not depend on the likelihood that a borrower will default. The amount that students can borrow from the government depends on whether they are financially dependent on their parents (as defined by a federal formula) and on their year in college (including whether they are a graduate student). Students from households judged to have more financial need are eligible to borrow a larger portion of their federal loans through the subsidized loan program, in which the government pays interest while the student is in school. Federal student loans carry additional benefits beyond the below-market interest rates and in-school interest subsidies for eligible families. Borrowers who face financial hardship after leaving college are eligible for deferral or reduction of monthly payments, and even forgiveness through a number of repayment programs.

Some students also borrow from private financial institutions, usually after they have exhausted their ability to borrow from the government. Unlike the loans offered in the federal lending programs, private lenders offer loans with interest rates that reflect a borrower's likelihood of default. This means that borrowers from low-income households or borrowers attending colleges with lower completion rates are likely to face the highest rates. In addition, private student loans carry less generous repayment terms than federal loans, an important distinction given that both federal and private student loans are more difficult to discharge in bankruptcy than other types of consumer debt.

Despite the significant role that loans play in our nation's higher education system and the increased attention to rising debt levels, there is little existing empirical evidence that attempts to explain these trends. In this chapter, we examine how education loan balances have evolved over time and measure the extent to which changes in degree attainment, tuition, demographics, and borrowing behavior have contributed to the observed increase in student debt.

## **BACKGROUND AND DATA**

The lack of empirical evidence available to support discussions about perceived problems in the student loan market is at least partly due to the limitations of existing data sources. The primary source of data on student aid is the Integrated Postsecondary Education Data System (IPEDS). These data, which are derived from the Department of Education's survey of all institutions participating in federal student aid programs, report institution-level lending variables, including total outlays within the federal loan program and number of borrowers. While this information is incredibly important, it does not tell the whole story. For instance, we cannot tell how the use of private loans has changed or how much debt students accumulate over time.

In addition to the data available through IPEDS, the Department of Education publishes the findings from a few different longitudinal studies, including *Baccalaureate and Beyond* and *Beginning Postsecondary Students*, both of which draw their participants from the National Postsecondary Student Aid Study. These studies track a specific cohort of

students for a set number of years. The Baccalaureate and Beyond study collects data for 10 years following graduation from a bachelor's degree program, and the Beginning Postsecondary Students study collects data for 6 years following initial enrollment in postsecondary education. These longitudinal data sources enable us to observe cumulative debt burdens for student borrowers, but only for a select cohort of students. The most valuable feature of these studies for this area of research is that they collect information on both earnings and education liabilities. However, the small number of cohorts available and the relatively short period of observation limit the usefulness of these data.

Two additional data sources not collected by the U.S. Department of Education have been used to answer questions about the evolution of the student loan market. First, the College Board has compiled annual reports that summarize both public and proprietary data on student borrowing from both federal and private sources. The proprietary data are collected through a survey of institutions administered by the College Board. The annual, Web-based survey collects data from nearly 4,000 accredited undergraduate colleges and universities. Although this data set succeeds in filling a void left by federal data, its usefulness is limited by the fact that the data are self-reported by institutions and thus are subject to inconsistencies in reporting and potential manipulation by institutions.

Another data source that has been used to produce evidence on the student loan market is the Federal Reserve Bank of New York's (FRBNY) Consumer Credit Panel. These data, which are based on the proprietary data used in credit bureau reports, capture longitudinal information on the debt portfolio of all individuals who have ever applied for credit. Researchers at the FRBNY have used this resource to compile data on the market for outstanding student loan debt. The primary shortcoming of these data for the purpose of understanding the state of the student loan market is that they do not capture much background information on borrowers, in particular, their level of educational attainment.

The Federal Reserve Board administers a nationally representative survey that generates data with many of the features not available in the previously discussed data sources. The Survey of Consumer Finances (SCF) is administered every three years and collects information on household finances. Unlike the Consumer Credit Panel, the SCF gen-



erates cross-sectional data. A key advantage of the SCF is that it links information on liabilities, including outstanding student loan debt, to data on earnings and demographics. Unlike the other data sources, the SCF is a household-level survey. This is advantageous for our analysis. Since financial decision making often takes place at the household level, individual analysis could easily misrepresent an individual's financial well-being. Although the SCF lacks some background variables that would be useful to allow us to more fully understand the decision to take out education loans, it does report educational attainment, which is critical for this work. Since the SCF has been administered in a relatively consistent manner since 1989, it allows for thorough analysis of changes over time for the full U.S. population. However, one limitation of the SCF is that, owing to its sampling procedures, it does not capture the liabilities of young adults living in a household headed by someone else, such as a parent.

We use the SCF from 1989 to 2010 to track changes in student loan debt over time. We measure student loan debt as the total outstanding balance, measured in 2010 dollars, of all education debt held by households, calculated on a per-person basis (that is, we divided household debt by two for households with two adults). We apply survey weights throughout the analysis so that the results are representative of the U.S. population of households.<sup>1</sup>

## RESULTS

### Trends in Debt over Time

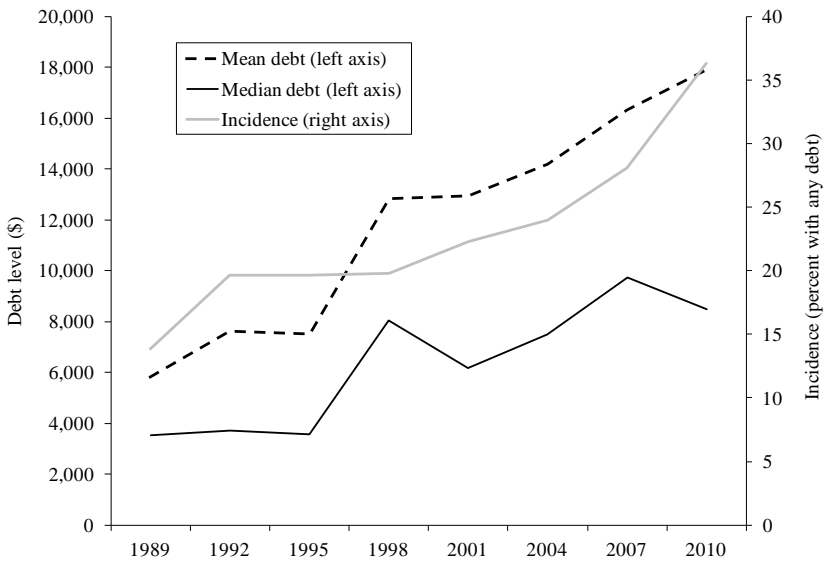
The SCF data show a dramatic increase in education debt among households with an average age between 20 and 40. Table 5.1, with key indicators depicted in Figure 5.2, shows that the share of young U.S. households with education debt more than doubled in 2010, from 14 percent in 1989 to 36 percent. Not only were more individuals taking out education loans, but they were taking out larger loans—not necessarily what you would expect as people cross the margin from being nonborrowers to borrowers. Among households with positive debt, the mean per-person debt more than tripled, from \$5,810 to \$17,916. Median debt

**Table 5.1 Incidence and Amount of Debt over Time, Age 20–40**

Year	Incidence (%)	Mean debt (\$)	Those with debt		Cell size
			Mean (\$)	Median (\$)	
1989	14	806	5,810	3,517	971
1992	20	1,498	7,623	3,730	1,323
1995	20	1,475	7,521	3,577	1,429
1998	20	2,539	12,826	8,027	1,362
2001	22	2,881	12,939	6,156	1,307
2004	24	3,402	14,204	7,503	1,246
2007	28	4,583	16,322	9,728	1,144
2010	36	6,502	17,916	8,500	1,865

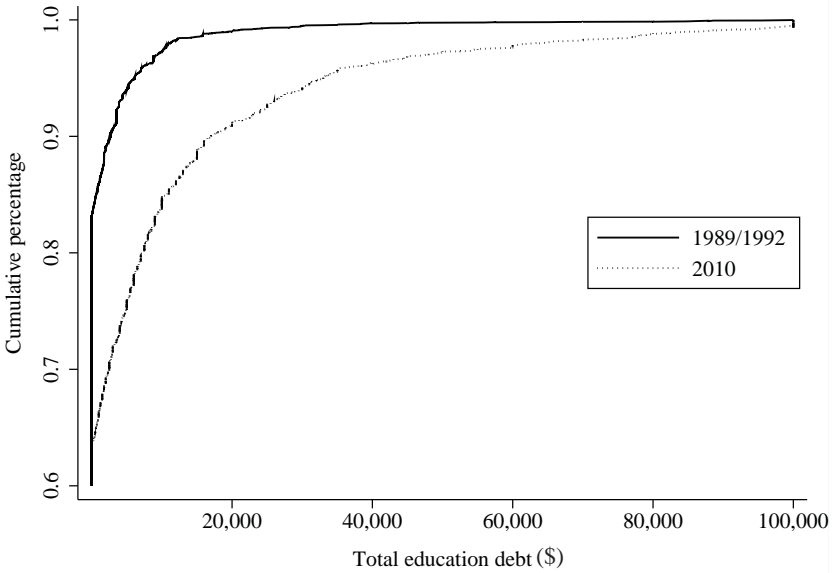
SOURCE: Authors' calculations using data from the SCF.

**Figure 5.2 Trends in Debt over Time, Households with Average Age 20–40, 1989–2010**



SOURCE: Authors' calculations using data from the SCF.

**Figure 5.3 Cumulative Distribution of Education Debt, Households with Average Age 20–40, 1989/1992 and 2010**

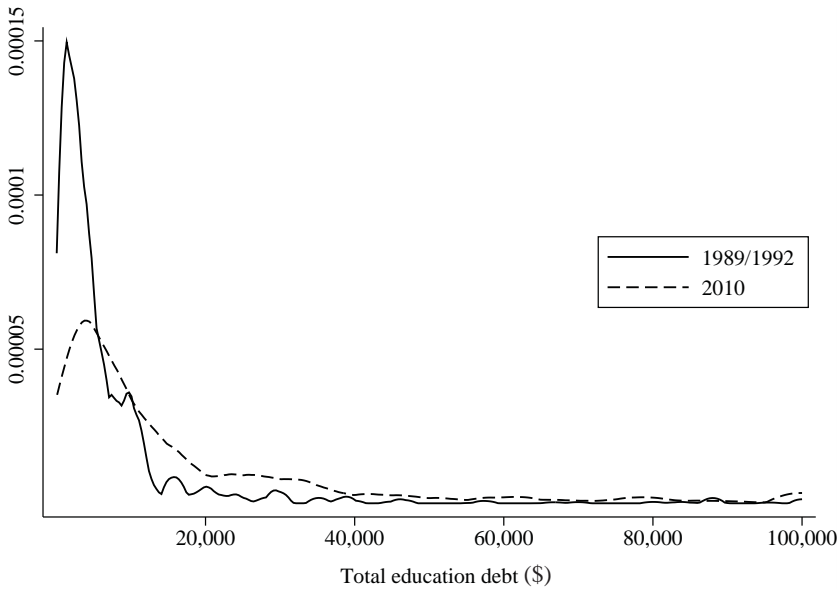


SOURCE: Authors' calculations using data from the SCF.

grew somewhat less rapidly, from \$3,517 to \$8,500. Among all households, including those with no debt, mean debt increased eightfold, from about \$800 to about \$6,500.

The change in the distribution of debt between 1989/1992 (combined to increase precision) and 2010 is depicted in Figure 5.3, which shows the cumulative share of households with debt at or below a given level (density plots are shown in Figure 5.4). In the earlier period, not only was the incidence of debt low, but most borrowers had very small loan balances. Only a trivial number of households had more than \$20,000 in debt (per person) in 1989/1992, whereas in 2010, about 10 percent of households—or more than a quarter of those with debt—had balances exceeding \$20,000. The incidence of very large debt balances is greater now than it was two decades ago, but it is still quite rare. In 2010, 3 percent of all households, or about 8 percent of households with debt, had balances in excess of \$50,000.

**Figure 5.4 Distribution of Education Debt, 1989/1992 and 2010**

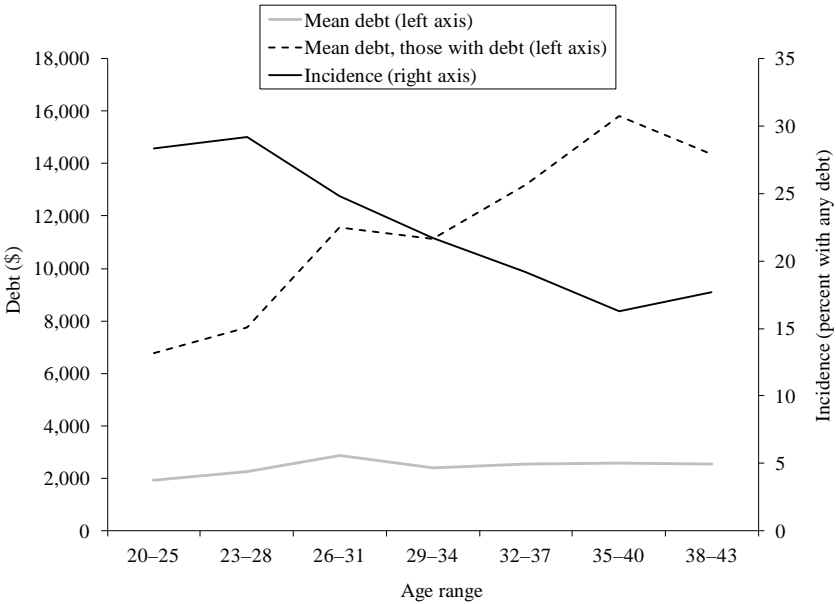


SOURCE: Authors’ calculations using data from the SCF.

The focus on the age range 20–40 allows us to examine households that are likely to be within the repayment period of student loans while also capturing individuals who potentially take on graduate as well as undergraduate debt.<sup>2</sup> Because we focus on the remaining total balance of education debt, the trends over time we observe will reflect changes in both borrowing and repayment behavior.<sup>3</sup> In order to examine repayment over time, we would ideally use a panel data set that tracks a cohort of individuals over a long period of time. As a rough approximation using the SCF data, we track a group of age cohorts over time. Specifically, we examine the education loan balances of the group that was aged 20–25 in 1989 or 1992 at three-year intervals through 2007 and 2010, when those cohorts were aged 38–43 (we average over pairs of survey years in order to increase the precision of the results).

The results of this descriptive analysis are shown in Figure 5.5. The share of this group with any education debt declines over time from 28 percent at ages 20–25 to 18 percent at ages 38–43. (The slight

**Figure 5.5 Tracking Cohort Debt over Time, Age 20–25 in 1989/1992 through Age 38–43 in 2007/2010**



SOURCE: Authors’ calculations using data from the SCF.

uptick between ages 35–40 and 38–43 could reflect a small number of loans taken for children in the household.) Among the remaining borrowers, mean debt increases dramatically, from less than \$7,000 to more than \$14,000. The combination of these two trends results in a mean debt level (including those without any debt) that increases from about \$2,000 to about \$2,500 over the roughly 20-year period that we observe, an increase of about 25 percent. We interpret these data as suggesting that many individuals are paying off their education loan balances during this time period, but some individuals are still taking on more debt (for graduate school or attending undergraduate programs at non-traditional ages) as they age, pushing up the balance of those with any debt.

## Explaining Changes in Education Debt

The large increases in education debt levels over the last two decades documented in the SCF data and other data sources are often attributed to the increases in tuition charged by colleges and universities. The tuition trends shown in Figure 5.1 certainly support that theory. But there is also evidence that college students are relying more on debt to finance college costs and paying less out-of-pocket (Greenstone and Looney 2013), suggesting that student behavior is changing in ways that favor loans over other ways of paying for college. Furthermore, there have been shifts in the educational attainment level and demographic characteristics of the U.S. college-age population that could impact observed student borrowing.

We begin by examining the extent to which changes in education debt levels can be explained by changing population characteristics. We primarily focus on educational attainment, given the fact that increased debt due to rising educational attainment may reflect rational human capital investments given the large and growing economic returns to education. Table 5.2 shows that educational attainment of households aged 20–40 rose between 1989 and 2010. The share of households with no college experience fell from 41 to 31 percent, the share with at least one person with a bachelor’s degree increased from 20 to 24 percent,

**Table 5.2 Summary Statistics, Household Level, Average Age 20–40 (%)**

Year	Race/ethnicity of household head					Maximum education of household			
	White	Black	Hispanic	Other	Couple	High school or less	Some college	BA	Graduate
1989	72	11	11	6	62	41	29	20	9
1992	71	14	10	5	61	37	29	25	9
1995	73	14	9	4	59	36	31	23	10
1998	71	14	11	4	62	36	32	21	11
2001	68	16	12	4	60	38	28	23	11
2004	67	15	14	4	58	34	31	23	12
2007	63	16	15	6	62	33	33	22	12
2010	62	15	17	6	58	31	32	24	13

SOURCE: Authors’ calculations using data from the SCF.

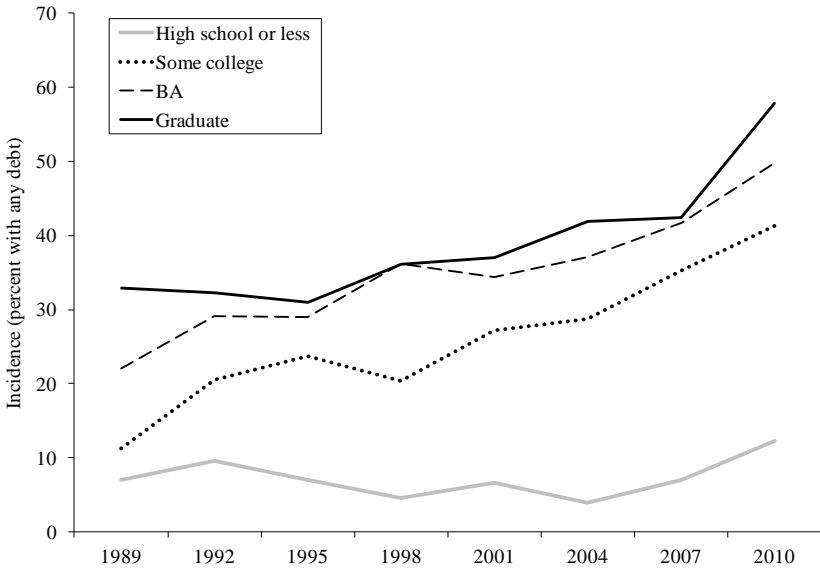
and the share with at least one person with a graduate degree increased from 9 to 13 percent.<sup>4</sup>

It is not surprising that education debt levels vary markedly by educational attainment, but debt trends also vary noticeably along this dimension, as shown in Figures 5.6 and 5.7. Among households with some college but no bachelor's degree, the incidence of debt increased from 11 to 41 percent. Households where at least one member holds a bachelor's degree saw an increase from 22 to 50 percent, and households with at least one graduate degree went from 33 to 58 percent. Among those with debt, the average per-person debt load increased 135 and 162 percent among households with some college and a bachelor's degree, respectively. Households with a graduate degree saw an increase of 311 percent, from just under \$10,000 to more than \$40,000.

Given the rising levels of educational attainment over the 21-year period from 1989 to 1992 and the concentration of debt increases among the more educated, to what extent do the changes in attainment explain the changes in debt? We address this question by calculating what the average debt in 2010 would have been had educational attainment remained at its 1989 level. We do this by calculating a weighted average of mean debt (including those without debt, in order to reflect changes in incidence) in 2010 by educational attainment, using the percentage of borrowers in the educational attainment category in 1989 as the weights. From 1989 to 2010, average debt increased from \$806 to \$6,502, a change of \$5,696. Had attainment (measured as the maximum value in two-person households) remained the same, average debt in 2010 would have been \$5,343, a change of \$4,538. In other words, the change in attainment explains about 20 percent of the observed change.

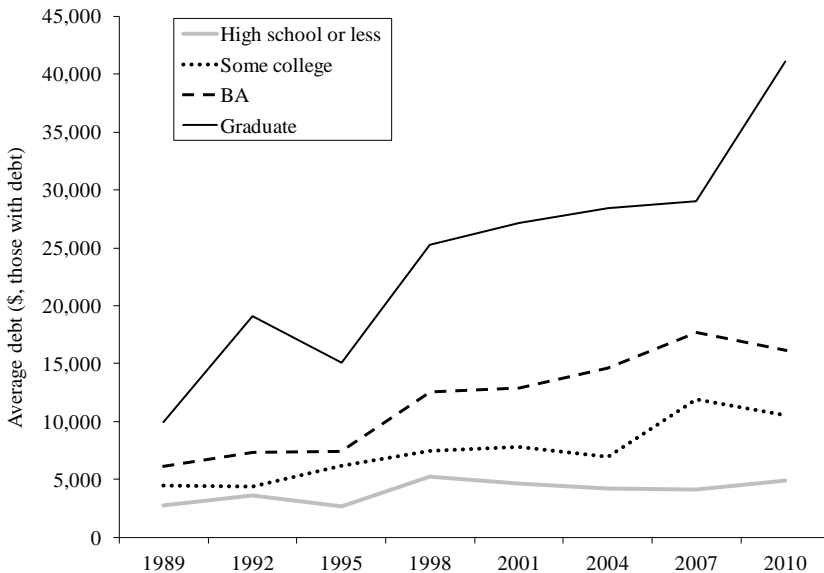
We implement this approach for all years of data and report the results in Figure 5.8. As attainment increases over time, the gap between actual debt and the simulated debt with constant attainment grows. These calculations only take into account educational attainment and do so in a simple way by taking the maximum for households. We next implement a multivariate decomposition that allows us to more accurately capture changes in educational attainment of the household and also adjust for race/ethnicity. Table 5.2 shows that, between 1989 and 2010, the white share of the population fell and the Hispanic share rose. To the extent that race and debt are correlated, these changes could also have contributed to (or mitigated) rising debt levels.

**Figure 5.6 Incidence of Debt by Educational Attainment, 1989–2010**



SOURCE: Authors' calculations using data from the SCF.

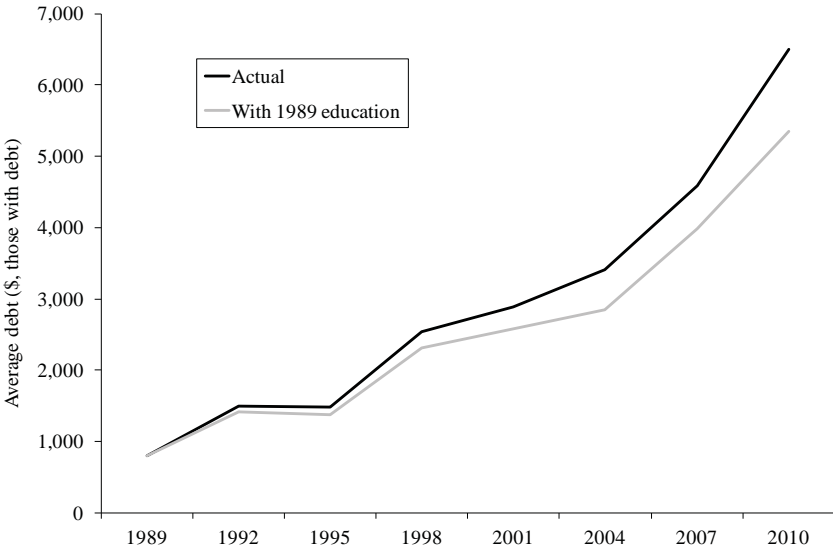
**Figure 5.7 Average Debt by Educational Attainment, among Those with Debt, 1989–2010**



SOURCE: Authors' calculations using data from the SCF.



**Figure 5.8 Reweighted (simple method, education only)**



SOURCE: Authors’ calculations using data from the SCF and the *Digest of Education Statistics*.

To more carefully account for changes in educational attainment and race, we implement a multivariate decomposition approach along the lines of the one used by Bound, Lovenheim, and Turner (2012). As above, we reweight the 1989 SCF to create a counterfactual distribution of debt in 2010 that captures what student debt would look like if population characteristics had remained constant between 1989 and 2010. To do this, we stack the 1989 and 2010 data and run the following logit regression:

$$I(\text{Year} = 1989) = \beta + \delta Ed_{hh} \times Ed_{sp} + \gamma Race_{hh} + \epsilon,$$

where  $I(\text{Year} = 1989)$  is a dummy variable identifying whether the observation is from the year 1989 (as opposed to 2010),  $\beta$  is a constant,  $Ed_{hh} \times Ed_{sp}$  is a vector of dummy variables identifying the full set of interactions between the educational attainment of the household head and the spouse (with one of the spouse education categories identifying

households where there is no spouse),  $Race_{hh}$  is a vector of dummies identifying the race of the household head, and  $\epsilon$  is the error term. We then obtain predicted values  $\hat{I}$  from the logit regression and calculate a set of weights  $\frac{\hat{I}}{(1-\hat{I})}$  (which we combine with the SCF survey weights).<sup>5</sup> We first confirm that the reweighting procedure is working correctly by reporting summary statistics for 1989, 2010, and 2010 with the reweighting. Table 5.3 shows that the reweighting produces summary statistics for 2010 that are nearly identical to the actual statistics for 1989, in all cases to within one percentage point.

We then apply these weights to the 2010 data to calculate an estimate of what debt would have been in 2010 had educational attainment and race remained at their 1989 values. We find that mean per-person debt (among all households) would have been \$4,932 (instead of \$6,502) in 2010 had educational attainment and race remained at their 1989 values. In other words, the variables included in the decomposition exercise explain 28 percent of the observed change.<sup>6</sup>

We next explore how much changes in education debt can be explained by rising college tuition. Ideally, we would implement this as follows: 1) measure how much each individual paid for his or her education; 2) measure how much they would have paid 21 years prior (i.e., the number of years between 1989 and 2010); 3) calculate the causal effect of price on debt; and 4) calculate how much debt they would have taken out had they faced the prices from 21 years prior by multiplying

**Table 5.3 Summary Statistics, Household Level, Average Age 20–40 (%)**

	1989	2010	2010 reweighted
Maximum education			
High school or less	41	31	42
Some college	29	32	29
BA	20	24	20
Graduate	9	13	9
Race/ethnicity of household head			
White	72	62	72
Black	11	15	11
Hispanic	11	17	11
Other	6	6	6

SOURCE: Authors' calculations using data from the SCF.

the effect of price on debt by the difference between actual tuition paid and the counterfactual tuition (from 21 years prior).

This is not possible for two main reasons. First, the SCF does not contain information on how much respondents paid for their education or even the institutions they attended—only the highest degree obtained. Second, it is far from straightforward to estimate the causal effect of price on debt, and we are unaware of any research on the topic. As a rough substitute, we instead deflate the 2010 distribution of debt to a simulated 1989 level using data on published tuition and fees by year, assuming that the percentage increase in debt is the same as the percentage increase in published tuition.

Specifically, for each individual we calculate counterfactual debt in 2010 as the actual debt multiplied by the ratio of counterfactual tuition (average tuition 21 years prior to when the respondent was age 20) to actual tuition (average tuition when the respondent was age 20).<sup>7</sup> For example, a household with an average age of 34 in 2010 is assigned an actual tuition from 1996 (i.e., at age 20) and a counterfactual tuition from 1975 (i.e., 21 years prior to age 20). Tuition is calculated as a weighted average of published tuition and fees at two-year, public four-year, and private four-year institutions across the country, using enrollment shares as weights (National Center for Education Statistics, various years). We use published tuition and fees, even though net price (tuition and fees less grant and scholarships) would be a better measure because the latter is not available for a sufficiently long period of time.<sup>8</sup> As a result, we likely overstate the contribution of rising prices to growth in debt.

The results of this analysis are reported in Table 5.4. The tuition adjustment explains 58 percent of the 1989–2010 increase in mean debt. Combining the tuition adjustment with the reweighting procedure, which adjusts for changes in educational attainment and race, increases to 72 percent the share of the change explained. Our use of published rather than net price implies that this is an overestimate, but it still leaves 28 percent of the change unexplained. This remaining share of the change could be the result of some combination of changes in characteristics not measured in the SCF data and changes in borrowing behavior.

**Table 5.4 Decomposition of Changes in Mean Debt, 1989–2010**

	Mean debt (\$)	Change from 1989 (\$)	Share of change explained (%)
1989 debt	806		
2010 debt			
No adjustment	6,502	5,696	0
Applying 1989 characteristics	4,932	4,126	28
Applying 1989 tuition	3,194	2,388	58
Applying 1989 characteristics and tuition	2,402	1,596	72

SOURCE: Authors' calculations using data from the SCF and the *Digest of Education Statistics*.

## CONCLUSION

The media has provided many anecdotes about recent graduates with large amounts of student loan debt who are in financial distress, often living in their parents' basements. Data on the distribution of loan debt, both from the SCF and other sources, indicate that extremely large debt burdens remain exceptional cases. Our analysis of the SCF data also provides some initial estimates of the role that different factors have played in driving up student debt over the last two decades. Rising educational attainment explains some of the trend, and debt data disaggregated by highest degree earned suggest that graduate education has played a particularly important role, especially for the cases of large debt balances.

Tuition is also a likely culprit, although the limitations of historical data on tuition make it difficult to tell exactly how much. Our analysis suggests that inflation in published prices may account for upward of 60 percent of the increase in debt, leaving a significant share of the rise in debt that is unexplained. This fact, coupled with evidence that students are substituting away from paying for college out-of-pocket toward financing (Greenstone and Looney 2013), suggests that behavioral shifts may account for some of the increase in education debt.

These analyses do not shed light on whether the increasing loan burdens taken on to finance education are leading to financial hardship

for borrowers. To the extent that increases in attainment are the culprit, at least some of the increase in debt has financed sound investments. But there are surely cases of investments in education that did not pay off or did not even result in a degree. Expanding this analysis to examine debt-to-income ratios and other measures of financial distress is a ripe area for future research.

## Notes

1. The use of survey weights in the SCF is particularly important because the sample design oversamples high-income households to properly measure the full distribution of wealth and assets in the United States. This high-income sample makes up approximately 25 percent of households in the SCF.
2. In addition, the SCF does not record the individual associated with loan origination. Therefore, with individuals no older than 40, we are more confident that the loans on their balance sheets are associated with an adult rather than a child in the household.
3. The SCF collects data on the size of loan at origination, but this refers to the date of most recent loan terms, which includes consolidation. Thus, we are not able to measure the size of loans taken out while enrolled for all households.
4. We find similar attainment trends after converting the household-level SCF data into individual-level data (assigning one-half the survey weight to each individual in a two-person household). These summary statistics are available from the authors upon request.
5. Specifically, we use weights that are the product of the weights generated by the logit regression and the original survey weights.
6. These types of reweighting exercises assume that the relative borrowing behavior of demographic groups remains constant over time. This is obviously a strong assumption, and understanding changes in borrowing behavior is left for future research.
7. We calculate the years to use for tuition using the average age of the household rounded to the nearest year.
8. Our tuition data series begins in 1971. We proxy for 1969 and 1970 tuition levels using the 1971 value.

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