

Hey U, What's going on?

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Summary

College tuition and fees have risen rapidly over the last thirty years. Based on the analysis in this report, they are mostly driven by increased leverage in the economy. The other factors that affect tuition and fees are taxpayer support for colleges and students, general inflation, and the earnings gap between college and high-school educated workers. Looking forward, many of these factors could lower the growth rate of tuition and fees. For example, how many tuition bills were paid with home-equity loans during the last five years, and how many will be paid during the next five years?

In today's economy one can easily criticize businesses that depend on credit markets, and higher education is one of those: Some colleges have short term liquidity problems and some of them have overinvested during the credit boom (but everything is relative: higher education is in a much better position than most other industries). Further, many highly leveraged households need big loans in order to pay tuition and fees, and in the current economic crisis taking (and giving) the loans might feel just too overwhelming.

In order to minimize possible future problems for colleges and their students, we make two suggestions related to information and funding options given to college applicants. These suggestions could increase transparency and improve the incentives of colleges and students.

College inflation

Everyone now seems to agree that US house prices got out of hand and that the US health care costs are at an unsustainable level. Well, everything is relative: Between 1987 and 2009 US college tuition and fees increased by a staggering 326% (6.8% annually), while medical costs went up by "only" 186% (4.9% annually) and house prices by 135% (4.0% annually). Note that due to the housing boom, during 1987 – 2007 house prices went up by 252% (6.5% annually), almost as much as college tuition and fees in that period. These trends are illustrated in Figure 1, where all the three components are drawn so that they start at 100.

Even though Figure 1 might suggest that the US colleges are a bubble, there could be alternative explanations (however, if they are a bubble then, in order to minimize the pain for colleges and students, it might be best to burst the bubble before it gets too big). For example, college could have been ridiculously cheap in 1987 and now it's only less so. However, college inflation is about 3.6 times higher than the general inflation (during 1987 - 2009 CPI increased by 90%) and about 3 times higher than the growth rate of US median family income (during 1987-2006 the family income

increased by 89%, in that period the college costs went up by 264%). Clearly, the college inflation is unsustainable in the sense that if this trend continues then soon most US families cannot send their kids to college. As an example, now the costliest colleges charge well over fifty thousand dollars a year.

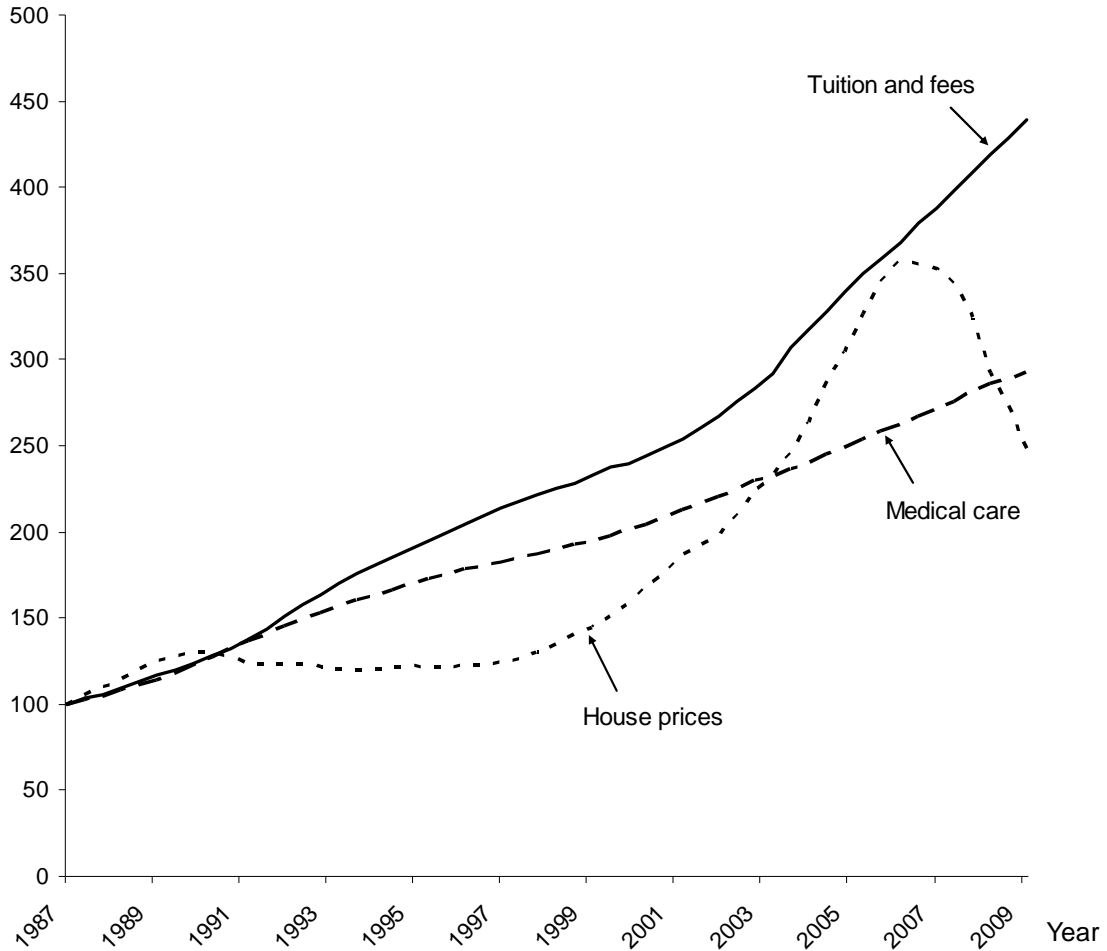


Figure 1. College tuition and fees ([Bureau of Labor Statistics, Consumer Price Index, All Urban Consumers](#)), US house prices ([S&P/Case-Shiller Home Price Composite-10 Index](#)), and medical care costs ([Bureau of Labor Statistics, Consumer Price Index, All Urban Consumers](#)). We start at 1987 since this is the first year in the house price index.

There are several factors that could explain the increases in college tuition and fees. For instance, currently US student loan prices are more or less set by the government which is nearly the only source for the loans. Thus, student loan prices are subsidized and in recent years when the loans were market based their prices fell because of the credit boom. The low student loan prices raise education demand and, thus, may allow colleges and universities to charge more, i.e., the low loan prices could, at least partly, explain the high college tuitions. Consistent with this, [Singell and Stone](#) find

that government grants increase private universities' tuitions and public universities' out-of-state tuitions.

We further analyze different factors that may affect tuition and fees. However, we consider mainly the whole college and university system, not e.g. private and public universities separately and not competition between colleges. Further, we ignore financial aid given by colleges. According to [Ronald G. Ehrenberg](#), private colleges return about 33% of their tuition revenues in the form of grant aid and public colleges about 15% (about 80% attends public institutions). First we study college revenues.

College revenues

According to [National Center for Education Statistics](#) (all degree-granting institutions), between 1978 and 2007 college revenues grew nominally 888% (8.2% annually). During the same period US GDP rose nominally 502% (6.4% annually). Thus, in revenue sense higher education has been a growth industry. This is illustrated in Figure 2, where the data is drawn so that the revenue and the GDP start at 100.

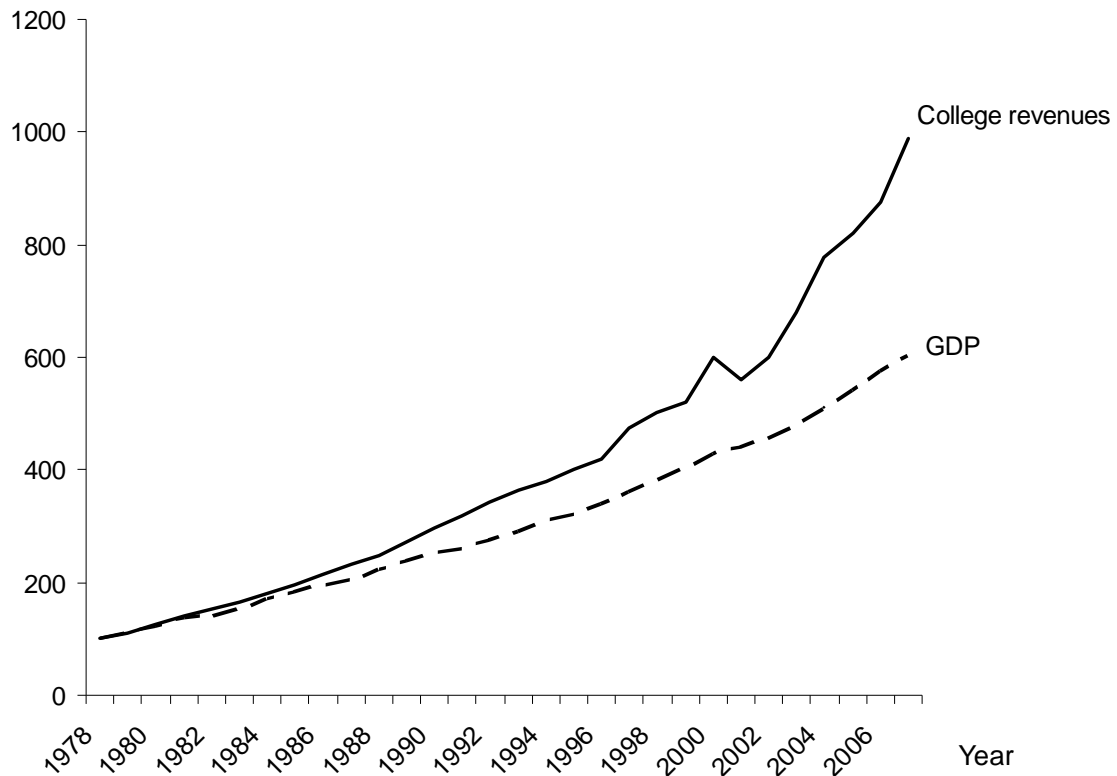


Figure 2. College revenues ([National Center for Education Statistics](#), all degree-granting institutions) and US GDP ([Bureau of Economic Analysis](#)).

In 2007 tuition and fees and taxpayer support (federal government, state, and local government) generated about 54% of college revenues. The other revenue sources are

endowment earnings, private gifts and grants, sales and services of educational activities, auxiliary enterprises, and hospitals. There are also some other income that include, e.g., earnings on some short-term investments and uncapitalized disbursements. Table 1 illustrates the revenue components as percentages of the total revenues. The total taxpayer support (federal government, state, and local government) has fallen from 50% in 1978 to 32% in 2007. On the other hand, tuition and fees have been steadily about 22% and endowment earnings are up from 2% in 1978 to 15% in 2007. Further, the other income is up significantly in 2007 but it has a high volatility (in 2006 it was 8% and in 2007 18%). Between 1978 and 2007 tuition and fees, taxpayer support, endowment earnings, private gifts and grants have totaled 73%-78% of the total revenues.

Table 1. Revenue components as percentages of college revenues between 1978 and 2007 ([National Center for Education Statistics](#), degree-granting institutions).

	1978	1988	1998	2007
Tuition and fees	21%	24%	23%	22%
Federal government	15%	13%	11%	12%
State governments	31%	29%	21%	16%
Local governments	4%	3%	2%	4%
Endowment earnings	2%	2%	10%	15%
Private gifts and grants	5%	5%	8%	6%
Sales and services of educational activities	2%	2%	3%	1%
Auxiliary enterprises	11%	10%	9%	3%
Hospitals	7%	9%	8%	3%
Other current income	2%	3%	4%	18%

Credit boom that started in the beginning of 80's has had a significant impact on many industries, including higher education. Like many businesses during the boom also several colleges overinvested. According to College Planning & Management, between 2002 and 2008 US colleges invested \$93 billion in new buildings and renovations, that's almost double what they did during 1996-2002. Some universities hedged their loans with interest rate swaps and, as rates have fallen, they need to fund the losses from the swaps. Further, the universities' endowment funds include private equity investments that have commitments for more money. This has raised another source of short term liquidity problems. Thus, looking forward, the cash management of these institutions most likely improves. There is also a longer term effect on the revenues since the endowment funds have made significant losses after 2007. For instance, according to NACUBO-Commonfund, between 6/30/08 – 11/30/08 (in five months) the US university endowments lost about 23% of their value (from \$412.8 billion to \$318.3 billion). Due to the smaller fund sizes, most likely the endowment earnings will be lower in the next few years.

Explanatory factors

Let's discuss different factors that could have contributed to the increased college tuition and fees. We select the following factor candidates:

1. *Consumer price index (CPI)*: Part of college inflation is due to general inflation. For the general inflation we use data from [Bureau of Labor Statistics](#) (Consumer Price Index, All Urban Consumers).
2. *Federal government, state, and local government support as a percentage of GDP*: The more support there is from taxpayers to universities and students, the less the universities have to charge the students. However, it could go also the other way round: the more support to students, the more the universities are able to charge them (so, the effect might depend on who gets the support, an issue not analyzed in this report). We calculate the support relative to the GDP because tax income depends on GDP. For the federal government, state, and local government support we use [National Center for Education Statistics](#) (all degree-granting institutions), and the GDP data is from the [Bureau of Economic Analysis](#).
3. *Federal government, state, and local government support per student enrolled*: We measure the support also per student enrolled because the support is received mainly to educate students. Federal government, state, and local government support data is introduced in factor 2 above. [US Census Bureau data](#) (Table A-7, the sum of all undergraduates, two-year college students, and graduate students) is used for the students enrolled.
4. *Household debt as a percentage of GDP*: Since many times college is a significant investment for students and their families, household debt could affect education demand. If households have a lot of debt, they may have problems financing college and, thus, demand might fall. On the other, as with house prices, the debt could be an indication that households have taken too much debt and this way pushed prices, including tuition and fees, too high. The household debt data is from the [FED](#) (Table "D.3 Debt Outstanding by Sector"). The GDP data source is introduced in factor 2 above.
5. *Interest rates*: The lower the rates, the easier for students and their families to finance college costs. There are many different student loans, see e.g. information from [Sallie Mae](#). We use one year maturity US Treasury yield as a proxy for the interest rates and this data is from the [FED](#).
6. *Financial sector debt as a percentage of GDP*: US financial sector debt increased from 20% of the GDP to 115% of the GDP during the credit boom 1980 - 2007. We analyze how much this affected the tuition and fees, and use the data from the same sources as in factor 4 above.
7. *The difference between the mean earnings of workers with college degrees and the mean earnings of non-college degree workers*: This difference acts as a proxy for the monetary benefit from college degrees. If this difference is high then presumably there is more value in the education and, therefore, the colleges can charge a higher tuition. The data is from [US Census Bureau](#) (Table A-3).

Figure 3 below illustrates the factors.

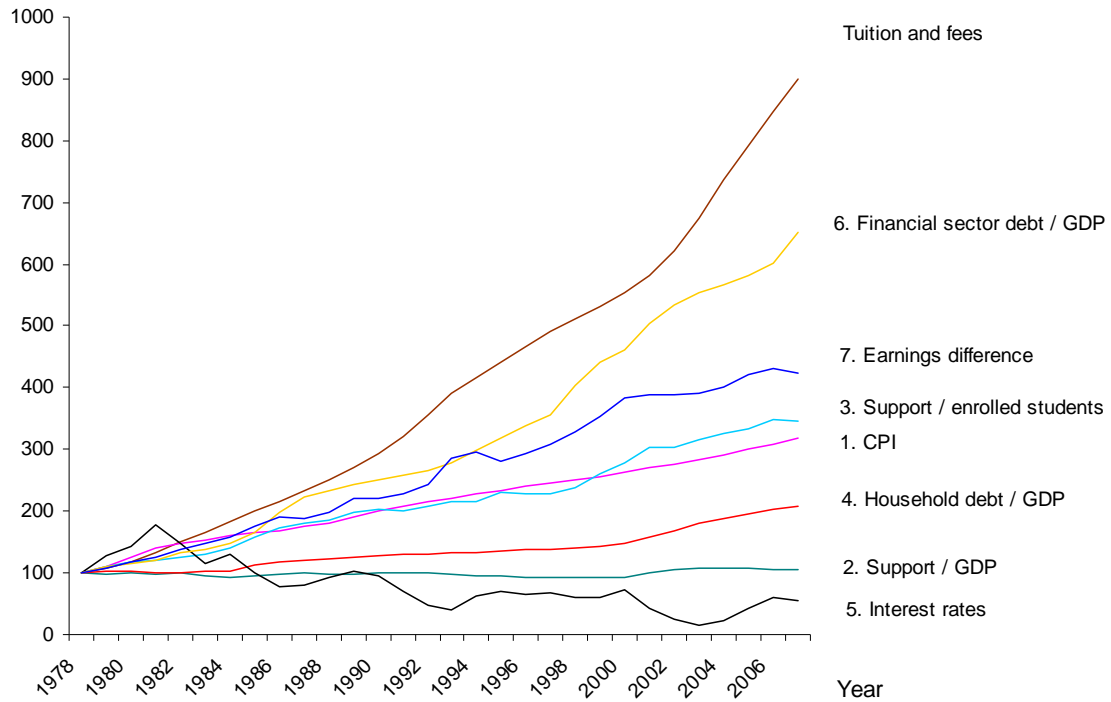


Figure 3. College tuition and fees and the explanatory factors 1 – 7 (all nominal). We use 1978-2007 because these are the overlapping years in the data sets.

Let's make few comments related to Figure 3:

- (i) *College tuition and fees*: Between 1978 and 2007 college tuition and fees went up by 799% (7.9% annually), more than any of the explanatory factors. Note, however, that between 1978 and 1987 the tuition and fees increased on average 9.8% annually, i.e. faster than during 1987-2009 (on average 6.8% annually). The corresponding real annual growth rates (i.e., growth above inflation) are 3.3% (1978-1987) and 3.8% (1987-2007). So, in real terms tuition and fees have grown faster after 1987. However, clearly college inflation is not a new invention. It has been around for many years but it just could be that now it has reached a level that too many students and their families cannot pay the college costs anymore, especially since the economy is in a recession and the credit markets don't function in a way they used to do few years ago. The above two time periods were selected randomly due to the explanatory factors' data sets.
- (ii) *Federal government, state and local government support*: The support relative to the GDP has decreased between 1978 and 2007 about 5% (0.2% annually). On the other hand, the support per student enrolled has increased by 246% (4.4% annually). This is, at least partly, due to the fact that private universities' enrollment has increased faster than public universities' enrollment (in 1978 private universities' enrollment was 7.5% of the total enrollment and in 2007 it was 18%). Anyhow, GDP has risen faster (nominally on average 6.4% per year) than the overall student enrollment (2.1% annually) in this period, i.e., relative to the size of the economy US universities now educate less students than it used to

do (this can be explained, at least partly, by productivity increase). However, relative to the whole population in 1978 about 3.8% studied at colleges and universities, and in 2007 it was 5.1%.

In the current economic recession many states have cut their funding. For instance, colleges in South Carolina are getting 18% less in state aid this year, colleges in Florida 9% less, and in Michigan 3%. On the other hand, government support is increasing (grants, tax credits, and expanded federal loans). The current administration plans to make the government the sole provider of federal student loans, ending the participation of private lenders in the program. This plan would eliminate subsidies to private lenders, and the government would use the savings estimated at \$47.5 billion over the next decade to help bolster, e.g., the Pell grant program for low-income students. The maximum amount of Pell grant is \$5,350 for the 2009-2010 academic year (it was increased by \$619). The tax credit is now \$2,500 per student for all four years and it is now available for all families who make less than \$180,000 a year (the income limit has almost doubled, the credit is up by \$700, and it used to cover only two years).

(iii) *The difference between the mean earnings of workers with college degrees and the mean earnings of non-college degree workers:* Between 1978 and 2007 the earnings difference has risen about 324% (5.1% annually). This suggests that the college degree value has gone up significantly and this might explain, at least partly, the increased tuition and fees. However, the ratio of college tuition and fees to the earnings difference has gone up by 112% (2.6% annually), i.e., the tuition and fees have risen faster than the earnings difference. So, most likely the earnings difference cannot be the only cause for the rise in college tuition and fees.

[Claudia Goldin and Lawrence F. Katz](#) use a supply-demand-institutions framework to analyze the factors that drove wages during 1890 - 2005. They find that the slowdown in the growth of 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. Thus, as discussed above, the student enrollment has risen slower than the economy.

According to the College Board, people between the ages of 25 and 34 with college degrees make on average \$50,900 a year, about \$20,000 more than those without. Assuming naively that there are no taxes, interest rates are zero, the earnings gap is constant, and that we can ignore the lost earnings during college then it takes about 10 years to pay back a \$200,000 college investment. Related to this, Figure 4 illustrates unemployment rates and earnings in 2008.

Note that the earnings difference might be a biased measure since currently almost all the best students go to college after high school and the worst don't. Therefore, the difference could be explained by other factors as well, e.g., by some national tests, like SAT and ACT. Thus, based on our earnings difference we don't really know, for instance, how much college raises the best students' earnings, because they might do quite well even without the degree.

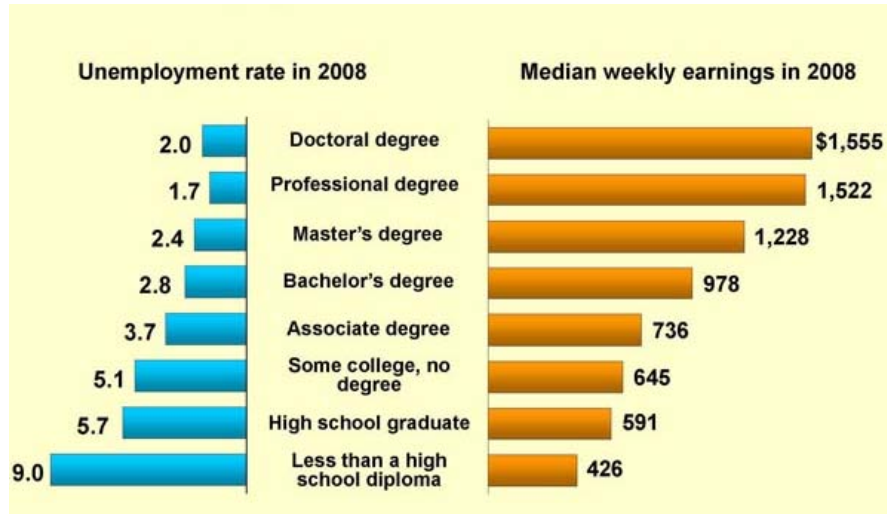


Figure 4. Unemployment rates and median weekly earnings for persons age 25 and over ([Bureau of Labor Statistics](#), Current Population Survey). Earnings are for full-time wage and salary workers.

(iv) *Household debt and financial sector debt*: Between 1978 and 2007 the household debt relative to GDP increased by 107% (2.5% annually) and the financial sector debt relative to GDP by 552% (6.7% annually). Both of these increases are mainly due to the housing and credit boom. During this boom the US student loans also got cheaper and most likely this has affected directly and/or indirectly college tuition and fees. Interestingly enough, the tuition and fees (nominal) have increased more than the financial sector debt relative to GDP during the biggest credit boom in the US history.

(v) *Interest rates*: Interest rates have about halved during 1978 – 2007. In 1978 the one-year US Treasury yield was 8.34% and in 2007 it was 4.53%. This is mainly due to inflation and federal fund rate changes during that period. In 1978 the general inflation was 7.62% and in 2007% it was 2.85%. The corresponding federal fund rates were 10.03% (December 1978) and 4.24% (December 2007).

Empirical analysis

In this section we analyze how the selected explanatory factors affect tuition and fees by using simple regression models (we ignore e.g. possible problem of spurious regression). We use the data in Figure 3, i.e., all the time series starts at 100.

Let's use the following notation:

- $Y(t)$ = tuition and fees in year t
- $X_1(t)$ = CPI in year t (1 above)
- $X_2(t)$ = support / GDP in year t (2 above)
- $X_3(t)$ = support / enrolled students in year t (3 above)
- $X_4(t)$ = household debt / GDP in year t (4 above)
- $X_5(t)$ = interest rate in year t (5 above)

$X_6(t)$ = financial sector debt / GDP in year t (6 above)

$X_7(t)$ = earnings difference in year t (7 above)

where t is the time index (in years).

First we estimate a regression model that uses all the explanatory factors. This gives:

$$Y(t) = \underset{(-3.21)}{-325.63} + \underset{(4.81)}{1.58} X_1(t) - \underset{(-1.75)}{1.79} X_2(t) - \underset{(-6.71)}{2.64} X_3(t) + \underset{(11.04)}{5.60} X_4(t) + \underset{(0.52)}{0.06} X_5(t) \\ + \underset{(3.50)}{0.49} X_6(t) + \underset{(3.13)}{0.80} X_7(t) + e(t) \quad (1)$$

where the t-statistics of the parameters are in the parentheses and e is a zero mean error term. The R^2 of the regression is 99.8% in the sample data.

In (1) the parameters of X_2 and X_5 are statistically insignificant. We drop the most insignificant parameter and after that estimate the new model. We continue this as long as we have a model where all the parameters are statistically significant. Doing this finally gives:

$$Y(t) = \underset{(-12.68)}{-466.70} + \underset{(6.07)}{1.86} X_1(t) - \underset{(-8.40)}{3.01} X_3(t) + \underset{(10.87)}{5.26} X_4(t) + \underset{(3.78)}{0.52} X_6(t) + \underset{(3.73)}{0.90} X_7(t) + e(t) \quad (2)$$

and its sample R^2 is 99.7%. The R^2 fell since the regression model in (2) has fewer parameters than the model in (1) has.

The regression model in (2) implies that there are five significant factors that drive tuition and fees:

- general inflation
- federal government, state, and local government support per enrolled student
- household debt as a percentage of GDP
- financial sector debt as a percentage of GDP
- difference between the mean earnings

Thus, we can divide the right-hand-side of (2) into the following groups: general inflation, effects from taxpayer support, effects from leverage, and the earnings difference. According to (2), the strongest effect is from the leverage and the second strongest from the taxpayer support. Hence, the parameters for the household debt relative to the GDP and the financial sector debt relative to the GDP indicate that leverage in the economy drives tuition and fees. Since the leverage depends on credit markets, tuition and fees depend also on the markets. If households and financial institutions are able to get big loans at low prices then usually their leverage rises as we have seen during the last 25 years. This credit boom has driven many things and it seems that tuition and fees are just one example of that. This could be, e.g., through families' willingness to take new debt, low loan prices (the credit boom inflated almost all asset prices), and/or through highest undergraduate starting salaries (the credit boom inflated also profit margins and bonuses). As we have seen during the credit boom: physicists go to Wall Street, historians go to Wall Street, chemists go to Wall Street etc. Looking forward, this trend might change.

During 1978 - 2007 household debt relative to the GDP rose by 107% and financial sector debt relative to the GDP by 552%. By (2), these changes increased tuition and fees by 848%. On the other hand, when the support per enrolled student increases then tuition and fees fall, i.e., colleges change tuition and fees partly in order to compensate fluctuations in taxpayer support. Between 1978 and 2007 the support per enrolled student rose 246% and, by (2), this decreased tuition and fees by 740%. Thus, the support from taxpayers eliminated most of the effects from the leverage.

College inflation is also highly sensitive with respect to the general inflation. During 1978-2007 CPI rose by 218% and, according to (2), this pushed tuition and fees up by 406%. Finally, the earnings difference raises the value of the education and this way also tuition and fees. Between 1978 and 2007 the earnings difference increased by 324% and, by (2), this raised tuition and fees by 292%.

Looking forward we seem to have two trends:

- (i) US households and financial institutions are deleveraging, i.e., their debt levels with respect to GDP fall.
- (ii) Taxpayer support rises and, therefore, the support per enrolled student increases.

According to (2), both of these trends should decrease college inflation. As an example, let's make the following scenario over the next few years:

- CPI rises 2% annually.
- Support per enrolled student increases 6% annually.
- Household debt relative to GDP falls 3% annually.
- Financial sector debt relative to GDP falls 4% annually.
- Earnings difference rises 2% annually.

Under this scenario and the 2007 factor values, model (2) predicts that tuition and fees fall about 10% annually. We haven't seen this, at least not yet, since college inflation is still high (see e.g. [Bloomberg](#)). This could be, e.g., due to the facts that households have just started deleveraging and the US government has been aggressive in the student loan markets. However, at minimum we should expect the college inflation to approach the general inflation over the next few years.

Some suggestions

Many authors have made suggestions related to topics discussed in this report. See, e.g., [Mark C. Taylor](#), [Andrew Gillen](#), [Richard Vedder](#), [Ronald G. Ehrenberg](#), [Richard Vedder](#), [Joseph Marr Cronin and Howard E. Horton](#), [Daniel L. Bennett](#), [Don Tapscott](#), [Ronald G. Ehrenberg](#), [Ronald G. Ehrenberg](#), [Ronald G. Ehrenberg](#), [Marc Scheer](#), [Washington Post](#), [Wall Street Journal](#), [Wall Street Journal](#), and [Center for College Affordability and Productivity](#). Here are two related thoughts:

- Better application information: Since a significant amount of taxpayer money is invested in higher education, some regulation might be needed. For instance, college programs could give more information to applicants. They could give

information, e.g., on graduation rates, inflation on their tuition and fees, median SAT scores, median starting salaries, starting salary distribution with respect to SAT scores, and unemployment among their graduates over several years. The fact is that college is a big investment for students and their families, and they might want to have more data.

- New funding options: In addition to the current financial aid and loans, colleges could use significant part of their endowment funds to offer bigger student loans at a low price, same level or lower as the government loans. These could be similar to mortgages with loan amount, e.g., up to 70% of the total college costs, i.e., students would pay, at least, 30% of the costs during their studies and the rest after their graduation. Since government is currently very active in the student loan markets, this probably could be implemented jointly with the government (this would help funding the loan program). Further, probably private sector could join as well.

Colleges have good information on their students and, thus, they are well positioned to offer the loans. The interest rate of the loan could depend on several factors, including academic achievements. For instance, the better the GPA, the lower the rate. And if a student doesn't graduate then the interest rate jumps to its highest level. This would give colleges more incentive to create new courses and programs to meet the future job market demand and to adjust academic measures to match better the industry needs. For students this would give an additional motivation to graduate and study well.