6-16-2021

Higher Education: Can Debt Beat Savings?

David Stackpole
Georgetown University- Alumnus, david.stackpole@outlook.com

Follow this and additional works at: https://ir.library.louisville.edu/jsfa

Part of the Higher Education Commons, and the Higher Education Administration Commons

Higher Education: Can Debt Beat Savings?
By David Stackpole

This paper investigates the possible opportunity cost of using standard college savings plans against the advantages of using debt to pay for college. In addition, it presents a practical argument for using debt in place of college savings plans in certain instances. By doing so, investors may not only be able to mitigate the difficulty of saving, but also realize greater financial benefit in the long run.

For college-bound families, replacing a 529 college savings plan with debt and an investment account could substantially improve a student's long-term financial well-being. Similar to retirement plans like a 401k or IRA, the 529 grows contributions through a menu of investments, but it differs from these plans because the 529 is more than tax-deferred, it's tax free. The 529's tax-free growth, however, comes at a price. Because it's eventually emptied to pay for college, all future investment growth is forfeited. This isn't the case with other investment accounts, which grow decades longer. Indeed, it is this particular shortfall in the 529 that is of interest.

Limits of the 529

Mixing combinations of the 529, debt, and an investment account provides only a handful of reasonable options and we're interested in options with the best financial benefit. Two considerations are using the 529 by itself (as commonly done) and alternatively, paying for school using debt while redirecting savings from a 529 to a regular investment account. Ideally this is an account that's tax-deferred, earmarked for retirement.

Scenario Assumptions

To uncover the advantages of the latter consideration, we'll first compare using a loan and alternative investment account over using the 529. We'll then assume the family pays college with the 529 and, in a best-case scenario, the student funds a retirement account with the same amount that would have gone toward the loan had she paid for school with debt. Funding begins the first year out of college. For reading ease, we'll refer to the investment account replacing the 529 as the "alternative account" and the investment account funded out of college with equivalent loan payments as the "post college account." A dollar earned today is usually worth less than a dollar earned later in part because the rising costs of living, or *inflation* (since it eats away at today's dollar value). To account for this, we'll convert past and future dollars to the buying power of today's dollars. Let's begin by listing some main assumptions for our scenarios.

Average Cost of Public University: $80,000

In its 2019 report, *Trends in College Pricing* the College Board reports the cost of yearly attendance (COA) for in-state, public universities averaged $26,590 (0). This includes tuition, fees, housing, books, supplies, and personal expenses. The sticker price for tuition, boarding, and fees alone averaged $21,950, but doesn't account for financial aid. If we factor that in, we get what the College Board calls average "net" price, a price they report to be $15,400 per year. With the average net price of $15,400 plus $4,600 for expenses ($26,600 – $22,000), we have a yearly total of $20,000 and a four-year total of $80,000. To grow contributions to

$80,000, we assume the first contribution for the 529 (and to our alternative account) happens in year zero and the others follow without a gap. The table provides several contribution options to reach $80,000 by age 17 as a junior or senior in high school. It includes the number of contribution years, rough annual contribution amounts, and the total contributed. The table follows Vanguard's 529 portfolio with an 8.6% average rate of return, detailed below under "Returns in Alternative Account."

Table 1

Contribution Options to Cover College Cost of $80,000

Years	Yearly Contribution	Total Contribution
3	$10,800	$32,400
4	$8,300	$33,200
5	$6,900	$34,500
6	$5,900	$35,400
7	$5,200	$36,400
10	$3,900	$39,000

Average Interest Rate of Student Loan: 5.8%

Dancy and Holt, in their 2017 paper entitled, *In the Interest of Few: The Regressive Benefits of Federal Student Loan Refinancing,* state that the average student loan interest rate to be 5.8% (0). For the 2018-2019 academic year, the College Board estimated that private student loans (avg. interest rate 8.18%) constituted 12% of all borrowing and parent PLUS loans (avg. interest rate 7.08%) constituted about the same, 12% (0). That leaves 76% in federal loans at a 5.05% rate (0). The weighted average of these puts us in line with Dancy and Holt's 5.8%. We'll use this 5.8% percent and assume all interest accrues during college. We'll also put in a handicap and assume the student pays *all* interest starting at graduation regardless of the loan type.

Loan Payback Period: 10 Years

Finally, we'll suppose that the student, through disciplined repayment, pays off the loan ten years after graduation. That period corresponds to our ten-year private loan rate and also to the ten-year standard repayment plan for federal loans (0). Though a ten-year payback is challenging to some, newly-minted graduates generally have no dependents and can afford to use cost-cutting measures like those at the bottom of this paper to meet repayment.

Returns In Alternative Account: 8.6% (5.44% Inflation Adjusted)

Our strategy is to use debt plus an alternative account in place of the 529. Our alternative account assumes an annualized, 8.6% return taken from Vanguard's 529 portfolio composed of 60% stock 40% bonds (0). If we use Vanguard's portfolio allocation models, moving increasingly more conservative over the life of our alternative account approximates this same average return. (7). The Vanguard portfolio is a good proxy for the stock and bond markets because it mimics them with a near-perfect fit of 0.99 (where a perfect fit is 1). A concern is whether using a return's average is the proper method. After all, what about falling markets during the investing period? Blackrock points out, "The order of your gains and losses does not impact your portfolio during accumulation. Assuming there are no additions or withdrawals, in the end, the average return

will still be the same" (0). In short, "sequence risk" from falling markets doesn't impact average return when there are no withdrawals or additions.

Inflation: 3%

The growth in all accounts is adjusted by three percent per year to account for inflation and so we may compare future dollar values to current dollar values. The paper refers to this as inflation-adjusted. Inflation is the rising cost of living and every twenty years or so this cost generally doubles—e.g., consider you lend someone $100 and they give the $100 back in twenty years. Because most everything costs twice as much twenty years from now, it would be as though they gave you back $50. Therefore, we need to adjust past and future values to "today's" values so we can compare the current cost of school with current purchasing power of the dollar. We do this by using a simple inflation-adjustment formula with 3% rate of inflation. It is [(1+% return) / (1+% inflation)] -1. This adjusts down our 8.6% return to 5.44%. The paper will provide tables with nominal, non-adjusted amounts and then real, or inflation-adjusted amounts to keep these clear.

Loan Debt Plus Alternative Account vs. 529

We now can look at our first scenario and compare the benefits of paying for school with debt while investing in an alternative account instead of the 529. Using our assumptions, we calculate a total debt of $112,600, composed of $80,000 borrowed and $32,600 interest. Interest accrual on the annual need for $80,000 is staggered over fourteen, thirteen, twelve, and eleven years. The staggering allows us to account for each year in school plus ten years to repay the debt accumulated each school year. Payment begins the year after graduation. Here, we use an annual loan schedule. Note that using semi-annual loans won't deviate significantly from this total. The results are derived on any loan calculator, or we can use the following formula per year:

loan amount = $r*a*n/[1-(1+r)^{-n}]$ in which
r = monthly loan rate
a = the loan amount
n = the number of monthly payment periods

In our alternative strategy to the 529, we need the investment growth in the alternative account to be larger than our loan to justify taking out the loan. Let's compare the cost of our loan against growing the $80,000 in the alternative account up to the end of the loan payback period. We'll use the annualized average growth rate of 8.6% discussed earlier. Again, we can use a compound calculator or apply the future value formula:

future value = $C_0(1+r)^n$ in which
C_0 = $80,000 (present value)
r = 8.6% (annual growth rate)
n = 14 (14 years from loan, 10 years after graduation)

We start with three yearly contributions of $10,800 to the alternative account, just as we might with the 529. Fourteen years after starting college, we complete our loan payback. At this point the alternative account grows from year zero to the end of year thirty-two (the year the loan is paid back) at a 5.44% inflation-adjusted value of $177,080. Comparing the amounts in *today's* inflation adjusted dollars, we find the alternative account is $78,184 higher than the loan at the time we pay off the loan ($177,080 - $98,896). By retirement, the difference grows to $473,479 in inflation-adjusted dollars.

Table 2

Growth in Alternative Account Compared to Debt

	Alternative Account	Debt
Year We Pay Off Debt	32	"Today"
Alt Account to Debt	$275,764	$112,600
Inflation-Adjusted	$177,080	$98,896

Time: The Great Asset

There are three basic components to growing investment wealth: rate of return (the percentage money grows), principal (the cash we invest to grow), and time. As any of these shrinks, so does our relative rate of growth. Time is of particular interest because it's a constant that can make up for variances in the other two. For example, even if we average a lower return of 7.6% (instead of 8.6%), by keeping our money in an account longer, we again arrive at the 8.6% value. Now consider we save $30,000 less ($50,000 instead $80,000). If we let the account grow for several more years at our original rate, we again arrive near the same value. This demonstrates how time can make up for a lower return or a lower contribution.

Indeed, time's impact on growth puts the 529 in a different light, since after college, the 529 is depleted. Because of this, the longer-lasting investment account, even with smaller contributions or lower returns, might still be the better choice. It begs the question: what if the wealth earmarked for college in the 529 was left to grow after college?

A Longer Investment Horizon

Specifically, what happens if the $80,000 for college grew in an investment account until retirement? The results are nothing short of staggering. They show that the longer the investment horizon, the more this approach should yield. From age seventeen to retirement, growing at the average rate and with no other contributions to the account, we arrive at about $1 million in inflation-adjusted dollars for a tax-deferred account or $342,575 in a taxable account with a marginal rate of 22%. Given the assumptions used, the student expectedly retires a millionaire by mixing the alternative investment account with debt of $112,600.

Table 3

Alternative Account Year 66

Amount @ 8.6% In Year 66	$4,557,759
Inflation-Adjusted	$1,072,394

Table 4

Post-tax Results

Summary	Fully-Taxable	Tax-Deferred	Tax-Free
Current investment balance	$80,000	$80,000	$80,000
Annual contributions	$0	$0	$0
Number of years to invest	49	49	49
Before-tax return	5.4%	5.4%	5.4%
Marginal tax bracket	22%	22%	22%
After-tax return	4.2%	5.4%	5.4%
Future account value *	$612,956	$1,072,394	$1,072,394
Future account value (after-tax)	$612,956	$854,067	$1,072,394

Higher Interest Rates, Longer Payback, Lower Return

Let's look at a whopping debt interest of 15% paid over eighteen years after college instead of ten years. Yearly payments of $14,346 over eighteen years would be about $175,300 in inflation-adjusted dollars. Total debt would be paid off in year forty. Our alternative account at this period holds $270,500 or $95,200 more.

Table 5

Debt Interest Rate 15%, Paid Off Year 39

Number of Years for Annual Payments	18
Annual Payment Amount	$14,346
Total Payment Amount	$258,200
Inflation-Adjusted	$175,300

Table 6

Alternative Account Year 40

Amount @ 8.6% In Year 40	$533,551
Inflation-Adjusted	$270,500

If we realize a lower average return of 7.6%, we still arrive at an inflation-adjusted value of $123,800. Compare to our debt amount of $98,896. The lower return account still beats the debt by $24,900. The more money that parents commit to the 529, the more they give up. This is because more is forfeited in lost future growth when the 529 is emptied. For example, instead of saving $80,000 in the 529, let's assume they save $130,000. By retirement the $130,000 would grow to $1.7 million inflation-adjusted. It's clear that staying invested beyond the life of the 529 has the potential to make up for the debt we'd incur. We'll turn our attention to using the 529 for college and opening an investment account after graduation. Specifically, what

if the student used the 529 for college and invested the equivalent of her annual loan payments over the life of the loan beginning first year after graduation?

Since our college debt is in today's dollars and not the cost of debt twenty-two years from now, the following calculations assume "today" is the end of year twenty-two, or the first year of our ten-year debt repayment. In this scenario, the student graduates and begins paying on the $112,600 loan. Over the same period, we note that her alternative account grows to an inflation-adjusted $186,781. We arrive at this by using the inflation-adjusted growth in the alternative account to year twenty-two, as if that amount were in the account "today." We then grow it at the inflation-adjusted rate for ten years, just as we did with the post college account. In the post-college account, we assume the student's college is paid by the 529 and she no longer needs a loan. Instead, she freely invests in that account the equivalent of what would have been her annual loan payments of $14,868. The post-college account's investments grow at an inflation-adjusted rate resulting in a ten-year total of $201,278, beating the alternative account by $14,498. However, the total contributions in the post college account sum to an inflation-adjusted total of $115,793— requiring nearly twice the contributions as the alternative account, wiping out its $14,498 lead in growth.

What's more, the student must systematically commit $14,868 every year for ten years, and do it without the compelling motivation of debt to pay. Without this brand of discipline, she can't approach the alternative account. How reasonable such an investment schedule is should be weighed by the student and parents.

Table 7

Alternative Account 10-year growth from year 23

Amount	$250,944
Inflation-Adjusted Growth	$186,781
Inflation-Adjusted Total Of Three $10,800 Contributions	$64,081

Table 8

Post-College Account (Debt Payments as Contributions) 10-year growth from year 23

Amount @ 8.6% (10 Contributions)	$240,680
Inflation-Adjusted Growth	$201,278
Inflation-Adjusted Total Of Ten $14,868 Contributions	$115,793

Relieving the Savings Burden

This not an *all or nothing* exercise. The assumptions have plenty of wiggle room to be effective because of how time broadens the distance in our totals from graduation to retirement. If a child had only $40,000 invested by the first year of college, the money would be expected to grow to $536,197 inflation adjusted, by retirement. That $40,000 relieves parents of half the $80,000 college saving burden. To get to $40,000 by year seventeen, using our 8.6% average, parents need only make two $8,000 investments during years zero and one. Unless parents can sock away the required amounts over the first few years of their child's life, the ability to soften the burden of tuition by taking on debt while leaving the child with significant retirement wealth might be the best reason for them to consider this strategy.

Caveats

We can never fully know how future returns will unfold. We do know, however, that the 529 and a standard investment account rely on the same markets and inflation rates for their returns. Hence, with the

same investment mix, an alternative account should win against the 529 because of the longer investment horizon.

That said, there are other considerations, including the consequences of unpaid debt, the uncertainty of sustained employment to pay off the loan and, of course, the stability of the market after college. What's more, because of IRA contribution rules, it is no easy task to sock this kind of money away for your child in this particular type of account (though outside the scope of this article, strategies do exist).

It's also important that parents be confident of their loan rate and inflation rate projections. Both, at present, are deeply below the 5.8% and the 3% used here. That's great news, particularly in the early years.
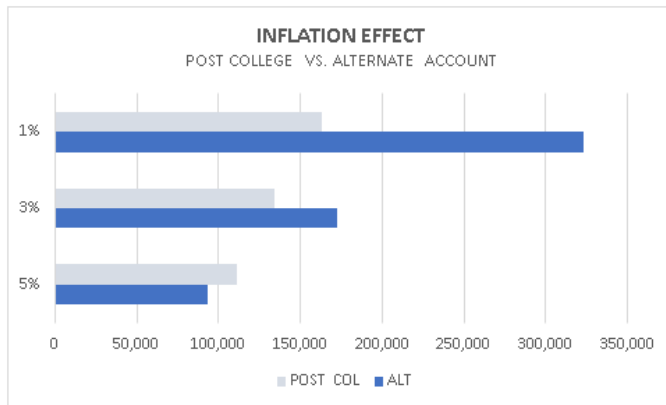

Figure 1

Inflation Effect
As inflation (vertical axis) pulls beyond its average, loan payment contributions redirected to the post college account can start to beat growth in the alternative account (horizontal).

This paper uses a simple model and very basic finance, but to those not familiar with finance, it can still be daunting. Parents can find help by using professionals to create a sensitivity analysis to look at best, worst and break-even scenarios. However, they should not use simply a financial adviser. Many of these professionals continue to have no formal education in finance, but rely on off-the-shelf software to create reports. Since this paper looks at atypical scenarios, such software does not exist. CFPs are high-level planners, not analysts, and also may not be able to provide adequate analysis. Instead, seek out a professional with the CFA, minimally the CIMA, or someone who has an advanced degree in business and finance from a rigorous, respected program. These professionals can be found through professional freelancer websites.

Summary

Many articles have shown the benefit of investing early. Indeed, it's the early money that impacts growth the most. However, we've looked at a second side—the opportunity cost of withdrawing *early*. Had parents no other choice, there wouldn't be an opportunity cost, but we see there is a choice. Parents can redirect contributions from a 529 to alternative investment accounts. They can then allow their contributions to compound for decades and even generations longer while using debt to pay for college. After subtracting taxation, and inflation and with no further contributions, the student potentially retires with significant wealth that is otherwise lost when using the 529.

College Savings Strategies

It's important that families reduce a loan where they can and pay it off as fast as they can. For example, if the total loan were seven thousand dollars less at $105,600, the student would potentially retire with an additional $70,000. Each parent should wisely look at all options, many of which are just beginning to evolve as schools and government wrestle for solutions to the high cost of college. Here are recommended steps, some of which may require help from a professional:

1. Open an investment account (ideally tax-deferred) and create a schedule of contribution options. Open the account at year zero. That extra time could make a huge difference. Tax-deferred accounts can be tricky, but there are creative work-arounds. Parents can start with a taxable account if they need to. Also be aware that parents can't reinvest tax-deferred growth into a 529, but they should be able to cash out a taxable account and reinvest it in the 529 if they decide to abandon this paper's plan. However, parents will be taxed on any growth before moving.

2. With so much time to grow the account, parents may decide to invest in a 100% stock fund for the first ten years for a potentially higher return. Vanguard states an average return of (10.1%), but parents should not blindly expect it (9). From here, parents can dial down stock exposure using the age-based rule:100 minus current age = percent in stock.

3. Be sure the account is diversified. Parents can follow the investments in the Vanguard 60/40 529 (or ones like them), or just buy three low-cost index funds: US total stock index fund, an international index fund, and an intermediate bond index fund. Vanguard has each of these wrapped in a variety of packages. Whatever isn't in the two stock funds can potentially go to bonds based on the age rule. Diversify how much to put in each fund by finding each fund's average-annualized return then weighting the allocations so you arrive at the 8.6% average (or higher if you wish). Remember, you take on more potential risk for a higher potential return, so also look at your volatility in the mix.

4. Your fund fees should be no more than 0.25% for any index fund. Many high-performers are much lower.

5. Rebalance the account annually to keep the same weights or reweight to potentially improve risk and new target returns.

Below are current strategies to help reduce debt should this paper's approach continue to appeal to parents.

Loan Reduction Strategies

1. To potentially reduce the interest rate, a student should get a cosigner and a job in high school.
2. Refinance the loan if your job allows and it makes sense.
3. Apply bonus money or other financial gifts to the debt.
4. Use autopay.
5. Work and save during high school and summer when in college.
6. Prepay and be sure the additional payments are applied to the current and not the coming month.

References

College Board, (2019). *Trends in College Pricing.* p. 18. Washington, DC: Author. Retrieved from
https://research.collegeboard.org/pdf/trends-college-pricing-2019-full-report.pdf

Dancy,K. & Holt, A. (2017). *In the Interest of Few: The Regressive Benefits of Federal Student Loan Refinancing.* p.4.
Washington, DC: New America. Retrieved from https://www.newamerica.org/education-
policy/policy-papers/interest-of-few/

Collegeboard.org, (2019). Total Federal and Nonfederal Loans by Type over Time, fig.6. Retrieved from
https://research.collegeboard.org/trends/student-aid/figures-tables/total-federal-and-nonfederal-
loans-type-over-time/

Edfinancial.com. Interest Rates on Federal Student Loans. Retrieved from https://edfinancial.com/Help-
Center/StudentLoans/Interest-Rates-for-Federal-Student-Loans

Studentaid.gov. Retrieved from https://studentaid.gov/manage-loans/repayment/plans

The Vanguard Group. Retrieved from https://personal.vanguard.com/us/insights/saving-investing/model-
portfolio-allocations

Blackrock.com. (2019). Sequence of Returns. Retrieved from
https://www.blackrock.com/pt/literature/investor-education/sequence-of-returns-one-pager-va-
us.pdf

Vanguard.com. The Vanguard 529 Plan Age-Based Options. Retrieved from
https://investor.vanguard.com/529-plan/age-based-options

Zhang, L., Hu, S., & Sensenig, V. (2013). The effect of Florida's Bright Futures Program on college
enrollment and degree production: An aggregated-level analysis. *Research in Higher Education, 54*(7),
746-674.