

Two's a Crowd: Are Retirement Savings Being Crowded Out by Student Loans?

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Student loans have exploded in popularity in recent years, and have become an increasingly prevalent way to finance higher education. Currently, little guidance exists on the best way to balance paying off student loans and contributing to employer-sponsored retirement plans. We examined two sources of data to see if there was an association between student loan debt and retirement savings, and built a model to determine the exact effects paydown strategies have on net wealth. After analyzing this data, we find that:

Student loan debt among households has nearly tripled in the past 20 years

In 1992, 10% of all households in the United States and nearly 30% of households headed by someone younger than 30 held education loans. By 2013, those proportions increased to 20% and 42%, respectively. Among those who graduate from college with a bachelor's degree, 60% take on student loans, and the average loan amount has increased significantly as well, rising from \$9,400 to almost \$27,300.

An additional dollar of student loan debt is associated with a decrease in retirement savings

To examine the impact student loans have on retirement savings, we used two sources of data: HelloWallet user data, and the Federal Reserve's Survey of Consumer Finances. In both HelloWallet's data and the Survey of Consumer Finances, we find that each additional dollar of student loan debt is associated with a decrease in retirement savings of 17 and 35 cents, respectively.

Workers are most often best served by contributing extra dollars to their retirement plans, and not paying off student loans ahead of schedule, particularly if their employer offers a match on retirement savings

We built a model to simulate a worker's net wealth at retirement, and examined the circumstances under which paying off student loans ahead of schedule results in a higher net wealth than paying. We conclude that there are few circumstances in which paying off student loans early results in a higher net wealth at retirement.

This research illustrates the need for decision support tools for workers deciding whether to use their discretionary funds to pay off student loans ahead of schedule or to save for retirement. In light of our findings, workers with student loans ought to carefully consider whether paying off their student loans ahead of schedule is truly a wise choice.

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Introduction

News media outlets have justifiably paid significant attention to the explosion of student loan debt in the United States. Both the average student loan balance and the number of borrowers have risen sharply in recent decades, crimping the living standards of many recent college graduates. But the negative consequences of onerous student loan debt are not just short-term. Using two different data sources and after controlling for income level and age, we find that increasing levels of student debt are associated with lower levels of retirement savings. The financial consequences of high student debt may last for decades, impairing some borrowers' ability to retire comfortably. In cases where high levels of student loan debt interfere with an individual's ability to leave assets to heirs, the financial impact may be multigenerational.

In part, the negative relationship between student loan balances and retirement savings makes sense: To the extent a person must repay a debt, he or she has fewer available resources for retirement savings. But the problem is deeper than that: There are few widely available tools to help individuals decide whether to prioritize student loan repayments or retirement savings. As a result, even individuals with relatively high incomes may have little assistance when making the difficult decision either to pay off student loans ahead of schedule, or make minimum loan payments and contribute remaining funds to a retirement account. On one hand, paying down debt ahead of schedule may seem attractive and definitely reduces interest payments. Diverting discretionary dollars to pay down student loan debt early, however, may prevent people from maximizing the value of their employer match and from taking advantage of tax benefits. This paper provides guidance about when to prioritize paying down student loans faster than required and when to direct excess funds to retirement savings.

Background

Student loans have become increasingly prevalent among households financing higher education ex-

penses. In 1992, 10% of all households in the United States and nearly 30% of households headed by someone younger than 30 held education loans.¹ By 2013, those proportions increased to 20% and 42%, respectively.² Among those who graduate from college with a bachelor's degree, 60% take on student loans. The average loan amount has increased significantly as well, roughly tripling in real terms over the same time frame from \$9,400 to almost \$27,300 (though the amount of debt declined slightly between 2012 and 2015 [Baum 2015]). The overall amount of student loans outstanding has risen from about \$350 billion in 2004 to \$1.2 trillion—more than the amount that Americans owe on their credit cards or cars (Federal Reserve Bank of New York, 2015).

Although no previous research has studied the explicit link between student loan debt and retirement savings, prior studies have documented a number of negative relationships between increasing student loan debt and life outcomes. One study found that students with high loan balances had less choice about what they study in college, as debt servicing requirements compelled them to gravitate toward higher-paying majors (Rothstein and Rouse 2011). Some studies suggest that at age 30, those with meaningful amounts of student debt are much less likely to be homeowners (Brown and Caldwell 2013) or get married (Gicheva 2011). Millet (2003) has found that after controlling for other characteristics, student loan borrowers are 60% to 70% less likely to apply to graduate school than non-borrowers. It stands to reason that a similar crowding-out effect may exist for funds that might have otherwise been allocated to retirement accounts.

Widespread media coverage suggests that rising tuition prices have fueled increasing student loan burdens—and this commonly held belief is at least partly correct. Rising tuition costs at four-year public universities, which educate about 7 in 10 college students, undoubtedly play a key role. For example, between 2004 and 2014, inflation-adjusted net tuition costs at public universities rose 62.5% (net tuition costs are defined as tuition rates less state, local, institutional, and private assistance to the student). By contrast, inflation-adjusted net costs declined at both public two-

year colleges and four-year private nonprofit colleges (Baum and Ma 2014).

At the state level, cutbacks in support for higher education have almost certainly driven exceptionally large increases in tuition and fees at public universities. The Government Accountability Office found that between 2003 and 2012, median state funding per public university student declined from \$6,211 to \$4,695. Adjusted for inflation, this represents a 40% decline in funding. Since the 1990s, the value of the maximum Pell Grant has fallen from 83% of the cost of tuition, fees, and room and board at a typical state university to 61% in 2015 (Baird 2015).

For lower-income students, rising tuition and borrowing costs often limit financial well-being and educational attainment. Due in part to difficulties in meeting educational expenses, only 1 in 10 people from the lowest income quartile has a four-year degree by age 25; for those in the highest-income quartile, more than 50% have achieved a university degree (Bailey and Dynarsky 2011). To be sure, these two groups are not equally ready for college, as evidenced by a lower high school graduation rate among lower-income students. But even after controlling for cognitive skill levels, lower-income students who enroll in college are much less likely to graduate than their higher-income peers (Ibid). Due in part to financial stress among lower-income students, the gap in attainment rates between higher- and lower-income students has actually grown over the past few decades (Ibid).

Despite tuition growth that has significantly outpaced general inflation, earning a bachelor's degree is largely seen as a worthwhile investment. Since 1968, real wages for workers with a bachelor's degree have outpaced inflation by about 8%.³ Wages for workers with a master's degree or Ph.D. have increased about 36% on an inflation-adjusted basis.⁴ Workers who have lower educational attainment, however, have seen their real wages fall, and precipitously so for workers with only a high school degree, who have seen their real wages fall more than 25%.

Given the proliferation of student loans and workers participating in workforce with larger loan balances, there is an increasing need for guidance and clarity around how to optimally manage student loan debt in the context of other obligations and financial goals. For example, by starting to save for retirement early, young workers can dramatically increase their retirement savings. Yet this is also the time in their lives when they are likely to have a lower income and potentially fewer discretionary dollars. Under what conditions do paying back student loans ahead of schedule make sense? Are retirement savings being crowded out in favor of paying back student loans? This paper aims to examine these issues.

Like most facets of personal finance, there is no one-size-fits-all guidance. The calculus changes dramatically based on the different conditions the individual faces. The amount of disposable income earmarked for paying down student loans or funding retirement accounts; interest rate on the student loan; the proportion of the employer match in a company-sponsored retirement plan; and future wage growth assumptions all have an impact on the future projected net worth of that individual.

Methodology

We draw on three sources of data for this analysis. First, we analyze HelloWallet user data, which incorporates factors such as retirement account balances, income levels, age, and student loan debt balances. Users can link their financial accounts to the HelloWallet application. Account balances are frequently updated, which gives both the user and the application real-time financial information. Users are incentivized to connect as many accounts as they can to the application: The more accounts they link, the more holistic view the application can provide of their personal finances.

One advantage of using HelloWallet data is that the user's account data is accurate. In financial surveys, respondents are often encouraged to reference their account information, but ultimately respondents may

not accurately estimate account balances when they attempt to recall them through memory. Once an account is connected through HelloWallet, the account data comes directly from the user's financial institution, ensuring a uniquely accurate view of that individual's finances.

HelloWallet data does have several drawbacks, though. HelloWallet's users are not representative of the working population with defined-contribution plans. Though HelloWallet serves a diverse range of large employers, users skew younger and wealthier than national averages for working households with defined-contribution plans. Users may choose to not connect all of their accounts, and it is difficult for us to detect when this happens. Users who have elected to connect their student loan accounts to the application may therefore be systematically different from those who have student loan accounts but do not track them with HelloWallet. Nevertheless, for a subset of the population, the HelloWallet data allows us to explore the relationship between student loan levels and retirement savings.

We then examine the Federal Reserve's Survey of Consumer Finances. The Survey of Consumer Finances is a nationally representative survey containing rich and detailed data about respondents' financial assets and liabilities. Through the use of survey weights, analyses of the Survey of Consumer Finances can be generalizable to the population of the United States.

A direct comparison to HelloWallet data is difficult, though. The primary unit of analysis in the Survey of Consumer Finances is the entire household, whereas HelloWallet data is generally representative of an individual user. HelloWallet income data is based on take-home income because the application records direct deposits, while the Survey of Consumer Finance tracks income on a pretax basis. Even so, both data sets provide sufficient information to examine the relationship between student loan debt levels and the amount of retirement savings, controlling for a number of important variables including age and income level.

In both the HelloWallet user data and Survey of Consumer Finances, we define retirement account balanc-

es as the sum of the balance of IRAs (both traditional and Roth) and the balance of defined-contribution retirement accounts (such as 401(k)s, 403(b)s, and 457s).

Using these two sources of data, we built regression models to quantify the relationship between student loan debt and retirement savings.

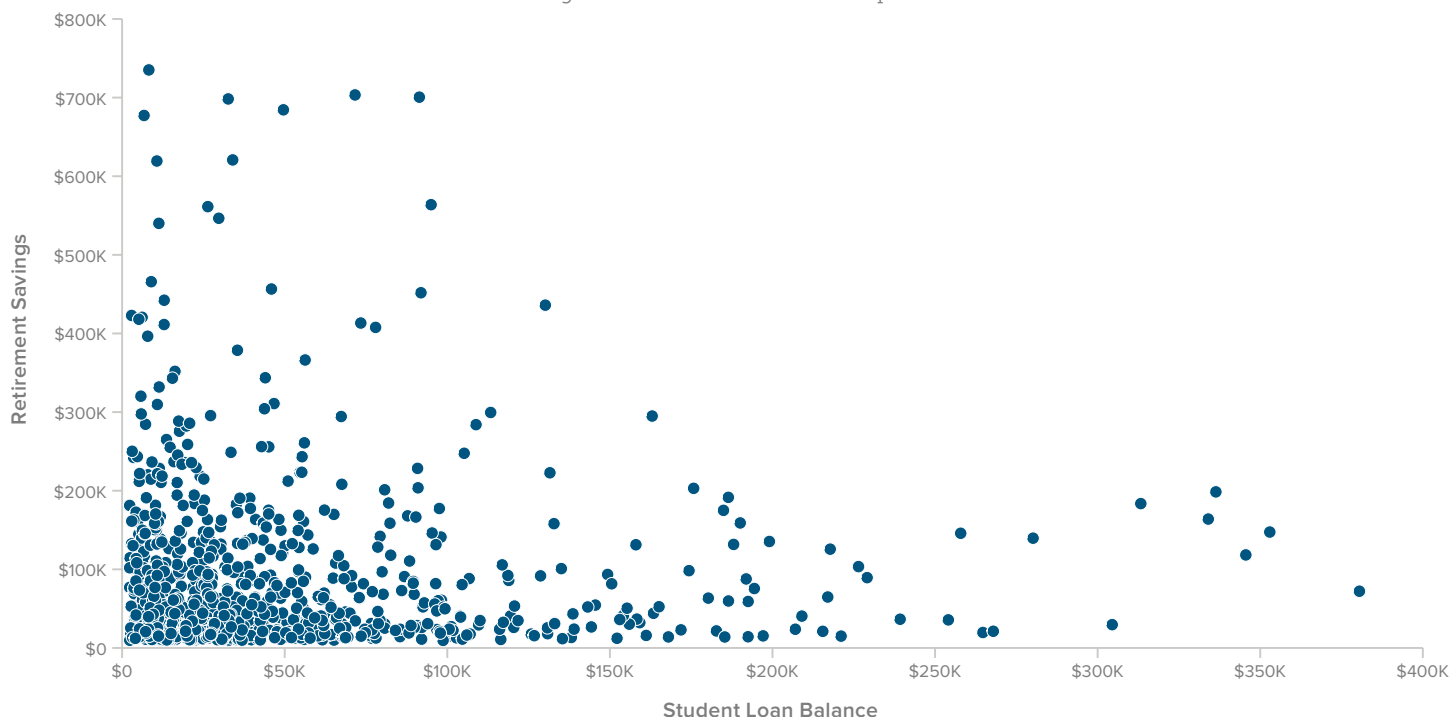
Finally, we built a model projecting the net wealth of workers with student loans and employer-sponsored retirement accounts under a number of different scenarios and assumptions. Inputs to this model include age, loan amount, term, annual percentage rate, investment annual percentage yield, income, employer retirement plan match rates, and wage growth assumptions. Investment returns are assumed to be 5% after inflation. This model is a projection of the worker's net wealth at retirement, and quantifies the impact of the decisions workers with student loans and retirement plans must face, such as whether to pay off student loans ahead of schedule or to maximize the employer match benefit.

Findings

In exploring the relationship between student loans and retirement savings, we first analyze HelloWallet data. There are 1,331 HelloWallet users who have connected both student loan accounts and retirement accounts through the application. We restrict our analysis to these HelloWallet users to eliminate false negatives. That is, we do not assume that a user who links a student loan but not a retirement savings account does not have any retirement savings, nor do we assume that users with retirement savings accounts linked do not have a student loan. Among these users, we see a mean outstanding student loan balance of almost \$42,000, and a median balance of roughly \$24,000. We also observe a mean income of \$89,335 and a median income of \$80,000, both of which are slightly higher than the broader HelloWallet user base.

Graphically, there appears to be a correlation between student loans and retirement account balances. Intuitively, this makes sense; larger student loan bal-

Figure 1: HelloWallet Data Scatterplot



Source: Anonymized HelloWallet user data

ance payments may crowd out discretionary dollars that might otherwise be diverted toward an employer-sponsored retirement account. With a larger burden, it may be difficult to accumulate a large balance. This analysis does not control for age or income, which are both strong predictors of retirement account and student loan balances.

To examine the impact after isolating the impact of student loans on retirement accounts from the effects of age and income, we employ an ordinary least squares regression model with heteroskedastic-robust standard errors. Controlling for age and take-home income, we see a statistically significant negative rela-

tionship between outstanding student loan balances and retirement account balances.

For each additional dollar of student loans, retirement account balances decrease by about 17 cents. This result suggests that to some degree, student loan repayments crowd out retirement savings.

We can see within the HelloWallet population that there is a strong association between student loans and retirement account balances. There is a statistically significant relationship where larger student loans are associated with lower levels of retirement savings, even after controlling for age and income. Due to the

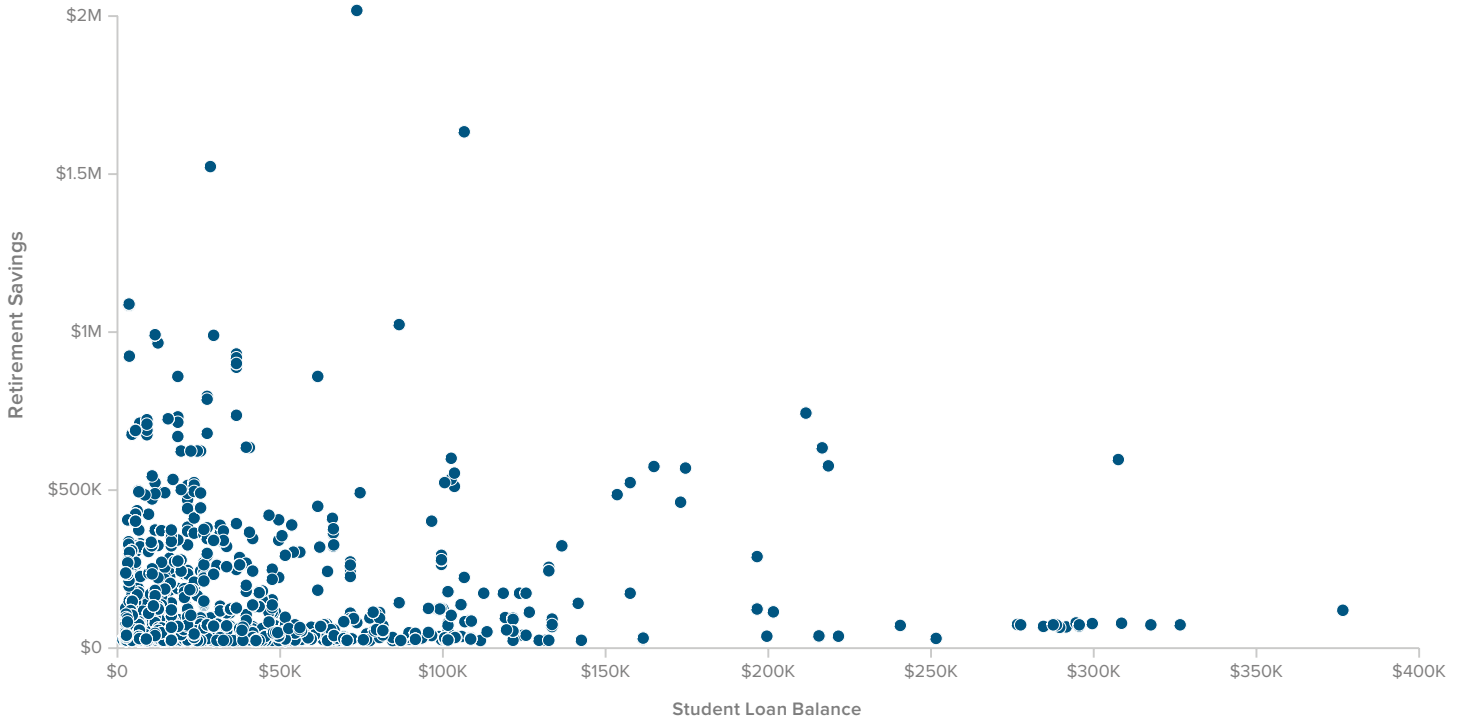
Figure 2: Regression Model of Relationship Between Student Loans and Retirement Savings, HelloWallet Data

	Coefficient	Standard Error	T-Statistic	P-Value	95% Confidence Interval	
Education Loan	-0.17288**	0.065881	-2.62	<0.01	-0.30214	-0.04362
Age	9403.748**	1231.426	7.64	<0.01	6987.67	11819.83
Wage Income	0.891837**	0.154675	5.77	<0.01	0.588362	1.195312
Constant	-294825**	39895.18	-7.39	<0.01	-373100	-216550

*Denotes statistical significance at a 5% level **Denotes statistical significance at the 1% level

Source: Anonymized HelloWallet user data

Figure 3: Consumer Finance Data Scatterplot



Source: 2013 Survey of Consumer Finances

systematic differences of the HelloWallet user base, however, we cannot assume that the same relationships hold in the whole U.S. population of workers with student loans.

Survey of Consumer Finances

To extend the analysis and generalize these models to a broader population, we turn to the Survey of Consumer Finances. While HelloWallet data is not representative of all working households in the United States, the Survey of Consumer Finances may be generalized to the working population by using survey weights.

Graphically, we see a similar picture to the scatterplot using HelloWallet data. Among survey respondents, there is a similar pattern in the relationship between student loan debt and retirement savings.

We then replicated the ordinary least squares model from the previous analysis of HelloWallet users. Here, too, we see a correlation between student loans and retirement account balances. Though the coefficients are not identical, they are directionally similar.

As in our HelloWallet analysis, we also see a statistically significant association between student loans and retirement savings. The student loan regressor

Figure 4: Regression Model of Relationship Between Student Loans and Retirement Savings, Survey of Consumer Finance Data

	Coefficient	Standard Error	T-Statistic	P-Value	95% Confidence Interval	
Education Loan	-0.35063**	0.101012	-3.47	<0.01	-0.54861	-0.15265
Age	9094.504**	769.7689	11.81	<0.01	7585.784	10603.22
Wage Income	0.472788	0.256797	1.84	0.066	-0.03053	0.976101
Constant	-301391**	41017.92	-7.35	<0.01	-381785	-220998

*Denotes statistical significance at a 5% level **Denotes statistical significance at the 1% level
Source: 2013 Survey of Consumer Finances

coefficient is much larger here; controlling for age and income, a one-dollar increase in student loans is associated with nearly a 35 cent reduction in retirement savings. This could be a result of the Survey of Consumer Finances' generalizability to the broader population of the United States. HelloWallet's user base, in contrast, is systematically different, which results in a regression coefficient that is directionally similar but different in magnitude. For example, HelloWallet users could be more likely to cut back on discretionary spending in order to save more in their retirement accounts, or by virtue of seeking out financial educational offerings, they may be more financially literate than the general population.

There exists, therefore, evidence in both the HelloWallet user data and the Survey of Consumer Finances that higher levels of student loan debt are associated with lower levels of retirement savings, even after controlling for age and income. Though the regression coefficients are slightly different, they are directionally the same. The fact that both data sources demonstrate similar results provides strong evidence of a crowding-out effect that larger amounts of student loans have on retirement savings.

Net Wealth Projection Model

Though we have evidence linking student loans to lower retirement savings, this does not suggest an optimal wealth-maximizing strategy. Does it make sense for workers to pay down their student loans early, or should they pay off the minimum and simultaneously contribute to their employer's retirement account? To answer that, we turn to a model we built to determine the effect that different student loan paydown strategies have on net wealth at retirement. In the model described earlier, we find that using funds that would otherwise be directed toward an employer-sponsored retirement plan to pay off student loans early rarely results in a higher net wealth at retirement, and that income-based repayment systems can be beneficial.

We note that our model involves significant assumptions about investment returns and the behavior of retirement plan participants. If the equity and fixed-in-

come markets post weak long-term returns, this will reduce the financial benefit of prioritizing retirement savings over debt repayments. Similarly, if individuals elect not to pay down their loans but then use their excess cash to fund consumption rather than retirement savings, they will enjoy smaller financial benefits than our model suggests.

With those caveats in mind, our model shows that once workers have made their minimum student loan payments, those who are investing in their retirement plan will maximize their wealth by contributing an amount to their accounts that maximizes their employer match. This provides a return on investment for those dollars that cannot be matched by investment returns or by paying off loans ahead of schedule. Assuming a starting salary of \$50,000, a student loan of \$20,000, and an effective employer match rate of 5%, paying off a student loan early to take advantage of only half of the employer match results in a \$341,000 reduction in net wealth at age 65. For an effective employer match of 3%, the reduction in net wealth is \$148,000, and at an effective employer match of 1.5% (a 25% match on a 6% contribution level), the reduction would be an estimated \$168,000. These effects are meaningful: The Employee Benefit Research Institute estimates that even among 401(k) investors in their 60s who have regularly contributed to their accounts, the average account balance is around just \$186,000. (EBRI Brief Sept. 2015)

Eligibility for income-based repayment plans can have a large effect on net wealth at retirement. These plans cap student loan payments at a certain percentage of income, leaving the worker with more discretionary income and allowing the worker to save additional dollars in retirement accounts. For example, relative to making the full scheduled payment, a worker with a \$25,000 loan who makes \$30,000 and has access to a repayment plan that caps repayments at 10% of discretionary income can accrue more than \$10,000 in net wealth at retirement by diverting dollars toward retirement accounts that would otherwise have been spent repaying student loans.

Figure 5: Examples of Net Wealth at Age 65 Under Varying Assumptions

Loan Amount	Interest	Investment Return	Loan Payments		Match Rate	Net Wealth at Loan End	Net Wealth at 65
\$40,000	5%	7%	\$424	On Schedule	3%	\$87,023	\$2,147,373
\$40,000	5%	7%	\$500	Ahead of Schedule	3%	\$54,010	\$2,090,096
						Difference at 65	\$57,276
\$20,000	5%	7%	\$212	On Schedule	5%	\$120,484	\$2,613,760
\$20,000	5%	7%	\$595	Ahead of Schedule	5%	\$2,464	\$2,272,103
						Difference at 65	\$341,658
\$20,000	7%	5%	\$232	On Schedule	3%	\$91,386	\$1,488,559
\$20,000	7%	5%	\$425	Ahead of Schedule	3%	\$21,778	\$1,422,846
						Difference at 65	\$65,712
\$20,000	7%	5%	\$212	On Schedule	5%	\$120,484	\$2,613,760
\$20,000	7%	5%	\$396	Ahead of Schedule	5%	\$30,571	\$2,490,490
						Difference at 65	\$123,271
\$20,000	5%	7%	\$212	On Schedule	3%	\$104,279	\$2,309,234
\$20,000	5%	7%	\$437	Ahead of Schedule	3%	\$18,875	\$2,160,262
						Difference at 65	\$148,972
\$20,000	5%	7%	\$212	On Schedule	1.5%	\$92,126	\$2,080,839
\$20,000	5%	7%	\$469	Ahead of Schedule	1.5%	\$12,800	\$1,912,552
						Difference at 65	\$168,287

Note: These calculations are based on a hypothetical 25 year old worker making \$50,000, experiencing constant wage growth, and 2% inflation.

Source: Author's Analysis

There are numerous advantages of favoring retirement savings over student loan payments. The tax-preferential treatment of retirement savings allow for larger sums of net wealth to accrue. This effect is magnified by the long time horizon that young workers enjoy; the longer this money sits in their retirement accounts, the longer investment returns compound. Interest on student loan debt is an above-the-line tax deduction for workers with a modified adjusted gross income below \$80,000, providing an additional, though minor, incentive to prioritize retirement savings.⁵

Though the model described above is enlightening, it is still an abstraction. The real-world decisions workers face are often more complicated. Workers may not necessarily view decisions about their discretionary dollars the same way this model portrays them; they

may not have a budget that accounts for dollars that can be allocated toward *either* paying down student loans *or* saving in an employer-sponsored retirement account. Nevertheless, this model shows that under most conditions, paying off a student loan early does not make sense from a wealth-maximization standpoint. It also reinforces the value of maximizing the employer match on defined-contribution plan deferrals.

Conclusion

The proportion of younger heads of household with student loans has increased by more than 50% over the past 20 years, and the mean loan balance has nearly tripled over that same time frame. Little guidance exists on the best way to balance paying off stu-

dent loans and contributing to employer-sponsored retirement plans.

We have seen evidence from two sources of data that suggests student loans, to some extent, crowd out retirement savings. In an analysis of HelloWallet user data, we find that an additional dollar of student loan debt is associated with a 17-cent-lower retirement account balance. Though the HelloWallet user base differs from the overall population in meaningful ways, a similar relationship exists in the Survey of Consumer Finances, which is generalizable to the working population of the United States. Our analysis of the Survey of Consumer Finances data demonstrates that an additional dollar of student loan debt is associated with a 35-cent decrease in a retirement account balance. We have built an illustrative model that demonstrates there are very few circumstances in which paying off a student loan ahead of schedule with funds that would otherwise be saved in an employer-sponsored retirement account leads to a higher net wealth at retirement. And particularly, participation in an income-based repayment program can be beneficial for workers who are eligible for it.

It is also worth noting that, while sensibly balancing debt repayments and retirement savings is a good thing, it may be even better to avoid or minimize student loan debt in the first place. Before incurring a significant amount of debt, students should carefully think through their educational options. Although the returns on higher education remain high—which may make taking on some loans a sensible decision—at times, students take on more debt than is absolutely necessary. Relative to students at other schools, research indicates that students at for-profit educational institutions build less human capital than students at traditional schools, have much lower graduation rates, and default far more frequently on their loans (Mettler 2014). By thoughtfully selecting a college or university and keeping a moderate debt load when possible, students can achieve their educational goals while not compromising their retirement security.

End Notes

¹ Author's analysis of 1992 and 2013 Surveys of Consumer Finance.

² *Ibid*

³ Author's analysis of 2014 Current Population Survey.

⁴ *Ibid*

⁵ The income limit increases to \$160,000 for married couples filing a joint return as of 2

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