

**Student Loan Relief
Programs: Implications for
Borrowers and the Federal
Government**

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Student Loan Relief Programs: Implications for Borrowers and the Federal Government

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Abstract

As college costs increase and more students fund their education through borrowing, debt load and delinquency rates have become significant problems on a number of levels. Student loan obligations are challenging to manage for new graduates with lower earnings and borrowers in financial hardship. This paper discusses the federal student loan repayment relief programs that are available and estimates their borrower and fiscal impacts. The implications of relief plans on borrowers' costs and the federal budget vary for different loan amounts, income levels, and relief program.

It is challenging for policymakers to design programs that adequately balance the risks between borrowers and taxpayers. Existing programs are also tremendously complicated, making it difficult for borrowers to make informed decisions on repayment programs. This paper examines how the various programs work in practice and considers their likely outcomes over a set of income-debt-program scenarios to bring much needed clarity to the repayment environment. In our analysis, lower-income borrowers and borrowers who will have significant remaining balance forgiven at the end of the required repayment period are generally more likely to benefit from student loan relief programs, but participation of these borrowers can be very costly from a fiscal perspective.

Keywords: student loan; repayment; relief programs; fiscal impact

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At the end of the first quarter 2016, the U.S. Department of Education reported that 3.7 million Federal Direct Loan (Direct Loan) and 4.3 million Federal Family Education Loan (FFEL) borrowers were in default, accounting for a cumulated \$124.8 billion of distressed student loan debt.¹ During the 2007-09 recession and recovery, aggregate student loan debt increased consistently. Most other forms of consumer debt fell, with the exception of auto debt, which has been increasing over the last few years².

The consequences of being unable (or unwilling) to repay student debt can be severe for debtors and have been shown to have broader economic impacts. Student loan debt can delay household formation. Gicheva (2016) found that MBA students are less likely to marry over a period of seven years if they have student loan debt. Delinquency or default on student loan debt mars credit history and disqualifies borrowers from additional access to credit, including federal student aid. Ambrose, Cordell and Ma (2015) found that student loan debt is negatively correlated with the formation of new businesses that rely heavily on personal debt to finance. Student loan debt may also reduce personal and retirement saving (Munnell, Hou, and Webb 2016). Mortgage-qualified student loan borrowers often delay purchasing homes due to increased economic uncertainty arising from student loan repayment (National Association of Realtors and Association of Student Assistance 2016).

Borrowers who do not repay in a timely fashion face accruing interest, which is usually capitalized, thereby increasing the amount of debt principal. Some recent research suggests that student loan debt is the most significant factor holding back millions Americans who have zero or negative net worth (Armantier, Armona, De Giorgi, and van der Klaauw 2016). For many families, student loans are the only financial tool available to bridge the gap between college costs and funds from family savings and other sources of financial aid, such as scholarships and

grants. However, some students and families may be reluctant to borrow for college because of the uncertainty over job prospects and the repayment burden associated with the debt, thereby keeping some potentially highly successful students out of the higher education system.

In light of these concerns, considerable political attention has focused on providing financial relief to student loan debtors, resulting in a number of programs that extend repayment terms, graduate payments, or tie required payments to discretionary income. Additionally, student loan debtors and their advocates have proposed changes in the bankruptcy code to facilitate the discharge of student debt or even blanket forgiveness of student loan debt (see, for example, Botstein, 2016).

The aim of student debt relief programs is quite clear: to provide a safety net for distressed borrowers, reduce the likelihood of delinquency and default, and possibly diffuse the fear of debt for reluctant borrowers. But, the costs and outcomes for participating borrowers are not clear. This paper seeks to contribute to the policy discussions on student loan debt relief by analyzing borrowers' repayment obligations and likely outcomes under alternative repayment programs and estimating the associated fiscal implications for the federal government. Specifically, we focus on income-driven repayment plans although the federal government operates several loan forgiveness and debt relief programs outside the Department of Education.

At this time, we do not believe a large-scale debt forgiveness program for the 43 million outstanding loans is fiscally viable or politically feasible and therefore do not consider such a policy in the analysis. We also do not consider bankruptcy discharge when discussing loan forgiveness. Although technically possible under current case law, discharge of student debt is for all intents and purposes impossible (see Iuliano, 2012). The discussion of a legislative

change on the dischargeability of student loans through bankruptcy is outside the scope of the paper.

Federal Student Loan Debt Relief Programs

Student loan debt has increased dramatically over the last several years, rising from about \$346 billion in the fourth quarter of 2004 to \$1.26 trillion the end of the first quarter of 2016. These figures are based on the Federal Reserve Bank of New York Consumer Credit Panel (CCP/Equifax), a 5 percent longitudinal sample of Equifax credit reports.³ At the end of the first quarter of 2016, about 43 million, or one in six of 258 million consumers with credit reports had student loan debt. The average balance for those with student debt was \$28,377, and the median was \$15,300. The median is significantly lower than the average because the distribution of student loan debt is heavily skewed by a small share of very-high-balance borrowers. About 15.5 percent of borrowers have student debt in excess of \$50,000, and 4.7 percent have student debt above \$100,000. Although borrowers with loan balances in excess of \$200,000 account for only one percent of all student loan debtors, the share has doubled from 0.5 percent since the first quarter of 2014.

By default, both the Direct Loan and FFEL programs put borrowers into a standard repayment plan, which is characterized by fully amortized, fixed, level payments for 10 years. Borrowers who have difficulty repaying their loans can apply for deferment or forbearance, both of which eliminate required payments for a fixed period of time, ostensibly to avoid default. Interest usually accrues during both deferment and forbearance, except for deferment of a subsidized loan.⁴

There are other programs for student loan borrowers to consider when repayment becomes a challenge. Borrowers with multiple federal loans (often with different terms and repayment periods) can consolidate these loans and make a single monthly payment. For Direct Consolidation loans, the repayment period can be extended to up to 30 years, depending on the loan amount. Borrowers who have more than \$30,000 in outstanding federal loans originated after October 7, 1998 may extend their repayment plan to 25 years.

Borrowers with low initial income but higher expected income in the future (such as physicians) may benefit from the Graduated Repayment Plan. Payments are low at the beginning of the repayment term and increase over time, usually every two years, so that the principal is fully paid at the end of the repayment term (typically 10 years or 25 years). Graduated Repayment schedules cannot negatively amortize and the payment due cannot exceed three times of payment under any other program. The specific repayment schedules differ across individuals.

Student loan debtors may also select repayment programs that limit the required payment to a formulaic amount determined largely by income, but also additional factors. Income-driven repayment plans (IDR plans) include Income-Contingent Repayment (ICR), Income-Based Repayment (IBR), Pay-As-You-Earn (PAYE), and the Revised PAYE (REPAYE) (Table 1).⁵

<Table 1 about here>

Table 1: Characteristics of Alternative Income-Driven Repayment Plans for Federal Student Loan Debt

Most borrowers are eligible for one or more IDR plans. An additional, potential very lucrative (for borrowers) benefit of IDR plans is that at the end of the repayment term (typically 10, 20, or 25 years), any remaining debt, including unpaid interest, usually is forgiven. Eligibility, payment amount, interest benefits, repayment period, and amount forgiven at the end

of repayment period vary by plan, amount of student debt, date of loan origination, income, and family size. Because the monthly payments for IDR plans are based on the difference between a borrower's income and some multiple of the poverty threshold, the monthly payment can be zero for some borrowers.

The oldest existing repayment plan is the ICR plan, first authorized as a pilot program in the 1992 Higher Education Act reauthorization (see Shireman, current issue) . The computation of payments under ICR is extraordinarily complicated (the computation is described in detail in the appendix). The monthly payment under ICR is the lesser of 20 percent of the borrower's discretionary income, defined under ICR as adjusted gross income (AGI) less the poverty threshold or the fixed payment on a fully-amortized loan over 12 years, adjusted by an "income percentage factor." Because of the higher valuation of discretionary income and the allocation of 20 percent of that income to student loan repayment, ICR is usually less advantageous for student loan debtors than other plans.

The loan repayment period of REPAYE, PAYE and IBR plans is typically 20 years. The repayment period is 25 years for older loans in IBR and loans borrowed for graduate and professional study in the REPAYE plan. Borrowers must have a Partial Financial Hardship to qualify for IBR or PAYE plans. A borrower satisfies Partial Financial Hardship requirements for IBR/PAYE if the 10-year standard repayment amount exceeds 15/10 percent of discretionary income (AGI less 150 percent of the relevant poverty threshold). The most recently created plan, REPAYE, which was originally conceived as an expansion of the PAYE program, does not have the Partial Financial Hardship requirement and brings most older loans into the IDR space.⁶ The ICR plan remains the only income-driven option for Parent PLUS borrowers (if borrowers consolidate these loans into a Direct Consolidation Loan).

The required payments under IDR are 10 percent of discretionary income for PAYE, REPAYE, and IBR borrowers with Direct Loans disbursed after July, 2014. In our simulations, we evaluate IBR under its original requirements, where payments are 15 percent of discretionary income. Because the calculation of repayment schedules under ICR is so individualized and cumbersome, we do not include the ICR program in most of our simulations and only compute an ICR repayment schedule for income of \$30,000 and debt of \$50,000. With the more appealing features of the more recently created plans for student loan borrowers, we expect that ICR participation is likely to decrease substantially, with borrowers largely moving into REPAYE.

After the required repayment periods, any remaining loan amount is forgiven. Under IDRs, monthly payments often do not cover the full amount of interest accrued during the month. The unpaid interest is not capitalized except under a triggering event, explained below. PAYE and IBR both void the first three years of unpaid interest on subsidized loans, while REPAYE voids unpaid interest on subsidized loans for the first three years and 50 percent afterwards. Unpaid interest on unsubsidized loans also is reduced by 50 percent throughout the repayment period under REPAYE. Under IBR and PAYE, the loss of Partial Financial Hardship status would lead to capitalization of accumulated, unpaid interest. Unpaid interest also would be capitalized if borrowers voluntarily leave the plans or fail to recertify their Partial Financial Hardship status. To recertify their Partial Financial Hardship status, borrowers typically submit their previous year's tax return to verify their income and family size. The Public Service Loan Forgiveness (PSLF) program forgives remaining balances on Direct Loans after 10 years working full-time for a qualifying employer, usually a government agency or 501(c)(3) organization. Candidates for PSLF must make 120 timely payments to qualify for forgiveness. The PSLF program is essentially an add-on to existing IDRs because a standard, fully amortizing

plan would pay off the principal in ten years. Thus, candidates for PSLF are necessarily enrolled in an IDR plan.. The program was implemented in 2007 and the first applications will be submitted in 2017.

The Government Accountability Office (GAO, 2015) estimates that the majority of borrowers of federal student loans are qualified for an IDR plan. To date, only a small percentage of eligible borrowers participate. In 2014, 19 percent of borrowers were using these programs. The take-up rate of these programs depends largely on the borrowers' understanding of the programs (GAO, 2015).

In recent years, federal agencies, institutions, and counselors have made efforts to raise awareness of these programs. The U.S. Department of Education emails borrowers with a balance higher than \$25,000 and/or who have missed payments information about repayment plans. The Congressional Budget Office (CBO) is seeing a recent increase in the take-up rates and has incorporated the possible increases in the adoption of repayment plans and forgiven amounts into projections of future costs to the federal government. Figure 1 shows the share of borrowers that participated in various programs in second quarter 2016.⁷ About a quarter of the student-loan borrowers were enrolled in an IDR plan.

<Figure 1 about here>

Figure 1: Department of Education Direct Loan Portfolio by Repayment Program (debtors)

Analysis of Borrower and Fiscal Impacts

In this section, we use simulations to evaluate how the IBR, PAYE, and REPAYE programs affect borrowers and the federal budget under a number of alternative income-debt scenarios when entering repayment. The income basis for IDRs is adjusted gross income (AGI, as defined by the IRS). Given our assumptions about the borrower in these simulations,

described below, AGI would rarely differ from gross income. In the simulations, income ranges from \$25,000 to \$50,000, while initial student debt load ranges between \$20,000 and \$100,000. The scenarios cover the large bulk of people with outstanding student loan debt entering a repayment program.

Currently, independent students or dependent students whose parents were denied a Federal Parent PLUS loan are limited to \$57,500 in accumulated debt for undergraduate study, while those who use student loans to finance graduate school are limited to \$138,500, inclusive of any undergraduate borrowing (medical school and health professions students can borrow up to \$224,000 in total). However, these principal balances could potentially grow significantly with capitalized interest in forbearance, or in the case of deferment, capitalized interest on unsubsidized loans. Consider an undergraduate who attends college over five years, borrows the maximum \$24,500 in subsidized loans and the maximum \$33,000 in unsubsidized loans, for an aggregate of \$57,500 (borrowing is limited to the cost of attendance less other financial aid). Interest (at an assumed 6 percent) would accumulate on the unsubsidized loans during the five years in which the borrower is enrolled in school and the six-month grace period that follows, assuming no interest payments are made during the loan period. The subsidized amount would remain \$24,500, but the unsubsidized amount, following interest capitalization, will have grown from \$33,000 to \$59,721. In this scenario, total student loan debt when entering repayment would be \$84,221.⁸

All graduate student loans are unsubsidized, so a student borrowing the maximum would be expected to leave school with a much higher balance if not paying accruing interest while enrolled or in deferment. Further, graduate students may borrow additional amounts from the graduate PLUS program with no limits other than the cost of attendance. For some programs,

particularly those leading to professional degrees, the cost of attendance can be extraordinarily high, and graduates often enter their careers (and repayment) with very large student debt loads. About 80 percent of medical students (pursuing an MD) graduate with over \$100,000 in student debt (AMA Insurance, 2014), and almost two-thirds graduate with more than \$150,000 in education debt. The median is about \$175,000.

Payments and outcomes of IDRs depend not only on income and debt, but also marital status, number of dependents (as defined by the IRS), interest rate on the student debt, the rate used to discount payments to calculate the net present value (NPV), growth rate of income, and rate of growth in the poverty threshold. For this analysis, we must make assumptions about these factors. Later in the paper we test the sensitivity of the results to these assumptions.

First, we assume that the borrower entering a repayment program is single and has no dependents. We believe that this assumption reflects the modal family structure of those entering repayment, if not the majority. We assume that interest rate charged on student debt is 6 percent, based on the average in the U.S. Department of Education's student loan portfolio (authors' calculation).⁹ In calculating discretionary income over time, we assume that income grows at 3.4 percent annually, which is the compound annual growth rate (CAGR) in employee compensation between 2000 and 2015.¹⁰ We assume the poverty threshold grows at a CAGR of 2.14 percent, based on the annualized rate of increase for a one-person household between 2000 and 2016.¹¹ We assume that the future stream of student loan payments is discounted at the same rate as investment grade U.S. corporate bonds (S&P Dow Jones Index, U.S. Corporate Bonds, U.S. Investment Grade Bonds), which was approximately 2.8 percent at time of analysis.

Our most critical assumption is that debt is paid as agreed. This analysis considers the impacts of these programs as the programs were designed, with no attention to late payments,

delinquency, or default. The impetus behind IDRs was an expected decline in delinquencies and defaults, and early results bear that out (GAO, 2015). Focusing on the impact of student loan repayment programs as designed is critical in making informed policy decisions.

Budget Process for the Federal Student Loan Program

The net costs of student loan programs are recorded in the federal budget on an accrual basis in the year the loan is disbursed (see Edmiston, 2012). The cost is calculated as the net present value of the federal government's expected cash flow over the life of the loan (or loan guarantee) less the amount disbursed.¹² We follow the same procedure in our simulations. These estimates do not account for the costs of administering the programs, such as those associated with origination, servicing, and collection. These costs are treated separately in the federal budget on a cash basis.

Recent federal budget estimates project a *negative* net cost for the Direct Loan program. While a negative net cost suggests that the federal government “profits” from the student loan program, more widely accepted accounting methodologies, specifically fair value, reflect a net cost.¹³ Under the Fair Credit Reporting Act, expected repayments are discounted to present value using the U.S. Treasury's borrowing rates. At that risk-free rate, expected repayments do not reflect the risk that default rates could be higher than projected (GAO, 2005). Although loans are not dischargeable in bankruptcy and the federal government can garnish wages and withhold social security benefits, some argue there are still risks associated with lending to students and should instead use fair-value accounting methods. To address this critique, we offer simulations that use an index of yields on investment grade U.S. corporate bonds. In addition to accounting for market risk, fair-value accounting provides a more complete picture of the cost of federal student loan programs because it includes administrative costs, which can be significant¹⁴.

Methodology

We evaluate the outcomes of student loan debt relief programs with simulations. For 25 combinations of income and debt when entering repayment, we use the criteria as of September 2016 for IDR program to compute the required payment for each month over the repayment term. For PAYE and REPAYE, there are 240 monthly payments (unless the balance is paid before 20 years); for IBR, we compute up to 300 payments. Figure 2 shows repayment schedules for each IDR program for an individual with income of \$30,000 and student debt of \$50,000 upon entering repayment. For comparison, schedules for the standard repayment plan, Extended Repayment plan, Graduated Repayment plan, and ICR also are included.

<Figure 2 about here>

Figure 2: Repayment Schedules Under Alternative Repayment Plans

The repayment schedules under PAYE and REPAYE are the same in this case because the individual does not lose Partial Financial Hardship status during the loan period under PAYE does not exit either program. REPAYE was conceived as an extension of PAYE to a larger pool of debtors, and the income-driven payment calculation is identical. While there are some significant differences between the programs (like the Partial Financial Hardship requirement for PAYE and rules on capitalization of unpaid interest), these differences result in significantly different outcomes only under special circumstances. If income were higher or grew more quickly or if there were an exit, interest would have been capitalized by up to \$5,000 for PAYE and \$9,126 for REPAYE, and the required payments under REPAYE would exceed those under PAYE at some point during the repayment term (as there is no payment cap under REPAYE).

PAYE and REPAYE typically yield nearly the same results in any kind of analysis, as seen in the simulations below. In the specific case considered here, payments and total amount

paid (area under the curve) are lowest under PAYE/REPAYE, and thus one of these programs would be the best choice among IDR programs for this candidate. However, PAYE or REPAYE may not be the best options for other borrowers, depending on their individual circumstances. Therefore, participation in IBR remains relatively high. PAYE or REPAYE may also not be the best option for borrowers who exit from the program. If forgiven debt and interest are taxable at the end of the repayment period, PAYE and REPAYE could be considerably more costly to the debtor. Combined forgiveness of principal and unpaid interest would likely be about \$60,000 under both programs. Forgiveness and tax implications are discussed further later in the paper. Of course, many borrowers entering repayment only qualify for some and not all plans.

An important factor in the calculation of fiscal impact is the capitalization of unpaid interest. Unpaid interest (typically arising from negative amortization) is treated differently across IDR programs. Under IBR and PAYE, a “capitalizing event” includes the loss of Partial Financial Hardship status. Unpaid interest is capitalized at that point, and that is how capitalization is treated in our simulations. Under ICR, IBR, PAYE, and REPAYE, exit from the program is a “capitalizing event.” In our simulations, we track unpaid interest, which gives an upper bound of the amount of capitalization that is possible under each program if a borrower were to exit.

Under IBR, PAYE, and REPAYE, unpaid interest is fully subsidized during the first three years of repayment if the loan is subsidized. In our simulations we assume debt is unsubsidized. REPAYE subsidizes unpaid interest by 50 percent throughout the program even if the debt is made up of unsubsidized loans. PAYE limits interest capitalization to 10 percent of the debt when entering repayment.

Simulation Results

For each IDR and income-debt combination, we compute total payments (decomposed into interest, capitalized interest, and principal), the upper bound for capitalized interest, the amount of forgiveness of loan principal and unpaid interest, and the net present value of the fiscal impact to the U.S. Department of Education (i.e., the fiscal impact) (Table 2). The simulations do not consider delinquencies, tax implications, and program exits.

<Table 2 about here>

Table 2: Comprehensive Accounting of Income-Driven Repayment Outcomes

Fiscal Impact. The fiscal impact is the present value of the future stream of repayments less the disbursed amount (denoted in Table 2 as NPV). We discuss two scenarios in some detail. We then summarize the simulations in a series of charts that highlight the variation in fiscal impact across scenarios.

Consider a borrower entering the IBR program with \$25,000 in income and \$20,000 in student debt. Payments over the repayment term sum to \$36,290 (Table 2), of which \$16,157 is interest, \$20,000 is the original principal, and \$133 is capitalized interest (due to the loss of Partial Financial Hardship status in the 181st month of repayment). The present value of the stream of payments is \$27,085, which, less the disbursement of \$20,000, yields a fiscal impact (NPV) of \$7,085. In this scenario, the fiscal impact is positive (and would be a negative entry in the U.S. Department of Education's budget),

Now consider the same borrower entering the IBR program with \$75,000 in student debt. Total payments would be \$59,988, all of which is interest. The borrower would remain qualified for Partial Financial Hardship throughout the repayment term, and thus no unpaid interest (amounting to \$52,512 over the repayment term) would be capitalized. The required payment

would never exceed the monthly interest accrual, and thus payment of the original principal would be \$0. In this scenario, the fiscal impact is a loss of \$35,059.

Figures 3, 4, and 5 show the fiscal impact of 25 income-debt scenarios under IBR, PAYE, and REPAYE, respectively. Tax implications could alter the calculus. The fiscal impact varies greatly by income level and debt level.

Consider first the IBR program (Figure 3). The greatest fiscal gain is derived from the participant with \$50,000 in income and \$100,000 in student debt, resulting in a fiscal gain of \$41,777. The most expensive participant from a fiscal impact perspective has \$25,000 in income and \$100,000 in debt, resulting in a fiscal cost of \$60,059. Under PAYE and REPAYE, the highest-cost participant is also the one with \$25,000 in income and \$100,000 in debt, both resulting in fiscal costs of about \$80,000. Also under both PAYE and REPAYE, the participant with \$50,000 in both student debt and income yields the greatest fiscal gain—about \$17,000 in both cases.

<Figure 3, 4, 5 about here>

Figure 3: Fiscal Impact Under the IBR Plan

Figure 4: Fiscal Impact Under the PAYE Plan

Figure 5: Fiscal Impact Under the REPAYE Plan

Considered together, the charts reveal that PAYE and REPAYE generally yield greater fiscal cost (or lower gains) than IBR. The charts also reveal that high-income, high-debt individuals often result in fiscal gains, which are substantial in some cases, while low-income, high-debt borrowers typically result in substantial fiscal losses. High-income, low-debt borrowers are not likely to qualify for IDR. Low-income borrowers with relatively low debts typically would still generate fiscal gains under IBR, although much smaller in magnitude. But those with lower incomes and low debt loads remain costly from a fiscal perspective under

PAYE and REPAYE. The difference in fiscal impact between IBR and PAYE/REPAYE for lower-income, low-debt borrowers is largely the share of discretionary income allocated to required payments, which is 15 percent under IBR (original plan) but 10 percent under PAYE/REPAYE. With lower incomes, payments usually are income-driven throughout the repayment period.

The simulations assume a continuous growth in income at 3.4 percent. While this assumed rate of growth in income is necessary, variations in an individual's income stream can obscure the potential for substantial interest capitalization. For example, consider an individual who enters repayment under IBR with \$25,000 in income and \$75,000 in debt. If income grows at 3.4 percent annually, then the individual never loses Partial Financial Hardship status and no interest is capitalized. But suppose the individual is promoted or takes a new job in the 120th month of repayment, and income increases from \$34,980 (projected at 3.4 percent) to \$75,000. The individual would immediately lose Partial Financial Hardship status and have nearly \$30,000 of unpaid interest added to the principal balance (capitalized). While the simulations are effective in understanding how the IDRs work and their implications for borrowers and the federal government, individuals each face unique circumstances that can result in very different outcomes both personally and fiscally.

Forgiveness. Forgiveness of debt principal and unpaid interest is the most attractive feature of IDR programs for many borrowers. Forgiveness occurs at the end of the repayment period after a specified number of payments have been made. Figure 6 shows forgiveness for the 25 income-debt combinations simulated for the REPAYE program. Debt load is the dominant factor affecting the amount of forgiveness, with initial income a secondary factor. For the REPAYE program, under the assumptions of our simulations, an individual entering repayment

with \$25,000 in income and \$100,000 in student debt could expect nearly \$200,000 in forgiveness of principal and unpaid interest. Those with relatively low debt, especially if incomes are relatively high, likely would not see any principal or interest forgiven.

<Figure 6 about here>

Figure 6: Debt and Unpaid Interest Forgiveness Under the REPAYE Programs

Forgiveness of principal and unpaid interest is not a real cost to the government and does not enter into fiscal impact calculations, although forgiven debts can be subject to federal income taxes. The fiscal impact is determined by the discounted stream of repayments and the disbursement amount. The fiscal impact of forgiveness is zero; forgiven balances represent “paper losses.” Forgiveness is critically important in the incentives for acquiring student debt, however. The combination of income-driven repayment and forgiveness of principal and unpaid interest creates a severe moral hazard.

Moral Hazard. Krugman (2009) suggests that moral hazard occurs when the person deciding on the amount of risk to bear (the student loan borrower) is not the person who pays if “things go badly” (taxpayers) (p. 63). This definition is particularly appropriate for the moral hazard inherent in IDR programs. Looking through Table 2, which provides complete results from the simulations, the moral hazard is quite striking and obvious.

Under all of the IDRs, a threshold is reached at which a student can borrow more at no cost to himself but at potentially substantial fiscal cost. For example, consider a borrower who expects to have income of \$25,000 after completing school and entering repayment. For an individual who accumulates \$20,000 in student debt, the payout over the repayment term in, say, REPAYE, would be \$27,459. Because payments are based entirely on discretionary income, the

payment would remain \$27,459 for any level of borrowing above \$20,000. While there are limits on borrowing—a maximum at the undergraduate level and cost of attendance at the undergraduate and graduate levels—the accumulation of large amounts of student debt is not at all uncommon. While this hypothetical student bears no additional cost by borrowing more, the fiscal cost is substantially higher. In our simulations, at \$20,000 of student debt, the fiscal cost is \$32. At \$30,000 it is \$10,032. At \$75,000, it is \$55,032.

Moral hazard is not limited to low levels of income on entering repayment. At \$50,000 in income, the debtor would pay \$99,661 whether borrowing \$75,000 or \$100,000. In these cases, the fiscal cost is \$1,511 and \$26,511, respectively. The difference is the \$25,000 in additional borrowing.

Sensitivity Analysis

The simulations in this study rely on a number of assumptions to evaluate borrower and fiscal outcomes of IDR programs. While we use what we think are the best assumptions given current economic data and research, we recognize that the results are sensitive to these assumptions, and some more than others. To gauge the sensitivity of results to assumptions, we consider a single case: an individual in the REPAYE programs with income of \$35,000 and debt of \$30,000. We consider specifically the sensitivity of fiscal impact to the assumptions. The results of the analysis are provided in Figure 7.

<Figure 7 about here>

Figure 7: Sensitivity Analysis of Fiscal Impact

The estimated fiscal impact changes with a change in any of the assumptions, but the estimated fiscal impacts are not qualitatively different—for example, positives do not become negatives. The fiscal impact is highly sensitive to the rate of interest on student loan debt, which

is not surprising given that interest has priority over principal, and in many cases, only interest is paid. While different assumptions about income growth affect the fiscal outcome, the effect does not appear to be as strong as changes in assumptions of student loan interest. This result is sensible because only a fraction of income is considered in calculating payments. The discount rate can significantly alter the NPV of fiscal impact, as would be expected. However, the impact should be proportional to the discount rate, which would not change the results of our simulations at all except for a scalar multiplier.

Conclusion

Student loans make higher education possible for many individuals who otherwise may not be able to pay the costs of higher education. A considerable body of research on the returns to higher education almost uniformly supports the notion that higher education yields private benefits that are worth the cost, however financed, as well as social benefits (see survey in Toutkoushian and Paulsen 2016). Baum, Ma and Payea (2014) estimate that the median lifetime earnings for those with a bachelor's degree are more than two thirds higher than those with only a high school diploma.

Using simulations under a large number of income and debt scenarios, we find that fiscal implications vary depending on income and debt load of borrowers and the relief program chosen. Fiscal costs are especially high for borrowers with low incomes and high debts. A natural policy question arising from this analysis is whether the fiscal cost of IDRs for this cohort and fiscal gains from higher-income, high-debt borrowers could be used in a way that would serve the purpose of the student loan program but at less cost and risk to the neediest borrowers.

A related question pertains to ways to reduce the moral hazard. The simulations uncover a moral hazard that is a significant concern given its costs. While we are not aware of any general tendency to over-borrow, a good program should not have incentives that come at such great cost to taxpayers.

Recent policy debates on student loan debt have focused on efforts to relieve debtors of burdensome payments. These efforts, as embodied in IDR plans, are largely successful in making student loan repayment more manageable for borrowers, but there are also important questions for policymakers. The IDR plans examined in this study shift a significant share of risk (say, from uncertain labor market outcomes) from borrowers to taxpayers but also come with fiscal costs.

Tax Implications

A detailed discussion of the tax implications of the cancellation of debt and unpaid interest is outside the scope of this paper. Nonetheless, these implications can be substantial and potentially create significant financial hardship for the borrower. Under current law, debt forgiveness is taxable in the year it is cancelled except where the debt is forgiven for participation in certain specified professions, such as under the Public Service Loan Forgiveness Program. Debt cancelled because of closed schools (e.g., Corinthian College) also is not generally taxable. If an individual were to have \$100,000 of debt and unpaid interest cancelled and have a marginal income tax rate of 28 percent, the cancellation would result in a tax cost of \$28,000 in the year the debt is cancelled. This is a huge tax bite for most people, but especially for lower-income borrowers who are the most likely to benefit from IDR programs.

An indirect but critically important tax implication of the student loan program is the effect of the generally higher incomes that come with higher education on federal, state, and

local tax collections. These higher earnings generally translate into higher tax contributions. Further, college graduates typically impose less cost on the government from public assistance, crime, and other sources. On the other hand, at least a portion of student loan interest is deductible on personal income tax returns for most borrowers in repayment.¹⁵

Delinquency and Default

About 16.3 percent of student loan borrowers and 11.3 percent of student loan debt were in any stage of delinquency (late in payment) at the end of first quarter of 2016 according to our calculations using the CCP/Equifax. These numbers include borrowers who are not in active repayment. The average and median balances for delinquent borrowers were \$25,193 and \$12,423 respectively, lower than the amounts when considering all borrowers. The average and median delinquent balances were \$19,664 and \$10,436, respectively, implying that some borrowers were delinquent on some student loans but current on others.¹⁶

Our goal in this paper was to describe the mechanics of IDR programs and estimate outcomes when these programs are working as intended. Nonetheless, delinquencies and defaults are critically important in evaluating the fiscal impact of IDR programs. A reduction in defaults was a driving force in conceptualizing IDR programs, and our expectation is that defaults are and will be much lower for those in IDRs, all else equal. Research using early data from these IDRs shows lower default rates (GAO, 2015), but little accessible data are available on the default rates across payment programs. Future research needs to take into account of how defaults and delinquencies in these IDR plans can affect the costs to the federal government.

¹⁵The FFEL program provided federal guarantees for student loans made by private lenders. In July 2010, the FFEL program was replaced by a direct loan program: the William D. Ford Federal Direct Loan Program (Direct Loan)

(that is, student loans are provided directly by the U.S. Department of Education). Private loans continue to be available to students, but they are not guaranteed by the federal government or otherwise subsidized. Subsidized student loans from revolving loan funds controlled by educational institutions also continue to be available. For additional details, see Edmiston (2013). The Direct Loan and FFEL Portfolios by Loan Status are available at: <https://studentaid.ed.gov/sa/about/data-center/student/portfolio>.

² Federal Reserve Bank of New York Quarterly Report on Household Debt and Credit. May, 2016. Available at https://www.newyorkfed.org/medialibrary/interactives/householdcredit/data/pdf/HHDC_2016Q1.pdf.

³All identifying information is removed from individual credit reports. Consumers are linked overtime by an ID that is a scramble of their Social Security numbers.

⁴ <https://studentaid.ed.gov/sa/repay-loans/deferment-forbearance>

⁵ For more details about each plan, see <https://studentaid.ed.gov/sa/repay-loans/understand/plans/income-driven>.

⁶See “Student Assistance General Provisions, Federal Family Education Loan Program, and William D. Ford Federal Direct Loan Program,” *Federal Register*, vol. 80, no. 210, pp. 67204-67242, October 15, 2015. REPAYE allows monthly payments to be higher than those under a standard plan, different treatment of married couples’ income PAYE plan, and different interest benefits.

⁷ The Direct Loan and ED-Held FFEL Portfolio by Repayment Plan can be found at <https://studentaid.ed.gov/sa/about/data-center/student/portfolio>

⁸ The calculation is $\$24,500 + [\$6,000 (1+0.06/12)^{66} + \$6,000 (1+0.06/12)^{54} + \$7,000 (1+0.06/12)^{42} + \$7,000 (1+0.06/12)^{30} + \$7,000 (1+0.06/12)^{18}] (1+0.06/12)^6$.

⁹ Data sources include interest rates enumerated at <https://studentaid.ed.gov/sa/types/loans/interest-rates> and Department of Education portfolio composition from The National Student Loan Data System / ED.

¹⁰ U.S. Department of Commerce, Bureau of Economic Analysis, Personal Income and Outlays, Table 1. Retrieved from Haver Analytics.

¹¹ U.S. Census Bureau, Historical Poverty Tables: People and Families - 1959 to 2015, Table 1: Weighted Average Poverty Thresholds for Families of Specified Size: 1959 to 2015

¹² The CBO budget calculations do account for the risk of default or exercise of options to prepay or to seek forbearance or deferment. The cost estimates under the former FFEL program also account for payments to lenders.

The CBO uses annual data from the U.S. Department of Education to update default rates for the outstanding loan portfolio to make allowances in the current budget for any difference in expected costs to the federal government.

¹³ For detailed description of fair-value accounting, see Financial Accounting Standards Board, 2010, “Statement of Financial Accounting Standards, No. 157, Fair Value Measurements” (<http://www.fasb.org/>).

¹⁴ The most recent estimates are in Table 3 of <https://www.cbo.gov/sites/default/files/51310-2016-03-StudentLoan.pdf>.

¹⁵ The limit in student loan interest that may be deducted was \$2,500 for the 2014 tax year. The deduction is available even to those who do not itemize deductions, but there are income limitations. For single borrowers in the 2014 tax year, the deduction was phased out beyond income of \$80,000. For borrowers who were married and filing jointly with their spouses, the phase out began at \$160,000. Borrowers who are married but file separately from their spouses are not allowed to take the student loan interest deduction.

¹⁶ The CCP/Equifax data contain servicer-reported defaults which are not consistent because of various criteria for defaults from different lenders. Also about 10 percent of the loans are private loans and won't have an impact on the federal government budget.

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Table 1: Characteristics of Income-Driven Repayment Plans for Federal Student Loan Debt

Program	Income-Based Repayment (old)	Income-Based Repayment (new)	Income-Contingent Repayment	Pay-As-You-Earn	Revised Pay-As-You-Earn
Abbreviation	IBR	IBR (new)	ICR	PAYE	REPAYE
Eligibility	FFEL; DL with no loans after Jul 14 2014	DL with loans after Jul 14 2014 “new borrowers”	DL; Direct Consolidated FFEL and FFELP	DL disbursed on/after Oct 1 2011; Direct Consolidated loans in some cases	DL; Direct Consolidated FFEL and FFELP
Hardship Requirement (PFH)	Yes	Yes	No	Yes	No
Discretionary Income	AGI – 1.5 (Poverty)	AGI – 1.5 (Poverty)	AGI – Poverty	AGI – 1.5 (Poverty)	AGI – 1.5 (Poverty)
Income-Driven Payment (share of discretionary income)	Lesser of 15% or 10-yr level payment	Lesser of 10%; or 10-yr level payment	Lesser of 20% or payment on 12-yr level payment plan	Lesser of 10%; or 10-yr level payment	10%; no limit on payment
Interest Capitalization	If no longer PFH (incl. not recertifying); no maximum	If no longer PFH (incl. not recertifying); no maximum	No limit	If no longer PFH, fail to recertify, or voluntarily leave PAYE; Limit of 10% of original debt amount	If fail to recertify or voluntarily leave REPAYE
Subsidy of Interest (if capitalized)	100% for 3 years if subsidized loan, else none	100% for 3 years if subsidized loan, else none	None	100% for 3 years if subsidized loan, else none	100% for 3 years if subsidized loan, else 50% life of repayment term
Repayment Term	300 payments over at least 25 years	240 payments over at least 20 years	300 payments over at least 25 years	240 payments over at least 20 years	240 payments over at least 20 years; 300 payments over at least 25 years if debt financed graduate or professional education
Sources: National Council of Higher Education Resources, “Income Driven Repayment Comparison Chart; U.S. Department of Education, Office of Federal Student Aid, “Income-Driven Repayment Plans for Federal Student Loans” and “Income-Driven Repayment Plans: Questions and Answers.					

Table 2: Estimated Impacts of Income-Driven Repayment Programs to Borrowers and Taxpayers

IBR									
AGI	Initial Debt	Payments				Upper Bound for Capitalized Interest	Loan Forgiveness	Unpaid Interest (forgiven if not capitalized)	NPV
		Interest	Capitalized Interest	Principal	Total				
\$25,000	\$20,000	\$16,157	(\$133)	\$20,133	\$36,290	\$0	\$0	\$0	\$7,085
\$25,000	\$30,000	\$45,064	(\$2,341)	\$14,790	\$59,854	\$0	\$17,551	\$0	\$9,873
\$25,000	\$50,000	\$55,225	\$0	\$4,763	\$59,988	(\$19,147)	\$45,237	\$19,147	(\$10,059)
\$25,000	\$75,000	\$59,988	\$0	\$0	\$59,988	(\$52,512)	\$75,000	\$52,512	(\$35,059)
\$25,000	\$100,000	\$59,988	\$0	\$0	\$59,988	(\$90,012)	\$100,000	\$90,012	(\$60,059)
\$30,000	\$20,000	\$8,741	\$0	\$19,919	\$28,660	\$0	\$81	\$0	\$4,080
\$30,000	\$30,000	\$22,727	\$0	\$29,810	\$52,537	\$0	\$190	\$0	\$9,930
\$30,000	\$50,000	\$61,545	\$0	\$28,210	\$89,755	(\$5,902)	\$21,790	\$5,902	\$10,308
\$30,000	\$75,000	\$84,483	\$0	\$5,272	\$89,755	(\$27,377)	\$69,728	\$27,377	(\$14,692)
\$30,000	\$100,000	\$89,755	\$0	\$0	\$89,755	(\$60,245)	\$100,000	\$60,245	(\$39,692)
\$35,000	\$20,000	\$6,718	\$0	\$20,000	\$26,718	\$0	\$0	\$0	\$3,249
\$35,000	\$30,000	\$14,464	\$0	\$30,000	\$44,464	\$0	\$0	\$0	\$6,776
\$35,000	\$50,000	\$49,947	(\$674)	\$50,674	\$100,622	\$0	\$0	\$0	\$20,951
\$35,000	\$75,000	\$94,411	\$0	\$25,112	\$119,522	(\$12,296)	\$49,888	\$12,296	\$5,675
\$35,000	\$100,000	\$113,653	\$0	\$5,869	\$119,522	(\$35,667)	\$94,131	\$35,667	(\$19,325)
\$40,000	\$20,000	\$6,645	\$0	\$20,000	\$26,645	\$0	\$0	\$0	\$3,216
\$40,000	\$30,000	\$10,939	\$0	\$30,000	\$40,939	\$0	\$0	\$0	\$5,261
\$40,000	\$50,000	\$35,363	\$0	\$50,000	\$85,363	\$0	\$0	\$0	\$15,767
\$40,000	\$75,000	\$89,930	\$0	\$59,360	\$149,289	(\$3,982)	\$15,640	\$3,982	\$26,042
\$40,000	\$100,000	\$125,821	\$0	\$23,469	\$149,289	(\$19,348)	\$76,531	\$19,348	\$1,042
\$50,000	\$20,000	\$6,645	\$0	\$20,000	\$26,645	\$0	\$0	\$0	\$3,216
\$50,000	\$30,000	\$9,967	\$0	\$30,000	\$39,967	\$0	\$0	\$0	\$4,824
\$50,000	\$50,000	\$21,337	\$0	\$50,000	\$71,337	\$0	\$0	\$0	\$10,119
\$50,000	\$75,000	\$57,479	\$0	\$75,000	\$132,479	\$0	\$0	\$0	\$25,297
\$50,000	\$100,000	\$115,506	\$0	\$93,318	\$208,824	(\$3,023)	\$6,682	\$3,023	\$41,777
PAYE									
AGI	Initial Debt	Payments				Upper Bound for Capitalized Interest	Loan Forgiveness	Unpaid Interest (forgiven if not capitalized)	NPV
		Interest	Capitalized Interest	Principal	Total				
\$25,000	\$20,000	\$20,464	\$0	\$6,996	\$27,459	(\$2,000)	\$13,004	\$2,056	\$56
\$25,000	\$30,000	\$26,543	\$0	\$916	\$27,459	(\$3,000)	\$29,084	\$9,384	(\$9,944)
\$25,000	\$50,000	\$27,459	\$0	\$0	\$27,459	(\$5,000)	\$50,000	\$32,541	(\$29,944)
\$25,000	\$75,000	\$27,459	\$0	\$0	\$27,459	(\$7,500)	\$75,000	\$62,541	(\$54,944)
\$25,000	\$100,000	\$27,459	\$0	\$0	\$27,459	(\$10,000)	\$100,000	\$92,541	(\$79,944)
\$30,000	\$20,000	\$15,152	\$0	\$20,000	\$35,152	\$0	(\$0)	\$0	\$6,798

\$30,000	\$30,000	\$31,423	\$0	\$10,477	\$41,900	(\$2,229)	\$19,523	\$2,229	\$804
\$30,000	\$50,000	\$41,744	\$0	\$156	\$41,900	(\$5,000)	\$49,844	\$18,251	(\$19,196)
\$30,000	\$75,000	\$42,061	\$0	\$0	\$42,061	(\$7,500)	\$75,000	\$47,939	(\$44,076)
\$30,000	\$100,000	\$42,061	\$0	\$0	\$42,061	(\$10,000)	\$100,000	\$77,939	(\$69,076)
\$35,000	\$20,000	\$9,592	\$0	\$20,000	\$29,592	\$0	\$0	\$0	\$4,561
\$35,000	\$30,000	\$25,825	(\$82)	\$30,082	\$55,907	\$0	(\$0)	\$0	\$11,336
\$35,000	\$50,000	\$51,099	\$0	\$5,442	\$56,541	(\$5,000)	\$44,558	\$8,090	(\$8,298)
\$35,000	\$75,000	\$56,541	\$0	\$0	\$56,541	(\$7,500)	\$75,000	\$33,459	(\$33,298)
\$35,000	\$100,000	\$56,541	\$0	\$0	\$56,541	(\$10,000)	\$100,000	\$63,459	(\$58,298)
\$40,000	\$20,000	\$7,267	\$0	\$20,000	\$27,267	\$0	\$0	\$0	\$3,545
\$40,000	\$30,000	\$18,010	\$0	\$30,000	\$48,010	\$0	\$0	\$0	\$8,336
\$40,000	\$50,000	\$53,149	\$0	\$17,872	\$71,021	(\$2,590)	\$32,128	\$2,590	\$2,480
\$40,000	\$75,000	\$69,676	\$0	\$1,346	\$71,021	(\$7,500)	\$73,654	\$20,231	(\$22,520)
\$40,000	\$100,000	\$71,021	\$0	\$0	\$71,021	(\$10,000)	\$100,000	\$48,979	(\$47,520)
\$50,000	\$20,000	\$6,645	\$0	\$20,000	\$26,645	\$0	(\$0)	\$0	\$3,261
\$50,000	\$30,000	\$11,316	\$0	\$30,000	\$41,316	\$0	(\$0)	\$0	\$5,503
\$50,000	\$50,000	\$38,105	\$0	\$50,000	\$88,105	\$0	(\$0)	\$0	\$17,040
\$50,000	\$75,000	\$80,618	\$0	\$19,364	\$99,982	(\$5,169)	\$55,636	\$5,169	(\$963)
\$50,000	\$100,000	\$96,948	\$0	\$3,034	\$99,982	(\$10,000)	\$96,966	\$22,778	(\$25,963)

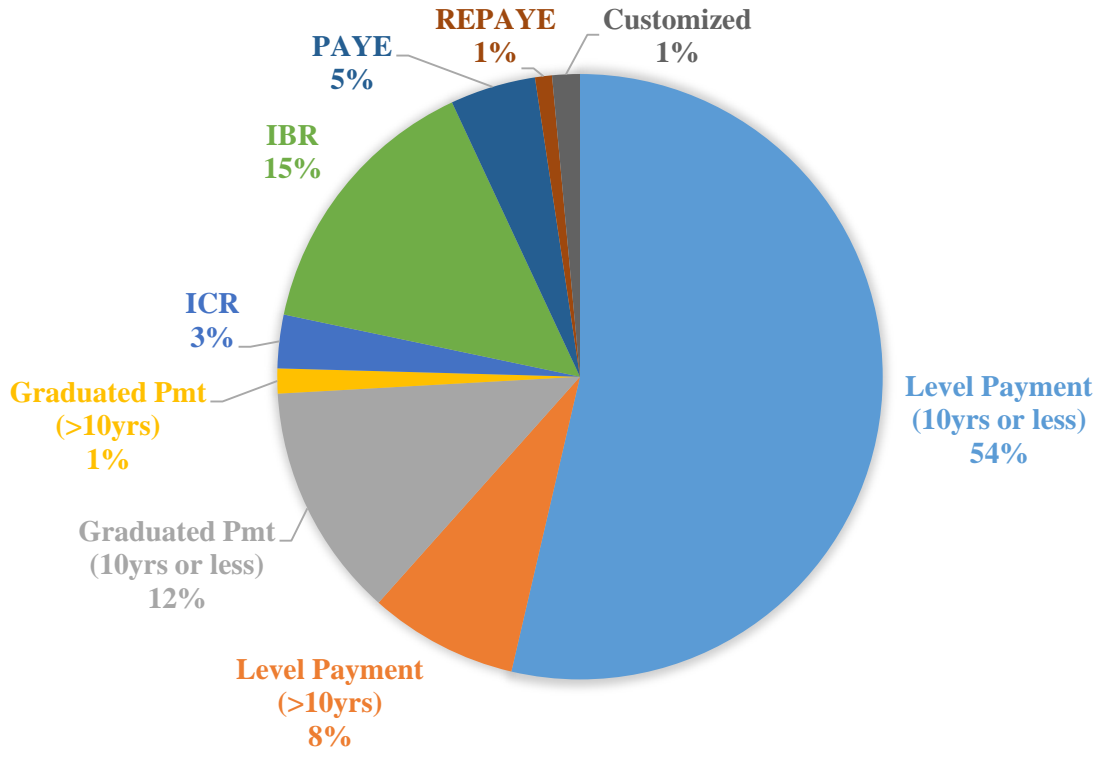
REPAYE

AGI	Initial Debt	Payments				Upper Bound for Capitalized Interest	Loan Forgiveness	Unpaid Interest (forgiven if not capitalized)	NPV
		Interest	Capitalized Interest	Principal	Total				
\$25,000	\$20,000	\$20,464	n/a	\$6,996	\$27,459	(\$1,028)	\$13,004	\$2,056	(\$32)
\$25,000	\$30,000	\$26,543	n/a	\$916	\$27,459	(\$4,692)	\$29,084	\$9,384	(\$10,032)
\$25,000	\$50,000	\$27,459	n/a	\$0	\$27,459	(\$16,270)	\$50,000	\$32,541	(\$30,032)
\$25,000	\$75,000	\$27,459	n/a	\$0	\$27,459	(\$31,270)	\$75,000	\$62,541	(\$55,032)
\$25,000	\$100,000	\$27,459	n/a	\$0	\$27,459	(\$46,270)	\$100,000	\$92,541	(\$80,032)
\$30,000	\$20,000	\$15,141	n/a	\$20,000	\$35,141	\$0	(\$0)	\$0	\$6,694
\$30,000	\$30,000	\$31,423	n/a	\$10,477	\$41,900	(\$1,114)	\$19,523	\$2,229	\$672
\$30,000	\$50,000	\$41,744	n/a	\$156	\$41,900	(\$9,126)	\$49,844	\$18,251	(\$19,328)
\$30,000	\$75,000	\$41,900	n/a	\$0	\$41,900	(\$24,050)	\$75,000	\$48,100	(\$44,328)
\$30,000	\$100,000	\$41,900	n/a	\$0	\$41,900	(\$39,050)	\$100,000	\$78,100	(\$69,328)
\$35,000	\$20,000	\$9,592	n/a	\$20,000	\$29,592	\$0	\$0	\$0	\$4,498
\$35,000	\$30,000	\$25,960	n/a	\$30,000	\$55,960	(\$44)	\$0	\$89	\$11,159
\$35,000	\$50,000	\$51,019	n/a	\$5,321	\$56,340	(\$4,099)	\$44,679	\$8,197	(\$8,623)
\$35,000	\$75,000	\$56,340	n/a	\$0	\$56,340	(\$16,830)	\$75,000	\$33,660	(\$33,623)
\$35,000	\$100,000	\$56,340	n/a	\$0	\$56,340	(\$31,830)	\$100,000	\$63,660	(\$58,623)
\$40,000	\$20,000	\$4,483	n/a	\$20,000	\$24,483	\$0	(\$0)	\$0	\$2,240
\$40,000	\$30,000	\$18,101	n/a	\$30,000	\$48,101	\$0	(\$0)	\$0	\$8,252
\$40,000	\$50,000	\$53,172	n/a	\$17,608	\$70,781	(\$1,327)	\$32,392	\$2,655	\$2,081
\$40,000	\$75,000	\$69,492	n/a	\$1,288	\$70,781	(\$10,210)	\$73,712	\$20,421	(\$22,919)
\$40,000	\$100,000	\$70,781	n/a	\$0	\$70,781	(\$24,610)	\$100,000	\$49,219	(\$47,919)

\$50,000	\$20,000	\$4,483	n/a	\$20,000	\$24,483	\$0	(\$0)	\$0	\$2,240
\$50,000	\$30,000	\$11,049	n/a	\$30,000	\$41,049	\$0	\$0	\$0	\$5,318
\$50,000	\$50,000	\$38,319	n/a	\$50,000	\$88,319	\$0	\$0	\$0	\$16,865
\$50,000	\$75,000	\$80,607	n/a	\$19,055	\$99,661	(\$2,638)	\$55,945	\$5,276	(\$1,511)
\$50,000	\$100,000	\$96,731	n/a	\$2,931	\$99,661	(\$11,505)	\$97,069	\$23,010	(\$26,511)

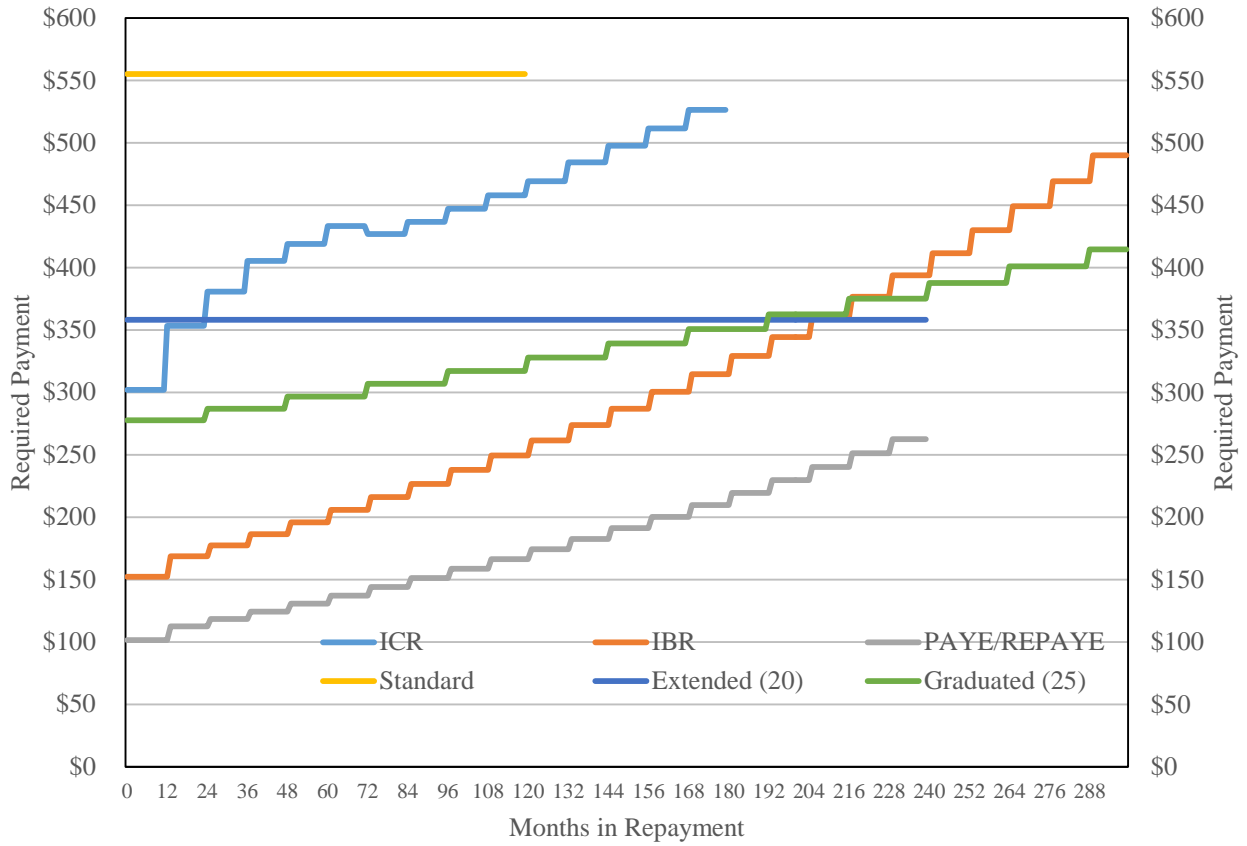
Note: Interest does not capitalize under REPAYE unless the borrower leaves the program.

Figure 1: Department of Education Direct Loan Portfolio by Repayment Program (debtors)
 Second quarter, 2016



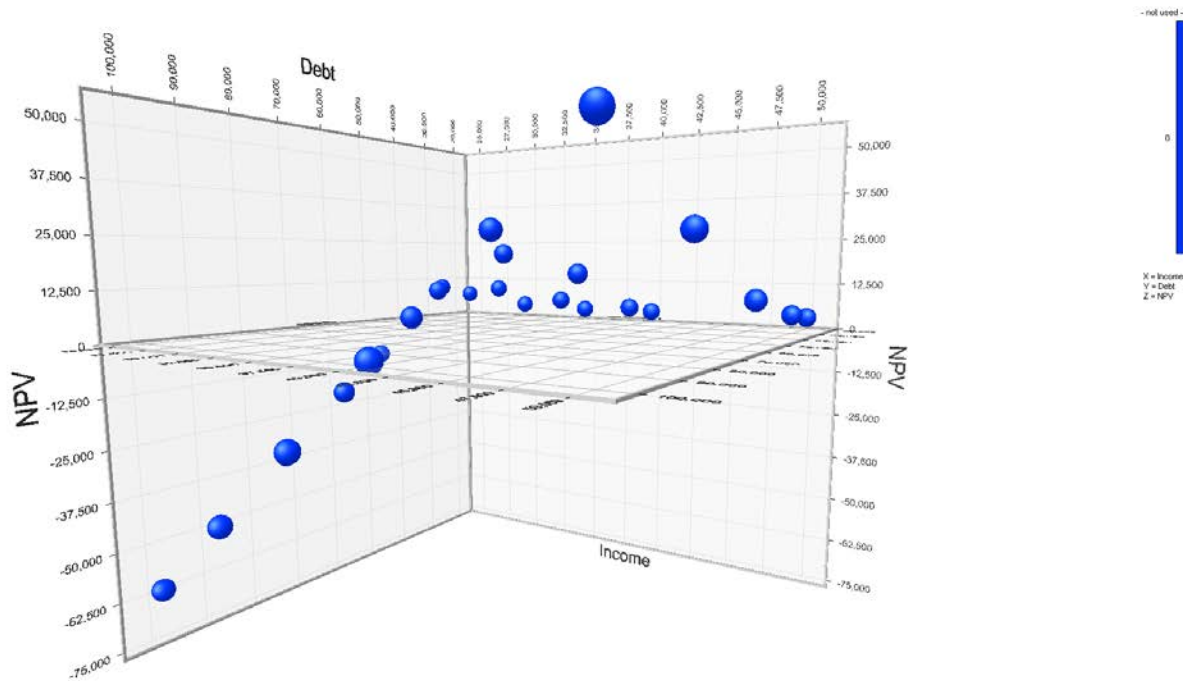
Source: Authors' calculations; National Student Loan Data System (NSLDS)

Figure 2: Repayment Schedules Under Alternative Repayment Plans



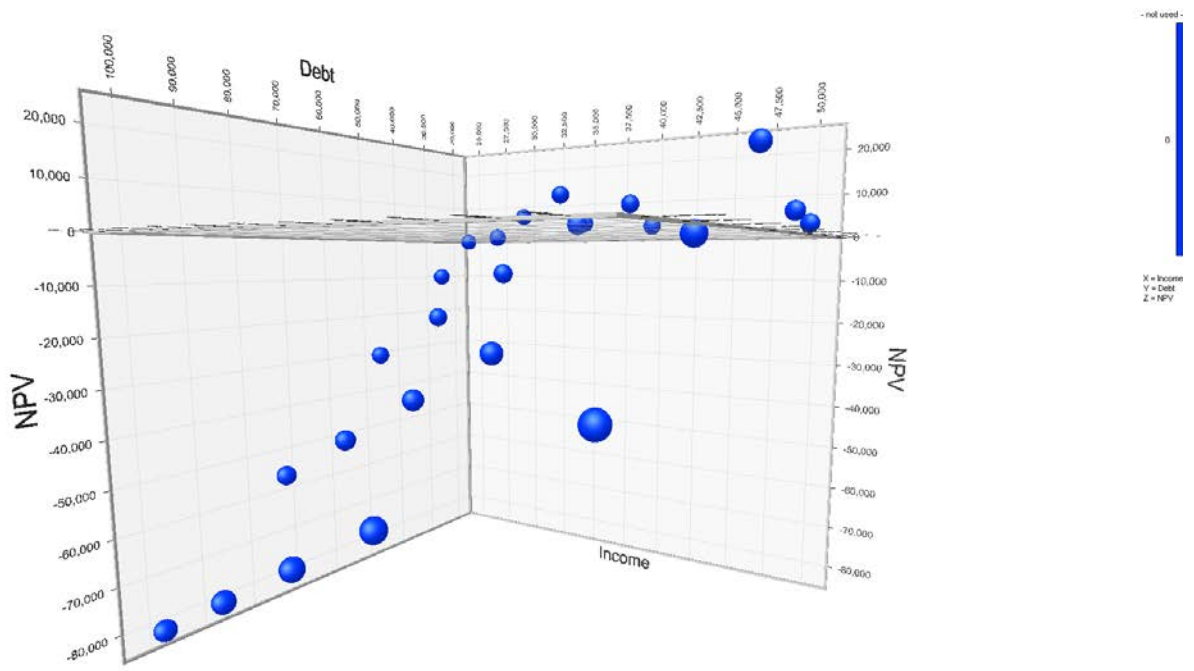
Source: Authors' calculations

Figure 3: Fiscal Impact Under the IBR Plan



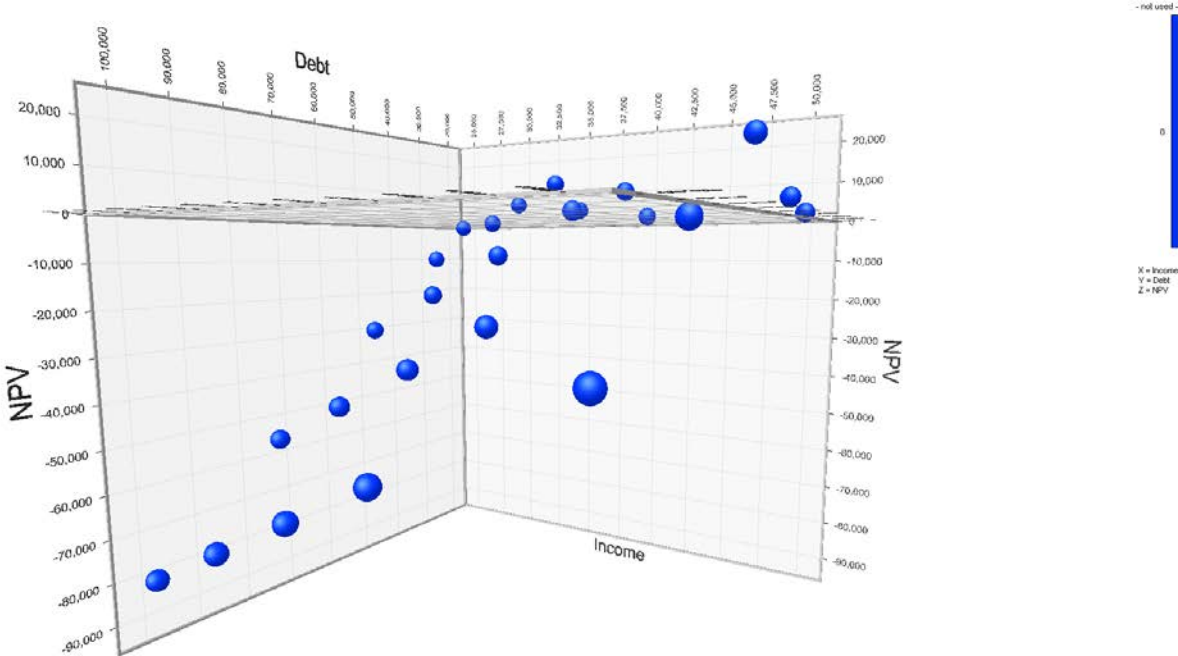
Source: Authors' calculations; Image created with *XLSTAT-3D Plot*

Figure 4: Fiscal Impact Under the PAYE Plan



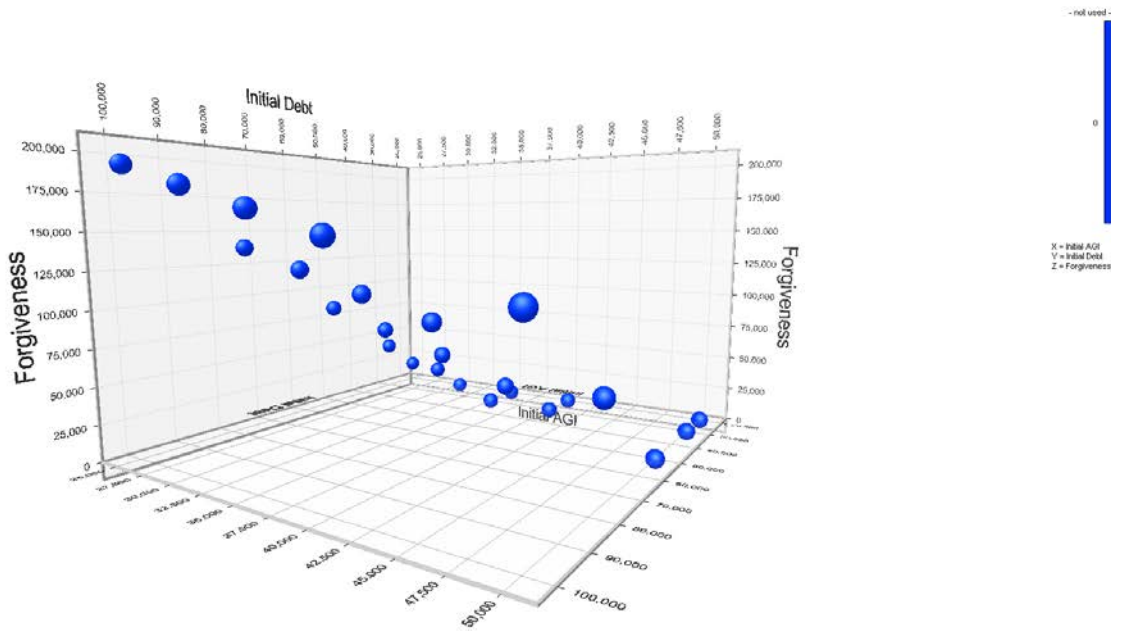
Source: Authors' calculations; Image created with *XLSTAT-3D Plot*

Figure 5: Fiscal Impact Under the REPAYE Plan



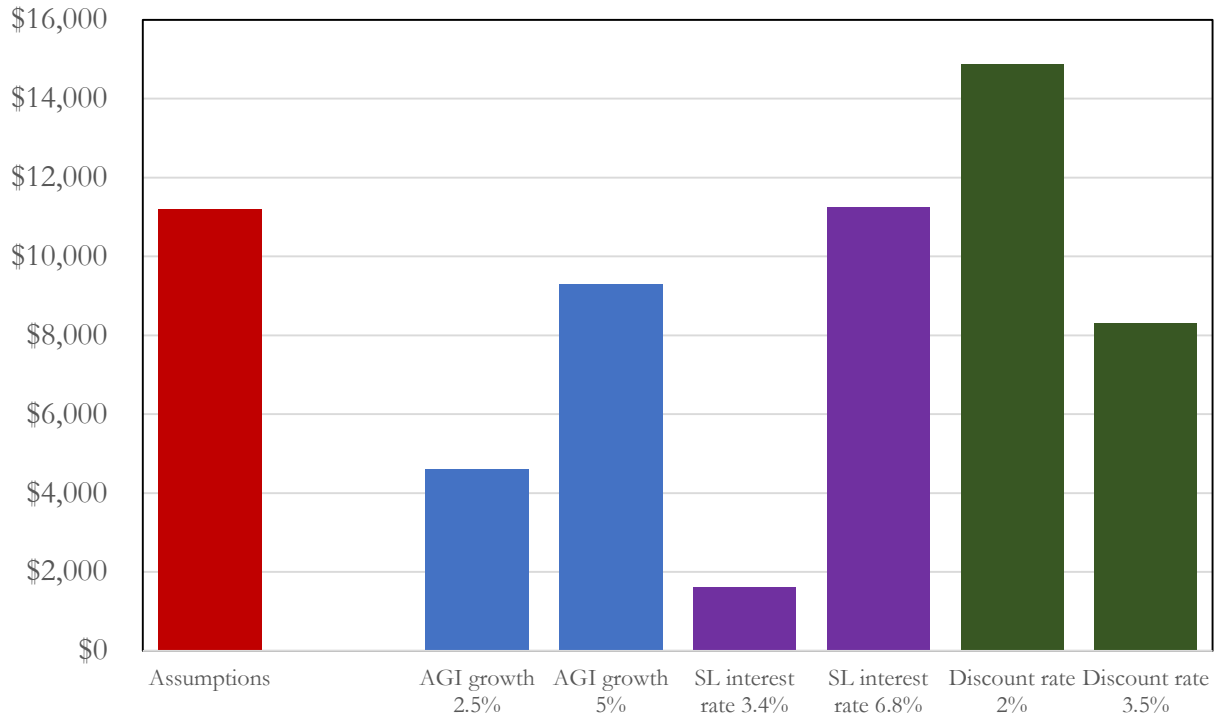
Source: Authors' calculations; Image created with XLSTAT-3D Plot

Figure 6: Debt and Unpaid Interest Forgiveness Under the REPAYE Programs



Source: Authors' calculations; Image created with *XLSTAT-3D Plot*

Figure 7: Sensitivity Analysis of REPAYE’s Fiscal Impact for Individuals of \$35K AGI and \$30K Debt



Note: The first column refers to the scenario with the baseline assumptions: income (AGI) grows at 3.4%, student loan interest rate at 6% and discount rate at 2.8% annually.