The Distributional Effects of Student Loan Forgiveness*

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April 14, 2021

Abstract

We study the distributional consequences of student debt forgiveness in present value terms, accounting for differences in repayment behavior across the earnings distribution. Full or partial forgiveness is regressive because high earners took larger loans, but also because, for low earners, balances greatly overstate present values. Consequently, forgiveness would benefit the top decile as much as the bottom three deciles combined. Blacks and Hispanics would also benefit substantially less than balances suggest. Enrolling households who would benefit from income-driven repayment is the least expensive and most progressive policy we consider.

*We are grateful to Scott Baker, John Barrios, Vadim Elenev, Caroline Hoxby, Adam Looney, Holger Mueller, David Thesmar, Anne Villamil and Eric Zwick for helpful comments, seminar participants at the Wharton School of the University of Pennsylvania, the Virtual Finance Seminar, the Moscow Higher School of Economics, the Bureau of Economic Analysis, the Congressional Budget Office as well as Greg Tracey for superb research assistance. Catherine thanks the Cynthia and Bennett Golub Endowment for financial support. Yannelis gratefully acknowledges financial support from the Booth School of Business at the University of Chicago. The views expressed in this paper are solely those of the authors, and do not necessarily reflect the views of any other organization.

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1 Introduction

Education debt in the United States stands at $1.6 trillion in 2020, and is growing rapidly. Growing debt burdens have led to both increased calls for loan forgiveness, as well as recent policies forgiving debts for some borrowers.[1] At the same time, income and wealth inequality has led to concerns about the distributional effects of debt forgiveness. Many holders of high loan balances completed graduate and professional degrees, and consequently earn high incomes. Untargeted debt forgiveness policies could thus disproportionately benefit high earners. High earners, on the other hand, are likely to pay down debts earlier, and thus might have lower unpaid balances remaining, making debt cancellation less attractive to them. Which effect dominates is ultimately an empirical question.

Alleviating soaring student loan burdens by providing debt relief to borrowers has increasingly been discussed by policymakers, academics and the media. There are a number of ways in which debt can be discharged, with important distributional implications. For example, forgiveness can be universal, capped or targeted to specific borrowers. These debt cancellation policies can benefit different socioeconomic and ethnic groups. This paper explores their distributional impacts. We find that the benefits of universal debt forgiveness policies largely accrue to high-income borrowers, while forgiveness through expanding income-contingent loan plans instead favors middle-income borrowers.

It is well known that student loan balances and income are positively correlated.[2] However, student loan balances do not accurately represent the actual cost of forgiving student debt nor the distribution of benefits between low and high-income households. Many low-income families struggle in making sufficient payments for their balance to decrease substantially –or at all– over time. However, to the extent that, under current law, their debt will ultimately be forgiven, their balance can greatly overstate the value of actual future payments, and therefore how much canceling their debt would benefit these families financially and how much it would

[1] There have been a number of recent policy proposals relating to student loan forgiveness. For example, see the *New York Times*, November 18, 2020 and *CNBC*, October 30, 2020. Significant student debt forgiveness also exists under current programs for public sector employees, teachers and for borrowers in income-driven repayment plans for more then twenty years. Amromin and Eberly (2016) and Avery and Turner (2012) provide a review of work on student loans.

[2] For example, the People's Policy Project and the Brookings Institution provide analysis of the relationship between student loan balances and earnings.

cost taxpayers.

While direct debt discharge has dominated many public discussions, much of the public discourse misses the fact that significant targeted debt forgiveness already exists in the United States for some borrowers. Importantly for most borrowers, Income-Driven Repayment (IDR) plans offer substantial loan forgiveness to low-income borrowers who have balances remaining after twenty to twenty-five years, depending on a borrowers' specific plan.[3] In the meantime, IDR plans link payments to income, so borrowers with persistently low incomes will only reimburse a fraction of their debt before it is forgiven.[4] Increasing enrollment in IDR, or increasing these plans' generosity is another option for targeted debt forgiveness.

In this paper, we use the 2019 Survey of Consumer Finances (SCF) to estimate the present value of each loan. The SCF contains information on student debt and, unlike administrative credit data, earnings, ethnicity and wealth, making it ideally suited to study the distributional impacts of loan forgiveness. Specifically, we rely on detailed loan-level data to forecast future payments and the evolution of a loan's balance until it reaches zero or is forgiven. Our analysis takes into account the current balance and most recent payments, family size, earnings, and the number of years left before the loan is forgiven under current law. We define the present value as the sum of expected payments discounted at the risk-free rate. We use these estimates to explore the distributional impacts of forgiveness policies.

We first explore universal and capped forgiveness policies, either discharging all debt, or all debt amounts up to a cap. Loan forgiveness from these policies disproportionately accrues to high-income households. Under a universal loan forgiveness policy, in present value terms, the average individual in the top earnings decile would receive $6,267 in forgiveness, while the average individual in the bottom earnings decile would receive $1,276 in forgiveness. Individuals in the bottom half of the earnings distribution would receive approximately one-quarter of the dollars forgiven. Households in the top 30% of the earnings distribution receive two-fifths of all dollars forgiven. Patterns are similar under policies forgiving debt up to $10,000 or $50,000, with higher-income households seeing significantly more loan forgiveness.

[3] In addition to forgiveness under IDR, Public Sector Loan Forgiveness (PSLF) offers loan forgiveness to borrowers who work in the public sector or qualified non-profits for ten years, and Teacher Loan Forgiveness offers partial loan forgiveness to some educators.

[4] Under current IDR plans, borrowers pay 10-15% of their income above 150% of the federal poverty line. Outstanding balances are forgiven after twenty to twenty-five years in repayment.

We then turn to a second form of loan forgiveness, through expanding IDR plans, which tie loan payments to income and forgive balances after a certain number of years in repayment. We examine enrolling all borrowers who would benefit from IDR, and increasing the generosity of IDR by raising the threshold above which borrowers must pay a portion of their income, and by accelerating loan forgiveness. In contrast to universal forgiveness, expanding IDR leads to substantial forgiveness for the middle of the earnings distribution. Under a policy enrolling all borrowers who would benefit from IDR, individuals in the bottom half of the earnings distribution would receive three-fifths of dollars forgiven and borrowers in the top 30% of the earnings distribution receive one-third of dollars in forgiveness. Raising the threshold above which borrowers pay a portion of their income and earlier loan forgiveness both lead to a large increase in forgiveness. However, under accelerating loan forgiveness, these benefits accrue to the top of the earnings distribution, while increasing the repayment threshold leads to large benefits for middle-income borrowers.

This paper primarily joins a literature within household finance on student loans. This paper presents a simple framework for computing the present value of student loans, and uses it to present new results on the progressivity of loan forgiveness options. Amromin and Eberly (2016) and Avery and Turner (2012) discuss the conceptual framework for student loans and review the literature. Looney and Yannelis (2015) provide an overview of recent empirical trends in the student loan market. Recent work has focused on student loans and housing (Goodman, Isen and Yannelis, 2021; Amromin, Eberly and Mondragon, 2016), the relationship between credit supply and tuition (Lucca, Nadauld and Shen, 2019; Kargar and Mann, 2018), guaranteed versus direct lending (Lucas and Moore, 2010), enrollment (Solis, 2017; Sun and Yannelis, 2016), raising borrowing limits (Black et al., 2020), the role of institutional control on outcomes (Eaton, Howell and Yannelis, 2020; Armona, Chakrabarti and Lovenheim, 2017), interactions of private and federal borrowing (Lochner and Monge-Naranjo, 2011) , loan discharge (Maggio, Kalda and Yao, 2019), racial gaps (Scott-Clayton and Li, 2016) as well as behavioral aspects of student loans (Cadena and Keys, 2013; Cornaggia, Cornaggia and Xia, 2019; Cornaggia and Xia, 2020; Marx and Turner, 2018; Mueller and Yannelis, 2021).[5]

[5]This paper also joins a growing body of work in finance and inequality. Recent notable papers include Agarwal et al. (2020), Agarwal, Mikhed and Scholnick (2016), Bloom et al. (2019), Chiappori and Meghir (2015), Catherine et al. (2020), Fagereng, Guiso, Malacrino and Pistaferri (2016), Mian, Straub and Sufi (2021), Mueller,

Within work on student debt, this paper links to a growing literature on IDR plans. Our paper shows that IDR plans are a useful tool for targeted loan forgiveness, and the benefits of this forgiveness largely accrue to middle-income individuals. Income contingent loans for higher education have been discussed at least since Friedman (1955) and Nerlove (1975). Previous work has largely focused on the insurance benefits of IDR plans to borrowers, and selection into these plans. Mueller and Yannelis (2019) show that IDR plans provided insurance to borrowers during the Great Recession. Herbst (2019) studies how IDR plans affect credit bureau outcomes and Britton and Gruber (2019) study the labor supply effects of IDR. Karamcheva, Perry and Yannelis (2020) discuss trends in IDR over time, and selection of borrowers in these plans. Despite significant pushes to increase the utilization of these plans, take-up remains low. Mueller and Yannelis (2021) show that administrative costs are a significant barrier to enrollment, which is consistent with college students not having information about financial aid options (Bettinger, Long, Oreopoulos and Sanbonmatsu, 2012; Hoxby and Turner, 2015).

The remainder of this paper is organized as follows. Section 2 discusses institutional background, the SCF data used in our main analysis and modeling the present value of student loan balances. Section 3 analyzes the distributional effects of loan forgiveness options, with a focus on income and ethnic heterogeneity. Section 5 concludes.

2 Value of Student Debt

2.1 Institutional Background

In 2020, there was approximately $1.6 trillion in outstanding student loan debt, according to the Federal Reserve Bank of New York. The vast majority of student debt in the United States is directly disbursed or guaranteed by the federal government. Modern federal student loan programs began in 1965, with the passage of the Higher Education Act. There have been two large federal student loan programs in the United States. The first was the Federal Family Education Loan Program (FFEL), which began in 1965, and which was terminated in 2010. The FFEL program was a guarantee program, under which private lenders provided capital for highly regulated loans. These funds were in turn guaranteed by the government. The William

Ouimet and Simintzi (2017a) and Mueller, Ouimet and Simintzi (2017b).

D. Ford Federal Direct Loan Program (DL) was authorized in 1992. Under the DL program, the US Treasury directly provides funds for student loans. Borrowers take either Subsidized or Unsubsidized loans. All borrowers are eligible for Unsubsidized loans, while borrowers from lower-income families are eligible for Subsidized loans. While the loans are quite similar, for Subsidized borrowers, interest does not accrue while borrowers are in school. Loan balances were historically relatively small, and grew rapidly from 2000 onwards (Looney and Yannelis, 2021).

Federal student loans are highly regulated, with interest rates and borrowing limits set by Congress. Pricing does not vary based on risk, and all students of the same level face the same interest rate.[6] Borrowing limits vary by class level, and are higher for upper level and graduate students. Loans are serviced by private companies, with contracts from the Department of Education (Amromin and Eberly, 2016). If borrowers default on their loans, 15% of their wages are garnished and tax payments can be withheld. Unlike other consumer loans, wages are garnished without a court order and are typically seized directly from payroll. Student loans are nearly impossible to discharge in bankruptcy, as borrowers have to prove a very stringent legal standard called “undue hardship."

Traditionally, most borrowers were in the Standard Plan. This plan is similar to a ten-year mortgage, and depending on the year could be fixed or variable rate. Some borrowers also choose the Extended Repayment Plan, which increases the loan maturity to twenty-five years. There are also a number of IDR plans, which all have the same basic features. IDR plans tie a borrower’s loan payment to their income. Under these plans, borrowers pay ten or fifteen percent of their discretionary income. After twenty or twenty-five years, outstanding balances are forgiven. These have increased in popularity since 2009, following the introduction of the Income-Based Repayment (IBR) Plan.[7] Under IBR, borrowers pay 15% of their discretionary income, defined as income above 150% of the poverty line. Under most IDR plans, payment amounts are capped by a borrower’s payment under the standard plan. Outstanding balances are forgiven after 25 years. Subsequently a number of more generous IDR plans were in-

[6]There are slight differences in effective interest rates based on whether borrowers are Subsidized or Unsubsidized. Additionally, in some years subsidized borrowers had lower interest rates. Interest rates also differ for graduate and undergraduate borrowers.

[7]Prior to the IBR plan, there was one IDR plan available, the Income-Contingent Plan. This was less generous, with borrowers paying 20% of their discretionary income and take-up was very low.

troduced, including the Pay As You Earn Plan and the Revised Pay As You Earn Repayment (REPAYE) Plan. Under these plans borrowers pay 10% of their discretionary income, and outstanding balances are forgiven after 20 years.[8] Most new borrowers in 2020 who choose IDR plans are in the new more generous plans. Borrowers are also able to stop payments through deferment or forbearance for a number of reasons, including job-loss, returning to school, joining the military, or at a loan servicer's discretion.

2.2 Data

Our primary data source is the 2019 SCF, a nationally representative survey conducted trienially by the Federal Reserve Board of Governors. The SCF surveys households on income, balance sheets, credit use, and financial outcomes including education debt. Crucially for our analysis, the survey contains information on earnings and demographics, as well as detailed information on student loan balances, interest rates and repayment. Importantly, the SCF includes information on whether borrowers are in IDR plans. Bhutta et al. (2020) provide a detailed description of the 2019 SCF, with a discussion of student borrowing. We include individuals between the ages of 22 and 60 in our main analysis sample, and only exclude borrowers at school or in the grace period. Due to the lack of granularity of the SCF, some households represent several centiles of the earnings distribution within a cohort and span over two deciles, in which case we allocate them on a proportional basis. Appendix table A.1 provides a list of the main analysis variables.[9]

The SCF is ideal for our analysis, as it includes information on income, demographics, student debt balances and detailed loan repayment information. The SCF is also reasonably large, surveying thousands of households. This allows us to have precision within earnings deciles and ethnic groups.[10] The main limitation of the SCF, that it does not contain panel data, is irrelevant in our context. This is because we project incomes, and hence need to make

[8] The Department of Education provides information on details of various repayment plans.

[9] The SCF has some limitations regarding student debt. In particular, it undercounts student debt aggregates relative to administrative sources as it only counts debt of the core economic unit of the household. Thus some individuals, such as adult children living with parents, many not be counted in student debt aggregates. This leads to the aggregate student debt in the 2019 SCF being about $1.2 trillion, which is lower than administrative sources. Approximately one-third of this debt is held by individuals still in school.

[10] The main alternative to using the SCF would be administrative data. Beyond administrative barriers, the main limitation of administrative student data is that it does not include information on ethnic groups.

assumptions on earnings growth in our analysis.

Our analysis compares all individuals in the SCF and individuals with student debt. We have 5,777 households in the sample, and 1,052, or 22% after accounting for survey weights, have education debt. In our analysis of student loan borrowers, we restrict the sample to borrowers who left college and are between the ages of 22 and 60, and are left with 758 households with debt. We take this restriction as our method of computing present values relies on observing initial repayment behavior. All estimates are weighted using SCF survey weights, to ensure that the estimates are nationally representative. Table 1 shows summary statistics for the main analysis sample, split by individuals with and without student debt.[11] The typical borrower in our sample left school in 2011, and their loan has an interest rate of 5.9%. Households with student debt have an average income of $98,500. For households without student debt, the average income is slightly higher, but this reflects a highly skewed distribution. The median income of student loan borrowers is $71,300, while the median income of the full sample is $59,100. The average student loan balance, conditional on having any education debt, is $41,800 in the 2019 SCF, up from $36,400 in the 2016 survey. 40% of borrowers are in IDR plans. We compute age specific per capita earnings deciles, which are shown in appendix Table A.2.[12]

Figure 1 shows the share of households between age 22 and 60 with student debt (Panel A), the mean balance (Panel B) and yearly payment (Panel C), by decile, along with a 95% confidence interval. While the relationship is non-monotonic, on average higher income households are more likely to have student debt, and have higher student loan balances conditional on borrowing. Importantly, yearly payments increase much faster with earnings than balances. The average balance of borrowers in the top decile is only 17% larger than those in the bottom decile. But their payments are nearly four times larger. These differences in repayment behavior motivate our computation of present values to estimate how much low earners would actually save as a result of debt forgiveness.

[11] Due to the sampling design of the SCF, standard procedures for variance estimation cannot be applied. This does not affect our analysis.

[12] We focus on earnings because they represent the main way households finance their lifetime consumption. Households with high student debt in the lower half of the wealth distribution tend to be in the upper half of the earnings distribution. Table A.3 shows the relationship by both income and wealth quartiles.

2.3 Computing Present Values

The outstanding balance of a loan is not its true present value, which depends on payments, maturity and discount rates. Put simply, the value of a loan reflects the timing of payments and how much future dollars are worth today. Assuming that non-repayment is caused by idiosyncratic risk, the present value of a loan is the sum of expected future payments $\mathbb{E}[\mathrm{P}_{ilk}]$ discounted at the nominal risk-free rate r_f. Specifically, we denote the present value PV_{ilt} of loan l of household i in year t:

$$\mathrm{PV}_{ilt} = \sum_{k=t} \frac{\mathbb{E}[\mathrm{P}_{ilk}]}{(1+r_f)^{k-t}}. \tag{1}$$

Payments are made until the loan is forgiven or the balance reaches zero. The balance evolves as follows:

$$\mathrm{B}_{ilt+1} = \mathrm{B}_{ilt}(1+r_{il}) - \mathrm{P}_{ilt}, \tag{2}$$

where r_{il} is the loan interest rate. Loans are forgiven after 25 years in repayment if they were originated before 2014, and 20 years otherwise.

By default, borrowers reimburse their loan over the ten years following their separation from school through a fixed-payment schedule under the Standard Plan. This fixed payment is:

$$\mathrm{P}_{il}^{\text{Fixed}} = \frac{\mathrm{B}_{il}^{0} \times r_{il}}{1-(1+r_{il})^{-10}}, \tag{3}$$

where B_{il}^{0} is the total amount they borrowed. Borrowers can also enroll in IDR. In IDR, they pay a fraction θ_{il} of their discretionary earnings, which is defined as the share of their earnings above 1.5 times the federal poverty line, but no more than what they would have paid in the Standard Plan. If the household has a single student loan, the payment under IDR is:

$$\mathrm{P}_{ilt}^{\text{IDR}} = \min\left[\theta_{il} \times \max\left(\mathrm{Y}_{it} - 1.5 \times \mathrm{FPL}_{is}, 0\right), \mathrm{P}_{il}^{\text{Fixed}}\right] \tag{4}$$

where Y_{it} represents the borrower's earnings and FPL_{is} is the federal poverty line. If the household has several student loans, the payment is divided across loans. The IDR payment can be zero. Households can also defer repayment because of economic hardship for up to five years.

We assume θ is equal to .1 for borrowers in IDR in cohorts that left school after 2009, which is consistent with the newer IDR plans, in which borrowers in recent cohorts tend to enroll. For earlier cohorts in IDR, we assume that θ is equal to .15, consistent with the Income-Based Repayment plan that is available to all borrowers.

To estimate the present value of each loan in the data, we forecast yearly payments and iterate over equations (1) and (2) until the balance reaches zero or the loan is forgiven. The initial balance is set to its observed 2019 value. Our forecast of future payments depends on whether a loan was in repayment in 2019.

Loans in repayment If we observe a payment in 2019, we assume that, in expectation, households will allocate the same share of their earnings towards repaying their loan. We make two exceptions. First, payments cannot exceed current balances and interest due for the year. Second, households will not pay more than in the Standard Plan, unless they did so in 2019. Hence, the expected future payment in year $s > t$ is:

- if $\mathrm{P}_{ilt} < \mathrm{P}_{il}^{\text{Fixed}}$, then:

$$\mathrm{P}_{ils} = \min\left(\mathrm{P}_{ilt} \times \frac{Y_{is}}{Y_{it}}, \mathrm{P}_{il}^{\text{Fixed}}, \mathrm{B}_{ils} \times (1 + r_{il})\right) \tag{5}$$

- otherwise:

$$\mathrm{P}_{ils} = \min\left(\mathrm{P}_{ilt} \times \frac{Y_{is}}{Y_{it}}, \mathrm{B}_{ils} \times (1 + r_{il})\right) \tag{6}$$

where P_{ilt} is the payment observed in 2019. For example, we would expect IDR payments to increase with a family's earnings, but only up to the default payment under the standard plan.

Loans in IDR with zero payment Some households in IDR had no earnings above 1.5 times the poverty line, and therefore made no payment in 2019 even though they were technically in repayment. We compute the present values of these loans by forecasting future IDR payments as a function of earnings. Hence, payment in year s will be:

$$\mathrm{P}_{ils} = \min\left(0.1 \times \max\left(\mathrm{Y}_{is} - 1.5 \times \mathrm{FPL}_{is}, 0\right), \mathrm{P}_{il}^{\text{Fixed}}, \mathrm{B}_{ils} \times (1 + r_{il})\right) \tag{7}$$

Loans in deferment or forbearance For households who made no payment in 2019 because they were in forbearance or were in deferment, we assume that payments will start six years after leaving school. This assumption is motivated by the fact that payments can be deferred for up to three years and forbearance is allowed for several years. At this point, we assume that these borrowers will enroll in IDR with $\theta = 0.1$ and that interest accrues in the meantime.[13] Hence, expected future payment is:

- if $s >$ Graduation Year$_i + 5$, then:

$$\mathrm{P}_{ils} = \min\left(0.1 \times \max\left(\mathrm{Y}_{is} - 1.5 \times \mathrm{FPL}_{is}, 0\right), \mathrm{P}_{il}^{\mathrm{Fixed}}, \mathrm{B}_{ils} \times (1 + r_{il})\right) \tag{8}$$

- otherwise:

$$\mathrm{P}_{ils} = 0. \tag{9}$$

Family incomes in the first year are set to their observed value in the SCF. The poverty line is calibrated based on family size and federal guidelines for 2019. In our main analysis, we report pre-tax present values and discuss the taxation of forgiveness in Appendix B. The overall progressivity of loan forgiveness options does not change with the imposition of taxes, while levels and costs change somewhat. When a borrower has several loans and is in IDR, we split the total IDR payment across loans in proportion to balance size at that point.

Future earnings and poverty line We assume that log earnings follow a random walk:

$$\ln(Y_{it+1}) - \ln(Y_{it}) = g_E + g_P + \sigma_E \epsilon_{it} \tag{10}$$

where g_E is the growth rate of earnings, g_P is the inflation rate and σ_E is the standard deviation of normally distributed permanent income shocks. In addition, we assume that the poverty line will grow at the rate of inflation.

[13] Borrowers could also not be making payments because loans are in default. We assume that default leads to a similar pattern of cashflows. If borrowers default, 15% of their wages are garnished above a threshold. In practice, some borrowers' wages are not garnished if they are self-employed, or it is difficult to contact their employer. We thus implicitly assume that recovery is imperfect and two-thirds of borrowers have their wages garnished.

$$\ln(\text{FPL}_{it+1}) - \ln(\text{FPL}_{it}) = g_P \tag{11}$$

Calibration and simulation We set the inflation rate to $g_P = 2\%$, the nominal risk-free rate to $r_f = 3\%$. We assume that households' earnings grow at a rate of $g_E = 2\%$, which combines the nationwide growth in per capita earnings, and the growth of earnings over the life cycle, which we estimate to be close to 1% among student debt borrowers in the 2019 SCF. We set the volatility of permanent income to $\sigma_E = .15$, a commonly found estimate across the literature (Carroll and Samwick, 1997). We conduct sensitivity analysis in appendix C, and our basic conclusions remain unchanged.

For each borrower, we simulate 1,000 paths and average them to estimate expected payment in each year. We then sum the discounted value of expected cash flows to get to present values.

3 Distributional Impacts of Loan Forgiveness Policies

We next turn to exploring the distributional impacts of loan forgiveness. Table 2 presents our main analysis of the present vale of loan forgiveness. Specifically, the table reports the total and per capita present value gains of the policies we valuate by earnings deciles, including households without any student debt, and ethnic groups. The first eight columns consider the present value of forgiveness amounts per person, the second eight columns consider aggregate amounts, and the final eight columns show the share of dollars given to each group.

We consider three policies related to direct cancellation of debt, canceling all student loan balances, or only $50,000 or $10,000 per person. We additionally consider three policies that increase IDR enrollment. First, borrowers pay 10% of their discretionary income, in line with current IDR rules. Second, loans are also forgiven 10 years after the first repayment. Finally, discretionary income is limited to earnings above three times the poverty line. The top panel shows the values by earnings decile, while the bottom panel shows values by ethnicity. The last two rows of the table report the present value gains and change in balance for the entire population.

3.1 Loan Cancellation

Figure 2 shows student loan balances and present values by earnings decile and race. This figure effectively shows the benefits of universal loan discharge to borrowers in different groups, which can be viewed as the present values of the loans forgiven. Households with higher earnings have larger balances because they are more likely to be college graduates. However, the relationship between earnings and the present value of student debt is even steeper because low earners are less likely to fully repay their balance before it is forgiven. For the top decile, the present value is very close to the balance, but it is below 40% for the lowest decile.[14]

Figure 2 demonstrates that most of the benefits of universal loan forgiveness would largely accrue to higher income individuals. The top panel shows balances and present values split by earnings decile. The figure shows that most of the benefits of universal loan forgiveness would accrue to high-income individuals. Both balances and present values are increasing for the first nine earnings deciles. The bottom earnings decile has a balance of $3,028, and a present value of $1,276, while the ninth earnings decile has a balance of $8,243 and a present value of $8,274. The highest earnings decile has a balance of $6,300 and a present value of $6,267, which is slightly lower than that of the ninth earnings decile and comparable to the seventh earnings decile. The average individual in the highest earnings decile would receive a little less than five times more forgiveness than the average individual in the bottom earnings decile. The solid red line shows the ratio of present value to balance, which is a measure of the disparity between considering the value of forgiveness based on balances and its true cost. The ratio is increasing in earnings deciles. This suggests that, while using only balances to analyze the distributional consequences of loan forgiveness would generate the same basic result–that higher-income households would see larger benefits, it would overestimate the true value of loan forgiveness, in particular for low-earners.

The bottom panel shows balances and present values split by race and ethnicity. In terms of balances, Blacks have the highest average loan balance, at $10,634. Whites have a lower average loan balance, at $6,157, and Hispanics and others have a much lower average loan

[14] To the best of our knowledge, there is no public benchmark to which we can compare our present value computation. However, *The Wall Street Journal* recently reported that, based on internal estimates, the Department of Education expected to recover only 68% of the value of federal student debt.[15] By comparison, we estimate the present value of student debt to represent 76% of total balance.

balance of $3,996. Computing present values presents similar overall patterns, but shrinks the gap between Blacks and Whites, who respectively have present values of $7,942 and $4,885. The ratio of present value to balance is lower for Blacks than Whites. Thus universal loan forgiveness would lead to larger average benefits for Whites and Blacks, and significantly lower average benefits for Hispanics and other groups.

Figure 3 presents similar analysis to Figure 2, but focusing on more targeted debt forgiveness policies which forgive debt below a cap. The figure shows the value of projected debt forgiveness under two policies, forgiving up to $10,000 of debt and forgiving up to $50,000 of debt by borrower. We assume that partial forgiveness is determined at the individual level. For example, if one spouse has a balance of $5,000 and the other a balance of $15,000, forgiving $10,000 by borrower reduces the household's overall student debt by only $15,000. The top panels show average balances forgiven and present values of loan forgiveness under the policy forgiving $10,000 of debt. The bottom panels shows average balances forgiven and present values of loan forgiveness under the more generous policy forgiving $50,000 of debt. The left panels show splits by earnings decile, while the right panels show splits by race and ethnicity.

Under both limited forgiveness policies shown in Figure 3, the overall relationship between income and projected forgiveness is very similar to universal forgiveness. Under both policies, we see much greater levels of loan forgiveness for higher income households relative to lower income households. With a $10,000 cap, the ratio of average present value forgiveness between the top and the bottom deciles is 3.6. With a $50,000 cap, the ratio of average present value forgiveness between the top and the bottom decile rises to 4.75. While the general relationship between forgiveness and income is similar under each policy, the overall levels of forgiveness are much greater with a higher cap. For people in the bottom decile, they receive $386 in forgiveness with a $10,000 cap, and $1,391 in the top decile. With a $50,000 cap people in the bottom decile receive significantly more, or $886 in forgiveness, as do people in the top decile, who receive $4,223.

Finally, we consider a policy in which households with earnings below $75,000 per person receive $50,000 in balance forgiveness. Above $75,000, forgiveness generosity decreases by one dollar for each additional dollar of earnings. Hence, households with at least $125,000 of earnings per person do not benefit from the policy. Under this policy capping forgiveness by

earnings, the bottom decile receives $886 and the top decile receives $1,527. As reported in appendix Figure A.1, for the bottom 90%, this policy is similar to canceling $50,000 of debt and is still regressive within this sub-group. But the benefits going to the top 10% are substantially reduced.

Turning towards the effects by race, shown in the right panels of Figure 3, we see slightly lower average present value levels of forgiveness for Blacks relative to Whites with a $50,000 cap. With a $10,000 cap, present value forgiveness levels are roughly equal between Blacks and Whites. Under both policies, Hispanics and others see lower levels of loan forgiveness relative to Blacks and Whites. The level relationship between the two policies is similar to that regarding income.

3.2 Income Driven Repayment

We next turn to an alternative option for loan forgiveness, IDR. IDR plans tie borrowers' monthly payments to their income. There are a number of IDR plans, with slightly different parameters.[16] Under current IDR plans, borrowers pay 10 or 15 percent of their discretionary income, above 150 percent of the poverty line. After 20 or 25 years, remaining balances are forgiven. IDR plans thus have a significant forgiveness component, but unlike more general forgiveness options, IDR targets forgiveness towards lower income borrowers. Indeed, some persistently low-income borrowers in IDR plans can end up paying nothing at all. Borrowers who earn below 150 percent of the poverty line for the duration of repayment will end up making no payments and receiving full loan cancellation.

We consider the distributional impact of three options expanding IDR. Policymakers effectively have two methods in terms of expanding IDR. One, more borrowers can be enrolled in IDR.[17] Two, IDR plans can be made more generous, by lowering time to forgiveness or raising the threshold below which borrowers pay nothing. We consider three specific policies. First,

[16]The first modern IDR plan, Income Based Repayment (IBR), was introduced in 2009. Under this plan, borrowers pay 15% of this discretionary income and remaining balances were forgiven after 25 years. Under more recent plans such as the Pay as You Earn and new IBR plan, borrowers pay 10% of their incomes and remaining balances are forgiven after 20 years. Most borrowers in recent cohorts who choose IDR repayment options are in these newer, more generous plans, and thus our repayment model uses 10% repayment and 20 year forgiveness.

[17]This is common in may countries with higher education systems similar to the US. For example, in the UK and Australia all student loan borrowers are automatically enrolled into IDR plans that are administered by tax authorities. Chapman (1997) provides a discussion of IDR plans in other countries.

we consider placing all borrowers in an IDR plan, under which borrowers begin paying on income above 150% of the federal poverty line and pay 10% of this income. Second, we consider putting all borrowers in IDR and forgiving remaining balances after ten years. Finally, we consider placing all borrowers in IDR and raising the repayment threshold to 300% of the federal poverty line, as opposed to 150% under current plans.

Importantly, we assume that this policy is targeted towards borrowers for which it generates a present value gain. Because interest rates on student loans exceed the risk-free rate, rolling debt is an NPV negative decision unless a substantial part of the balance is rolled until it is forgiven. Some middle-class earners have lower payments in IDR than under the ten-year schedule, but these payments would still be sufficient to fully repay their loan, or most of it. For them, it is better to repay sooner rather than later and reducing their payments is not a good idea.

Figure 4 explores who benefits from the expansion of IDR, in terms of loan forgiveness. The figure shows a quartet of columns for income and racial or ethnic groups, each one depicting forgiveness under a different policy. In each quartet of columns, the first column shows projected forgiveness from enrolling all borrowers in the current most generous IDR plan, PAYE. The second column shows projected forgiveness from enrolling all borrowers in a plan slightly more generous than PAYE, under which remaining balances are forgiven after ten rather than twenty years. The third column shows forgiveness under a plan identical to PAYE, but under which borrowers begin paying a portion of their income above 300% of the federal poverty line. The rightmost column shows a plan again identical to PAYE, but under which borrowers. pay 7.5% of their income rather than 10%. The left panel shows projected forgiveness in earnings deciles, while the right panel shows projected forgiveness by race and ethnicity.

The leftmost column in each quartet shows projected forgiveness under a loan repayment system similar to that in the UK or Australia, with all borrowers in IDR. Under this system, we see most projected forgiveness accrues to borrowers in the middle of the earnings distribution. Individuals in the lowest earnings decile receive almost six times ($316) as much forgiveness relative to borrowers in the top of the earnings distribution ($56). Borrowers in the next highest and lowest deciles respectively see similar forgiveness, $209 and $108 respectively. Individuals in the third to seventh deciles each receive substantially more forgiveness

than the top and bottom. Putting all borrowers in IDR thus leads to significant forgiveness for middle income borrowers, in contrast to universal or capped forgiveness policies which disproportionately benefit high income borrowers. Individuals in the third through seventh deciles receive 53% of the total forgiveness, and people in the bottom half of the earnings distribution receive half of the gains. In terms of the racial and ethnic effects of putting all borrowers in IDR, forgiveness amounts are three times as high for Blacks relative to Whites and the general population. Hispanics and others see lower loan forgiveness amounts relative to other groups.

We next turn to the second column, which depicts a more generous IDR plan under which loan balances are forgiven after ten years, as opposed to twenty under current plans. Unsurprisingly, earlier loan forgiveness leads to substantially more forgiveness across all groups. This increase in forgiveness amounts comes at the expense of progressivity, with high earners seeing larger forgiveness amounts. With ten-year forgiveness, we see the highest earnings decile receiving $4,018 in loan forgiveness, almost four times the amount that the bottom earnings decile receives, $1,075. The bottom three income deciles receive roughly twice the forgiveness in this scenario as they would under a plan with forgiveness occurring after twenty years. This is likely due to the fact that they are paying very little under either plan, and hence receive substantial forgiveness after ten or twenty years. Higher earnings deciles see significantly more forgiveness under this plan. The racial and ethnic patterns of forgiveness under an IDR plan with forgiveness after ten years are similar to those under a plan with twenty-year forgiveness. Relative to Whites, we see higher forgiveness amounts for Blacks and lower amounts for Hispanics and other groups.

The third column of each quartet shows projected forgiveness under a different IDR plan with increased generosity. Rather than borrowers paying a fraction of their income above 150% of the federal poverty line, under this hypothetical plan borrowers pay a tenth of their income above 300% of the poverty line. This plan shows a similar pattern to the first option-enrolling all borrowers in IDR-albeit with higher forgiveness amounts for middle-income households. Individuals in the lowest and highest earnings deciles again receive $762 and $267 respectively, which are close to the amounts under the system enrolling all borrowers in IDR. We further see similar patterns along racial and ethnic lines, with Blacks receiving the most forgiveness and Hispanics and others receiving less relative to Whites.

The final column of each quartet shows projected forgiveness under an IDR plan with a different kind of increase generosity. Rather than borrower paying 10-15% of their income above 150% of the federal poverty line, they pay 7.5%. This plan again generates more forgiveness for the middle of the income distribution. Individuals in the lowest and highest earnings deciles respectively receive $442 and $248. We see similar patterns across ethnic lines, with Blacks receiving the most forgiveness.

It is useful to directly compare IDR to other forgiveness policies. Table 2 indicates that enrolling borrowers in an IDR plan where borrowers pay a tenth of their income above 300% of the poverty line would lead to $174.0 billion in present value forgiveness. This is slightly lower in aggregate than the $145.0 billion in forgiveness under a policy forgiving up to $10,000 of student debt per person, but the bottom 60% of the income distribution would actually receive higher forgiveness amounts under the more generous IDR plan. The difference in aggregates arises from the fact that the top 40% of the income distribution receives substantially more forgiveness under the capped plan than under the more generous IDR plan. We see a similar pattern when we compare the more generous IDR plan to a policy forgiving up to $50,000 of student debt per person, which would lead to $491.4 billion in present value forgiveness. However, under the more generous IDR plan the bottom 30% of the income distribution would receive more forgiveness than under the a plan forgiving up to $50,000 of student debt.

The results of this section suggest that enrolling more borrowers in IDR, and making IDR more generous leads to significant loan forgiveness that is somewhat targeted towards middle-income borrowers. Households in the bottom two earnings deciles receive roughly the same amounts for forgiveness in a system expanding IDR as they would under a capped or universal forgiveness plan. However households in the top income deciles see significantly more forgiveness under capped or universal forgiveness plans relative to expansions of IDR.

3.3 Timing of Forgiveness

We next explore the timing of forgiven payments. This is particularly relevant in determining the impact of student loan forgiveness on consumption, and any short term effects of loan forgiveness on aggregates. Some commentators and economists have argued that student loan forgiveness could act as stimulus during recessions, boosting consumption and housing invest-

ment.[18] Taking a classical Keynesian multiplier argument for stimulus at face value, the efficacy of such stimulus depends on the timing of cashflows, and whether they occur during recessions when aggregate demand is low.

Figure 5 displays the flows of canceled future student debt repayments over the next 25 years, split by quartiles, under our assumptions. Canceled payments are computed as the difference between expected payments under the new policy and without any form of forgiveness. In some cases, the difference can be positive when borrowers decide to enroll in more generous IDR programs, which defer payments into the future. The top panel shows the timing of cashflows for full forgiveness, while the bottom panel shows the timing of cashflows for a plan forgiving up to $10,000 of debt. Panel A reports these cash flows in dollars, while Panel B reports the cumulated share of these cash flow paid after a given number of years. The figure shows that a larger portion of the cashflows forgiven in early years go to high income borrowers, who also have lower marginal propensities to consume (Baker et al., 2020; Baker, 2018). Higher income borrowers in the top two quartiles have a much steeper trajectory of forgiven payments, whereas forgiven payments are relatively flat for lower income borrowers. Figure 6 presents a similar exercise, instead showing the flows of canceled future student debt repayments under more generous IDR plans. Under these plans, most of the forgiven payments in early years go to borrowers in the middle of the income distribution. More generous IDR plans lead to higher cancelled payments for low-income borrowers in early years relative to partial forgiveness.

4 Robustness

In our main analysis, we assume an earnings growth rate of 2% and a discount rate of 3%. This is slightly lower than that used by the CBO, who assume earnings grow at 3% and a discount rate of 4%. In appendix C, we show that the basic pattern of results is not sensitive to the earnings growth rate and discount rate used.

[18] This point has been echoed by some policymakers. For example, Senator Elizabeth Warren argued that student loan forgiveness is the "the single most effective economic stimulus that is available through executive action."

4.1 Discounting Loan Payments

In our baseline specification, we assume a uniform discount rate of 3% for all loans. There are two ways this assumption can be relaxed: (i) by increasing the discount rate for all borrowers or (ii) by using higher discount rates for riskier borrowers. In any case, such an adjustment is only warranted if it reflects some exposure to systematic risk.

Figure 7 reports the percentage change in the present value of student debt when discount rate increases by 1 percentage point, that is the opposite of the debt duration. We calculate this sensitivity for each decile and ethnic group by increasing the discounting rate applied to future cash flows from 3% to 4%. Increasing discount rates generally reinforces our main conclusions: increasing interest rates would depress present value more for the bottom earnings decile and for Blacks. The debt of these groups tend to have higher duration because, in many cases, it will not be fully repaid within 20 or 25 years following graduation. On the other hand, high earners are more likely to reimburse their debt within ten years under the standard payment plan. Using private student loans as a benchmark, Lucas and Moore (2010) estimate that the cost of capital for student debt is 2.18% above the risk-free rate. This spread is an upper bound on the risk premium as it includes the cost of taxes and a liquidity premium. Appendix Table C.6 shows that our conclusions do not change when we assume a discount rate of 5%.

Should we use different discount rates for low earners? One argument is that, for borrowers under IDR or at risk of default or deferment, loan payments depend on earnings. This is more likely to be the case for households who have a lower monthly payment in IDR, as a drop in their earnings would translate into lower IDR payment. Importantly, his or her reduction in payments does not necessarily translate into a lower market value for the loan. If the balance is expected to be reimbursed before it is forgiven, the payment reduction would only defer these cash flows. In fact, as interest rates accrue at a higher rate than the risk-free rate, the value of the loan could, theoretically, go up. Reductions in payments translate into losses only if the borrower is not expected to fully reimburse his or her loan. Loans are safe if they are expected to be fully repaid a few years before IDR forgiveness dates. Figure 8 shows the fraction of borrowers who are expected to fully repay their balance within two years before the remaining balance would be forgiven under current IDR rules. The share of borrowers who are expected to repay prior to IDR forgiveness occurring is increasing in income deciles, and

higher for White borrowers relative to Black and Hispanic borrowers. Given that debt is safer at the top of the income distribution, heterogeneity in discount rates would only reinforce our conclusions.

Note that as long as non-repayment risk is idiosyncratic, it should not be reflected in discount rates. We find little evidence that student loan default risk is systematic. Appendix figure A.2 shows that there is little correlation between student loan delinquency and market returns. More precisely, the figure shows mean annual 90-day delinquency rates by S&P-500 returns. The left panel shows contemporaneous annual returns, while the right panel shows lagged annual returns. The correlation, while insignificant, is actually positive, suggesting the higher market returns are weakly associated with higher loan defaults. The coefficient from a regression of delinquency rates on returns is .0185, with a standard error of .0161.[19] The coefficient from a regression of delinquency rates on lagged returns is .0266, with a standard error of .0112. While this may be surprising, Looney and Yannelis (2021) argue that almost all of the time series variation in loan defaults is driven by shifts in the composition of borrowers. In particular, increases in the share of for-profit borrowers drive most of the swings in loan defaults.

4.2 Sensitivity to Discount Rate and Earnings Growth Assumptions

Tables C.1 to C.11 repeat the main analysis in Table 2, varying earnings growth and discount rate assumptions. Higher earnings growth rates decrease the generosity of forgiveness, with larger effects on IDR. This is because with higher earnings, more borrowers make the highest payment. Higher discount rates have a similar effect, since cash flows far into the future have a lower present value. The basic patterns remain unchanged regardless of earnings growth assumptions and discount rates. Universal loan forgiveness remains a regressive policy, while expanding IDR options leads to more forgiveness for lower and middle-income borrowers.

[19] It is also worth noting that this is likely an overestimate of how actual collections vary with the business cycle. Collections rates are high, and students loans are effectively non-dischargeable in bankruptcy. Thus one of the main effects of delinquency is to push payments further into the future.

5 Concluding Remarks

The ultimate distributional effects of student loan forgiveness depend on the present value of loans discharged to different individuals. This paper computes the present value of student loan forgiveness under different options. We find that universal and capped forgiveness policies are highly regressive, with the vast majority of benefits accruing to high-income individuals. On the other hand, enrolling more borrowers in IDR plans linking repayment to earnings leads to forgiveness for borrowers in the middle of the income-distribution. These results are important in studying the distributional consequences of loan forgiveness, and in designing policies aimed at student debt relief.

While the distributional effects of student loan forgiveness are an important aspect of student loan forgiveness, other factors may play a role in determining the desirability of debt forgiveness. Student loans may distort career choices (Rothstein and Rouse, 2011), credit constraints may hinder entrepreneurship (Barrios, Hochberg and Yi, 2020), debt overhang may distort labor supply decisions (Donaldson, Piacentino and Thakor, 2019) and debt relief may have macroeconomic consequences (Auclert et al., 2019). Future work should study tradeoffs between the distributional impacts of loan forgiveness and other potential benefits of borrower relief.

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Figure 1: Student Debt and Payments by Earnings Decile

This figure displays the share of households between age 22 and 60 with student debt (Panel A) and the average per capita balance (Panel B) and yearly payment (Panel C), by within-cohort decile of earnings. We estimate debt levels and 95% confidence intervals by running OLS regressions on decile dummies using SCF sample weights. The x-axis reports the median earnings within each decile.

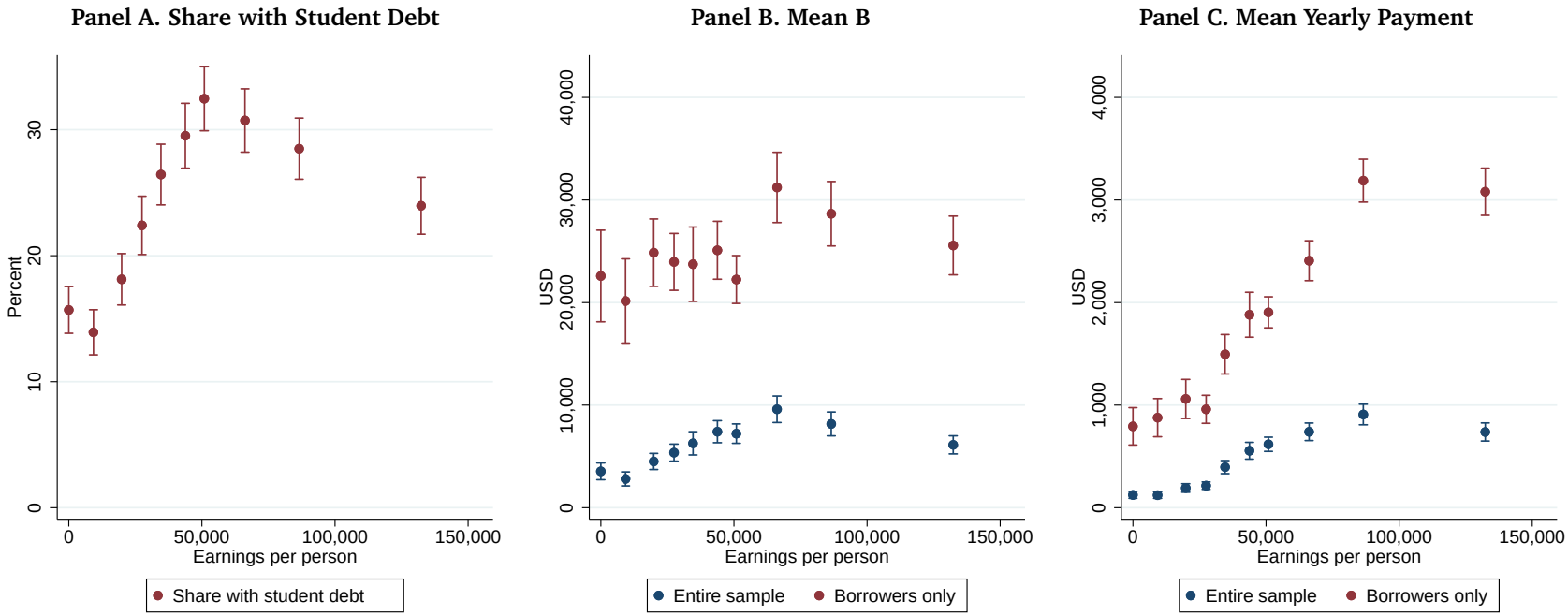
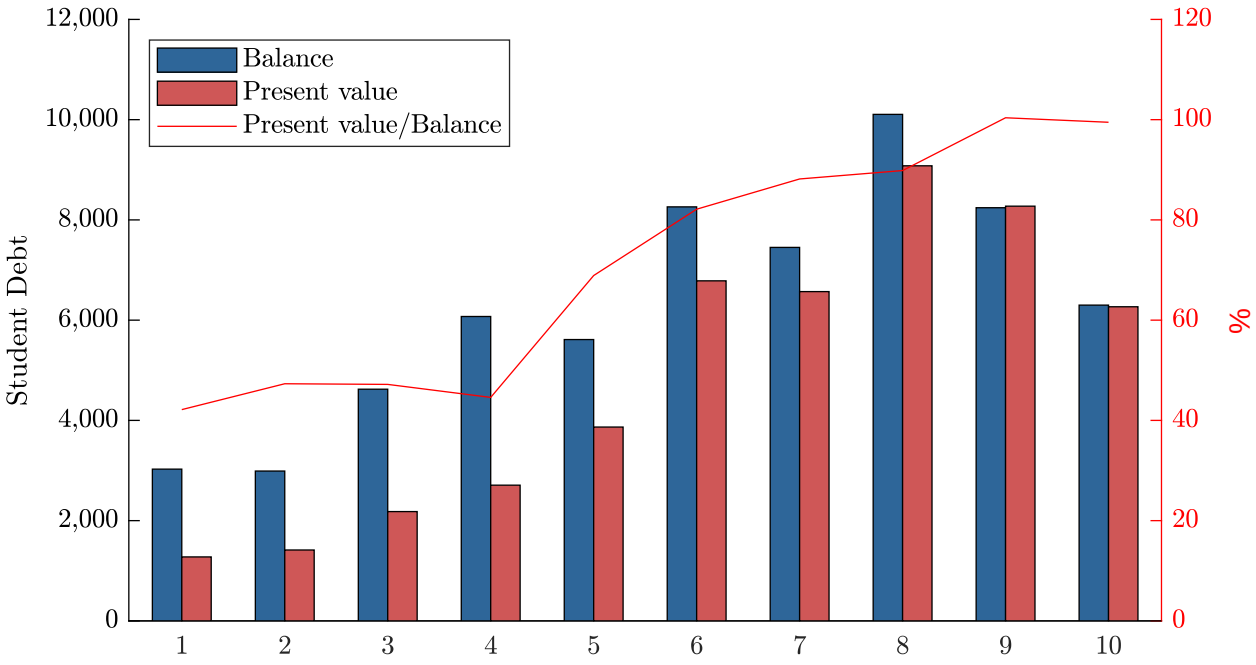


Figure 2: Average Student Debt

This figure displays the average student debt per capita in 2019, by within-cohort decile of labor earnings and ethnic group, including households without student loans. Present values represent the sum of expected future payments discounted at the risk-free rate. The red line reports the ratio of the average present value to the average balance for each group.

Panel A. By Decile of Earnings



Panel B. By Ethnicity

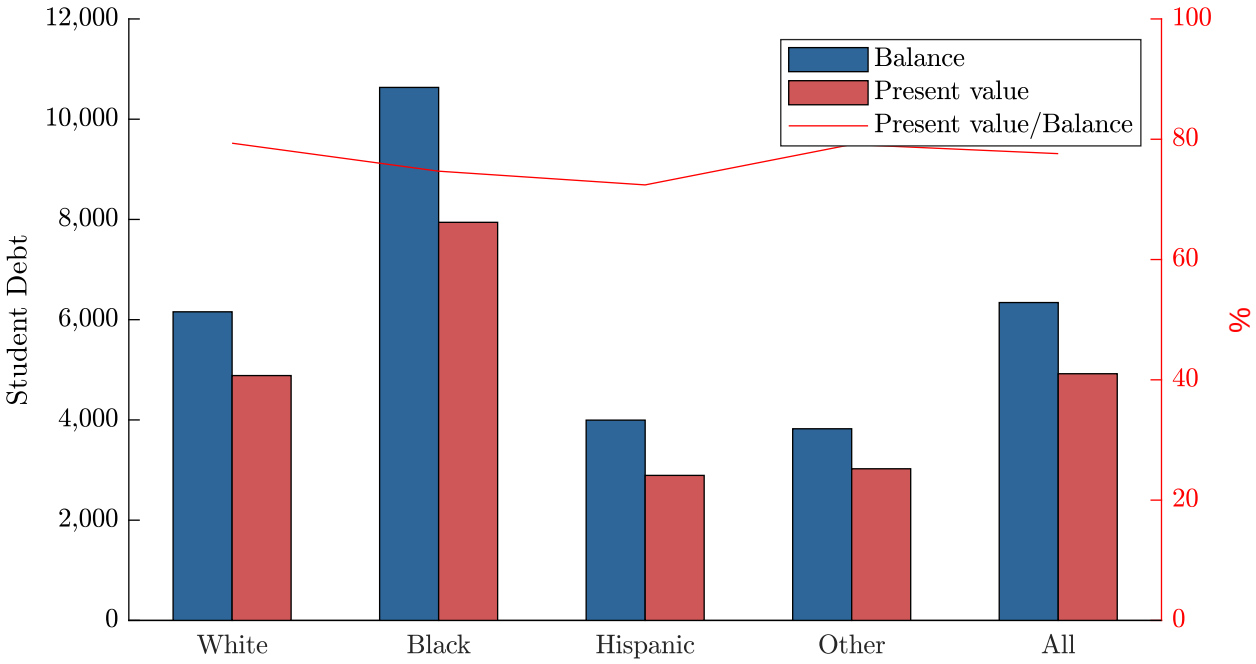
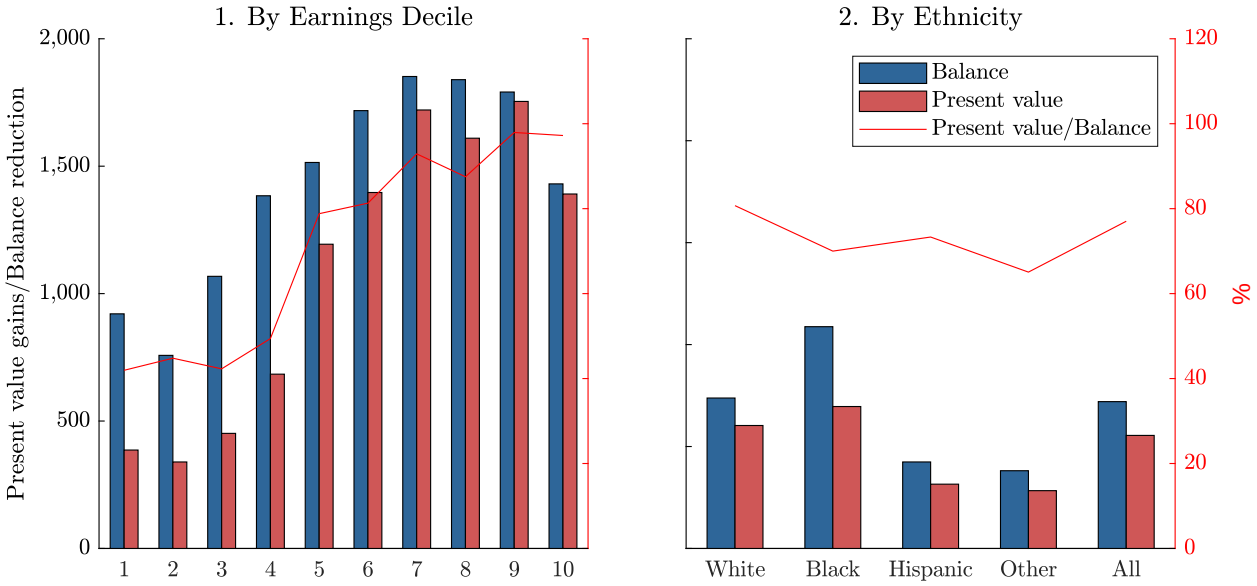


Figure 3: Partial Balance Forgiveness

This figure displays the average change in student debt per capita after a partial balance forgiveness, by within-cohort earnings decile and ethnic group, including households without student loans. Panel A and B consider balance reductions of $10,000 and $50,000 respectively. The new present value of each loan is computed as before but assuming a lower counterfactual balance as of 2019. The red line reports the ratio of the average present value gain to the average balance reduction in each group.

Panel A. Gains from forgiving $10,000



Panel B. Gains from forgiving $50,000

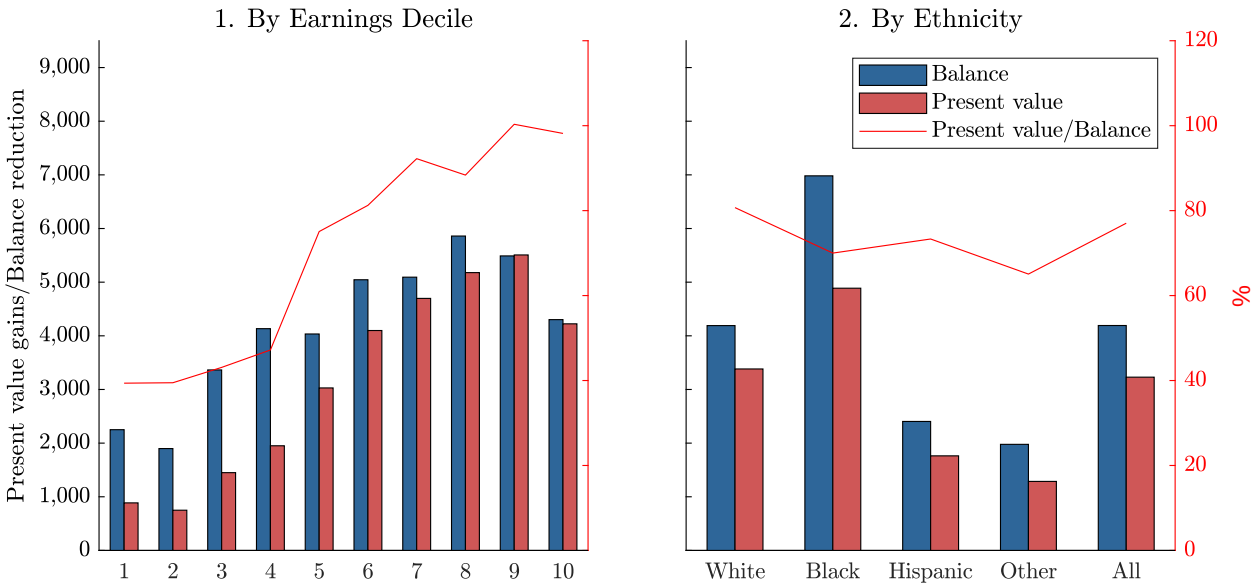


Figure 4: Targeted Enrollment in IDR

This figure displays the average present value gains from targeted policies of automatic enrollment in income-driven repayment, by within-cohort earnings decile and ethnic group, including households without student loans. First, we consider the case in which households would pay 10% of their discretionary earnings, in line with current IDR rules. We also consider *(i)* a variation of this policy in which loans are forgiven 10 years after the first repayment and *(ii)* a variation in which households pay 10% of their earnings only above three times the poverty line. In all cases, payments are capped by the default fixed payment. We assume that these policies are targeted towards households for which they generate present value gains.

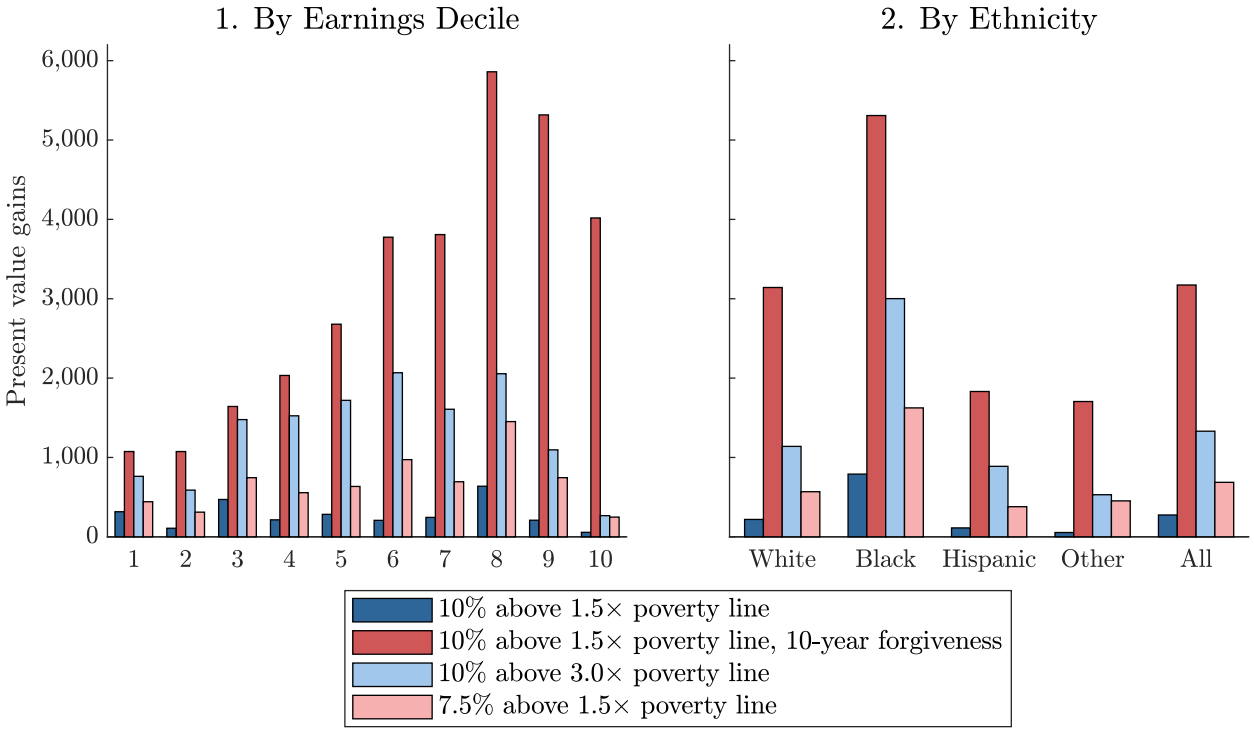
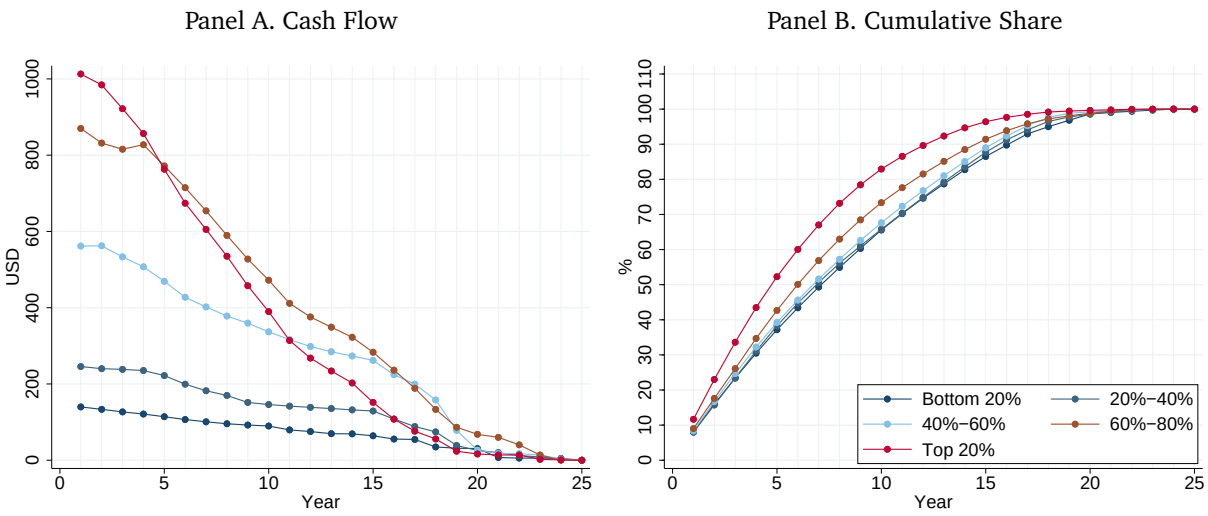


Figure 5: Cash Flow Timeline - Balance Forgiveness

This figure displays the flows of canceled future student debt repayments over the next 25 years, by quintile of earnings, including non-borrowers. Panel A reports these cash flows in dollars. Panel B reports the cumulated share of these cash flow paid after a given number of years.

1. Full Forgiveness



2. $10,000 per borrower

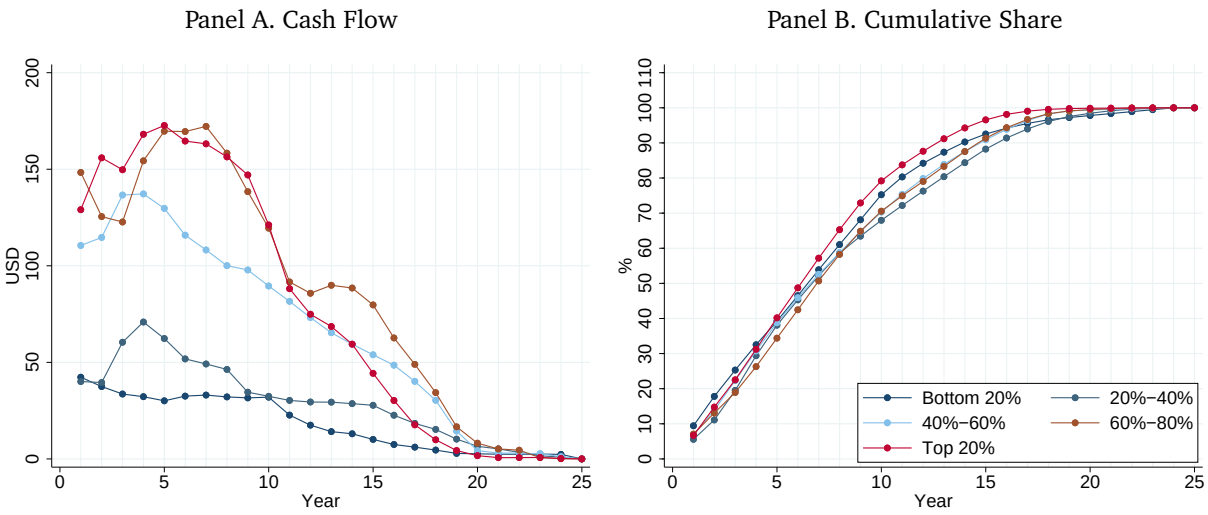
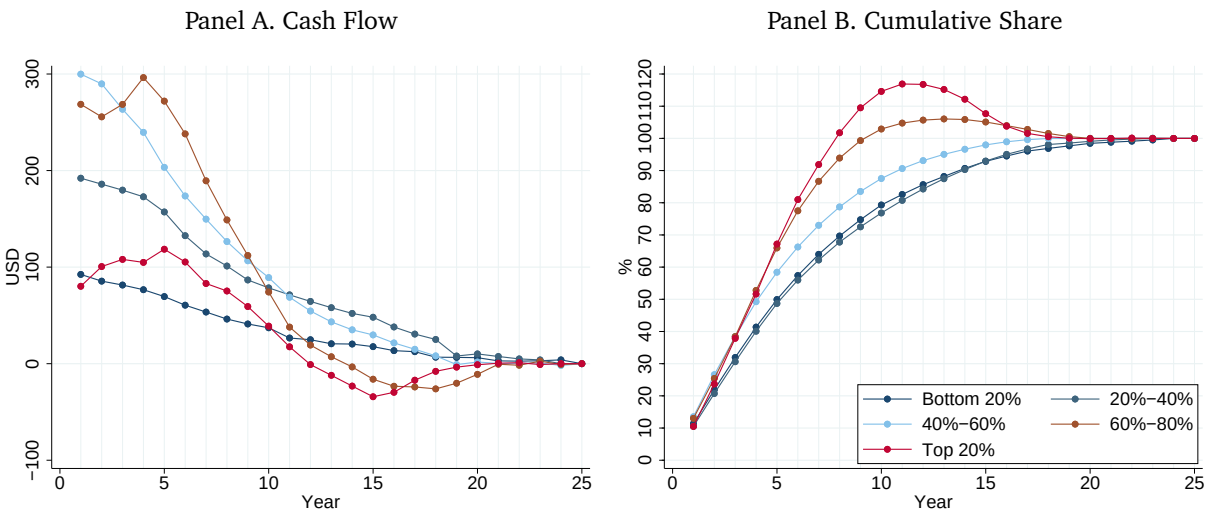


Figure 6: Cash Flow Timeline - Balance Forgiveness

This figure displays the flows of canceled future student debt repayments over the next 25 years, by quintile of earnings, including non-borrowers. Panel A reports these cash flows in dollars. Panel B reports the cumulated share of these cash flow paid after a given number of years.

1. 10% Above 3x Poverty Line



2. 7.5% Above 1.5x Poverty Line

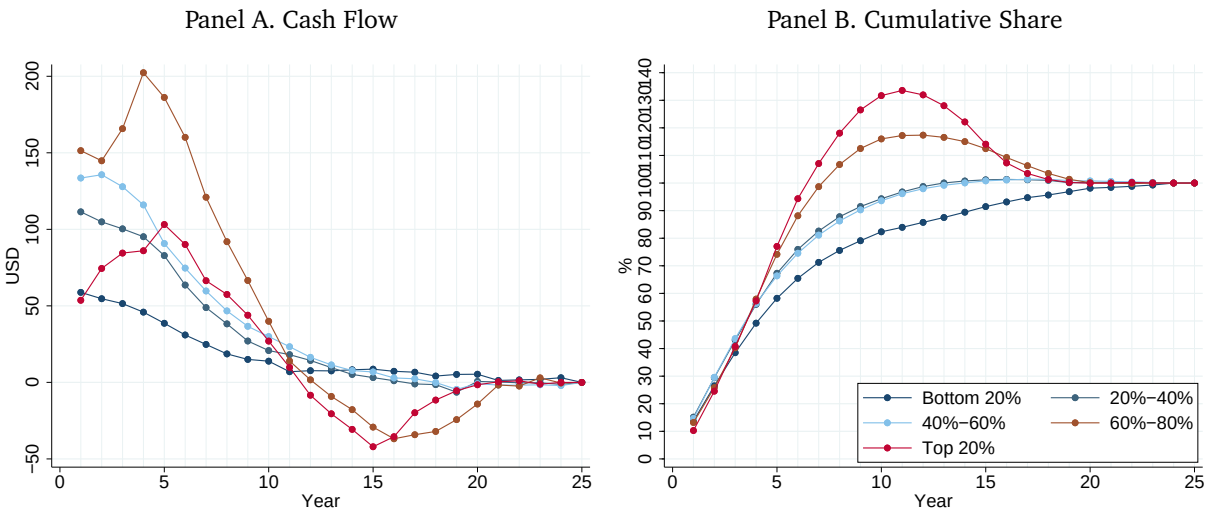


Figure 7: Sensitivity of Debt Present Value to Discount Rate

This figure displays the percentage change in the present value of student debt when discount rate increases by 1 percentage point. We calculate this sensitivity for each decile and ethnic group by increasing the discounting rate applied to future cash flows from 3% to 4%.

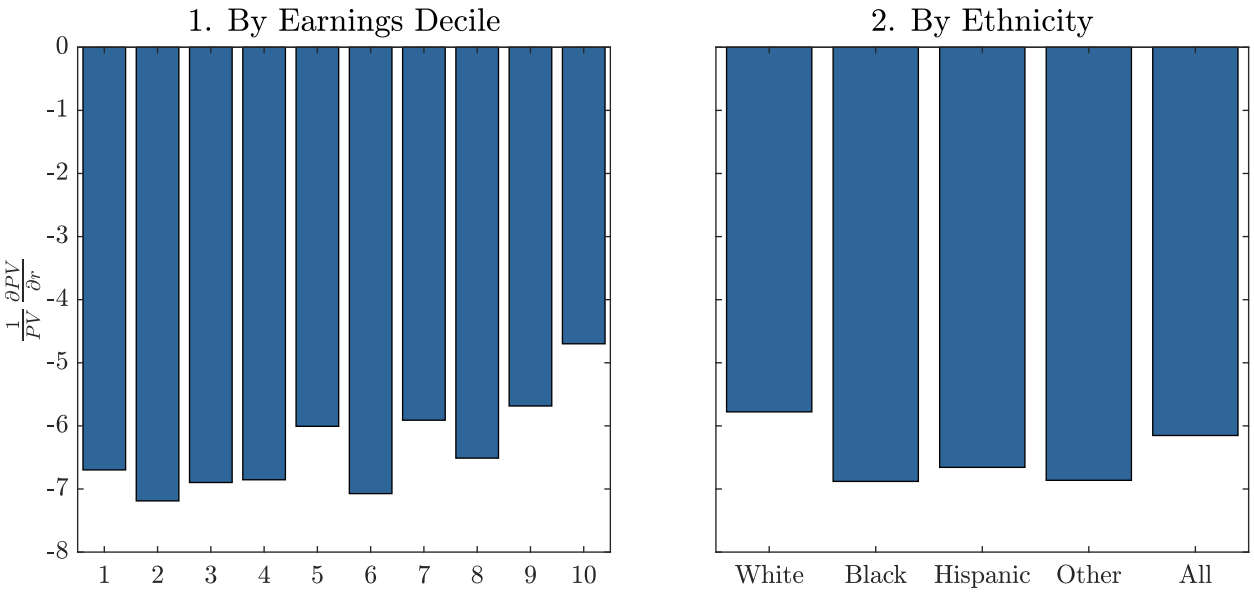


Figure 8: Share of Borrowers Expected to Repay More Than Two Years Before Forgiveness

This figure displays the percentage of borrowers who are expected to fully repay their balance two years before the remaining balance would be forgiven under current IDR rules. For each borrower, we average the year the balance is fully repaid across simulations.

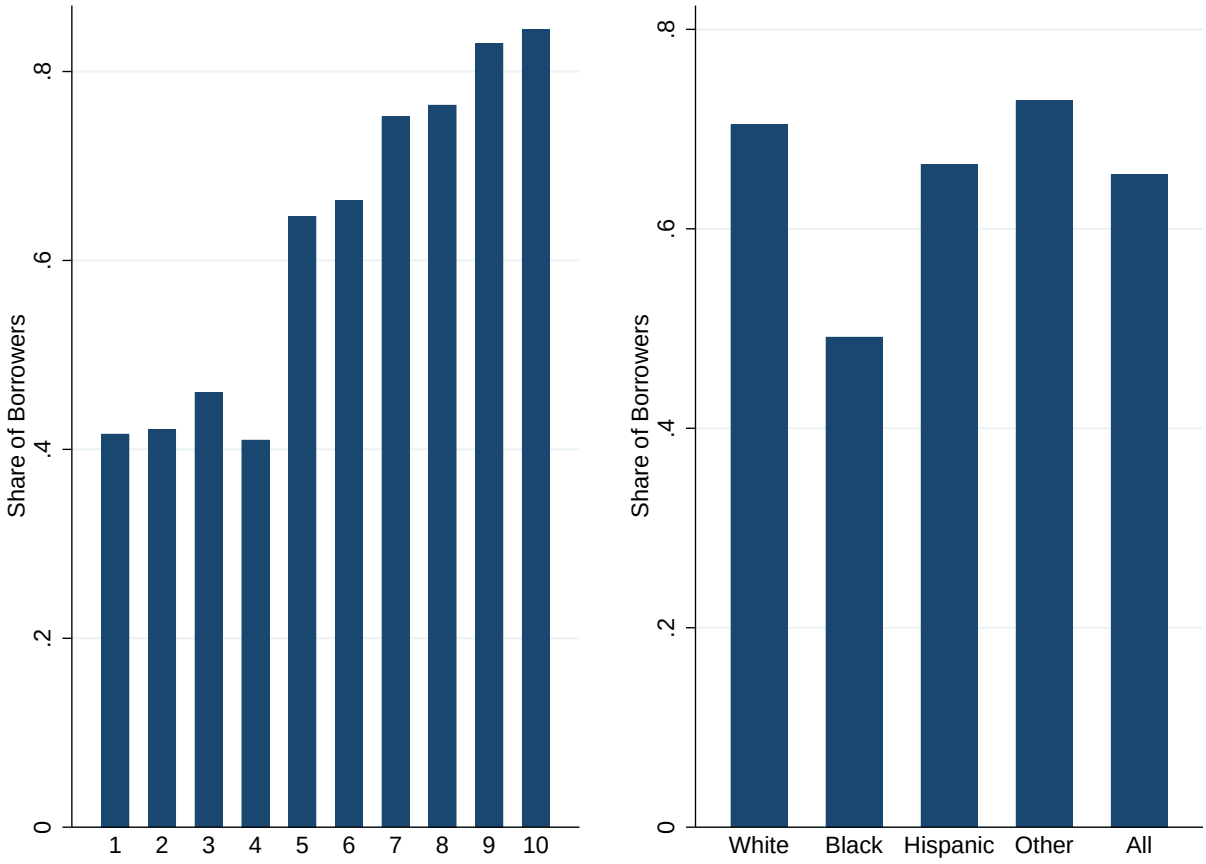


Table 1: Summary Statistics

This table provides summary statistics for the main variables used in the analysis. The left-hand panel is for our sample, that is, all households for which there are education loans and the school attendee has left their education program. The right-hand panel gives summary statistics for the full sample including individuals without any student debt. All statistics are weighed using SCF survey weights. The standard deviations are derived by regressing a variable x on a constant, taking the square of the difference between x and $\hat{x}$, and regressing the result again on a constant to get the variance.

	Households with Education Debt					**Full Population**				
	Minimum	*Median*	*Mean*	*SD*	*Max*	*Minimum*	*Median*	*Mean*	*SD*	*Max*
Have Education Debt			100%					21%		
Balance	120	22,000	41,800	56,000	419,000	0	0	8,700	21,000	419,000
Initial Balance	400	32,000	51,900	59,200	555,000	0	0	10,500	22,600	555,000
Payment	0	2,000	3,300	4,300	38,400	0	0	600	1,700	38,400
Interest Rate	0%	5.5%	5.9%	3.3%	29.0%					
Year Left School	1987	2012	2011	5.4	2019					
First Repayment Year	1999	2014	2013	5.2	2019					
Family Income	0	71,300	98,500	139,300	2,433,300	0	59,100	106,300	459,300	703,590,700
Number of Adults	1	2	1.6	0.5	2	1	2	1.6	0.2	2
Number of Children	0	1	1.1	1.2	6	0	0	0.7	1.2	7

Table 2: Present Value Gains from Forgiving Balances and Targeted IDR Enrollment

This table reports the total and per capital present value gains of the policies we evaluate, by within-cohort decile of earnings and ethnic group, including households without student debt. First, we consider canceling all student loan balances, or only $50,000 or $10,000 per person, or up to $50,000 with a phase out range between $75,000 and $125,000 in earnings. Second, we consider enrolling households who would benefit from income-driven repayment. In IDR policy (a), they pay 10% of their discretionary income, in line with current IDR rules. In policy (b), loans are also forgiven 10 years after the first repayment. In policy (c), discretionary income is limited to earnings above three times the poverty line. In policy (d), payments are reduced to 7.5% of discretionary income. The last two rows report the present value gains and change in balance for the entire population. All present values are in pre-tax dollars.

	Per person ($)								Total ($bn)								Share (%)							
	Balance Forgiveness				IDR Enrollment				Balance Forgiveness				IDR Enrollment				Balance Forgiveness				IDR Enrollment			
Earnings Decile	Full	50K	10K	Cap	(a)	(b)	(c)	(d)	Full	50K	10K	Cap	(a)	(b)	(c)	(d)	Full	50K	10K	Cap	(a)	(b)	(c)	(d)
1	1,276	886	386	886	316	1,075	762	442	14.7	10.2	4.4	10.2	3.6	12.4	8.8	5.1	2.3	2.4	3.1	2.8	10.1	3.0	5.0	5.7
2	1,414	750	339	750	108	1,075	588	311	17.6	9.3	4.2	9.3	1.3	13.4	7.3	3.9	2.7	2.2	2.9	2.5	3.7	3.2	4.2	4.3
3	2,181	1,450	452	1,450	470	1,642	1,477	745	29.2	19.4	6.0	19.4	6.3	22.0	19.8	10.0	4.5	4.6	4.2	5.2	17.5	5.3	11.4	11.1
4	2,708	1,951	684	1,951	214	2,033	1,525	556	36.1	26.0	9.1	26.0	2.9	27.1	20.4	7.4	5.6	6.2	6.3	7.1	7.9	6.5	11.7	8.3
5	3,867	3,029	1,194	3,029	283	2,679	1,720	635	50.6	39.6	15.6	39.6	3.7	35.0	22.5	8.3	7.9	9.4	10.8	10.7	10.3	8.4	12.9	9.2
6	6,784	4,099	1,397	4,099	207	3,776	2,067	973	91.6	55.3	18.9	55.3	2.8	51.0	27.9	13.1	14.2	13.1	13.0	15.0	7.8	12.3	16.0	14.6
7	6,570	4,698	1,721	4,698	245	3,808	1,608	694	89.3	63.9	23.4	63.9	3.3	51.8	21.9	9.4	13.9	15.1	16.1	17.3	9.2	12.5	12.6	10.5
8	9,079	5,178	1,610	5,002	637	5,860	2,055	1,452	120.4	68.6	21.3	66.3	8.4	77.7	27.2	19.2	18.7	16.3	14.7	18.0	23.5	18.7	15.7	21.4
9	8,274	5,507	1,754	4,378	209	5,317	1,096	745	111.8	74.4	23.7	59.2	2.8	71.8	14.8	10.1	17.4	17.6	16.3	16.0	7.9	17.3	8.5	11.2
10	6,267	4,223	1,391	1,527	56	4,018	267	248	82.2	55.4	18.2	20.0	0.7	52.7	3.5	3.3	12.8	13.1	12.6	5.4	2.1	12.7	2.0	3.6
Ethnicity																								
White	4,885	3,382	1,206	2,920	219	3,142	1,139	568	413.7	286.5	102.2	247.3	18.5	266.1	96.5	48.1	64.3	67.8	70.5	67.0	51.6	64.1	55.5	53.6
Black	7,942	4,887	1,392	4,423	790	5,309	3,002	1,625	149.9	92.2	26.3	83.5	14.9	100.2	56.6	30.7	23.3	21.8	18.1	22.6	41.4	24.1	32.5	34.1
Hispanic	2,894	1,763	631	1,595	112	1,831	888	380	52.1	31.8	11.4	28.7	2.0	33.0	16.0	6.8	8.1	7.5	7.8	7.8	5.6	8.0	9.2	7.6
Other	3,025	1,286	567	1,068	54	1,705	530	453	27.7	11.8	5.2	9.8	0.5	15.6	4.9	4.1	4.3	2.8	3.6	2.7	1.4	3.8	2.8	4.6
All																								
PV	4,922	3,229	1,109	2,824	275	3,173	1,331	687	643.5	422.2	145.0	369.3	36.0	414.9	174.0	89.8								
Balance	6,342	4,192	1,440	3,778					829.2	548.1	188.3	493.9												

A Additional Tables and Figures

Figure A.1: Partial Balance Forgiveness - Phased out above $75,000

This figure displays the average change in student debt per capita after a partial balance forgiveness of $50,000 per person for households with per capita earnings below $75,000. For each additional dollar of per capita earnings, the amount forgiven per person is reduced by one dollar. The red line reports the ratio of the average present value gain to the average balance reduction in each group.



Figure A.2: Student Loan Delinquency and Market Returns

This figure displays mean annual 90-day delinquency rates by S&P-500 returns. The left panel uses contemporaneous returns, while the right panel uses lagged returns. The coefficient from a regression of delinquency rates on returns is .0185, with a standard error of .0161. The coefficient from a regression of delinquency rates on lagged returns is .0266, with a standard error of .0112. 90-day delinquency rates are obtained from the Federal Reserve Bank of New York.

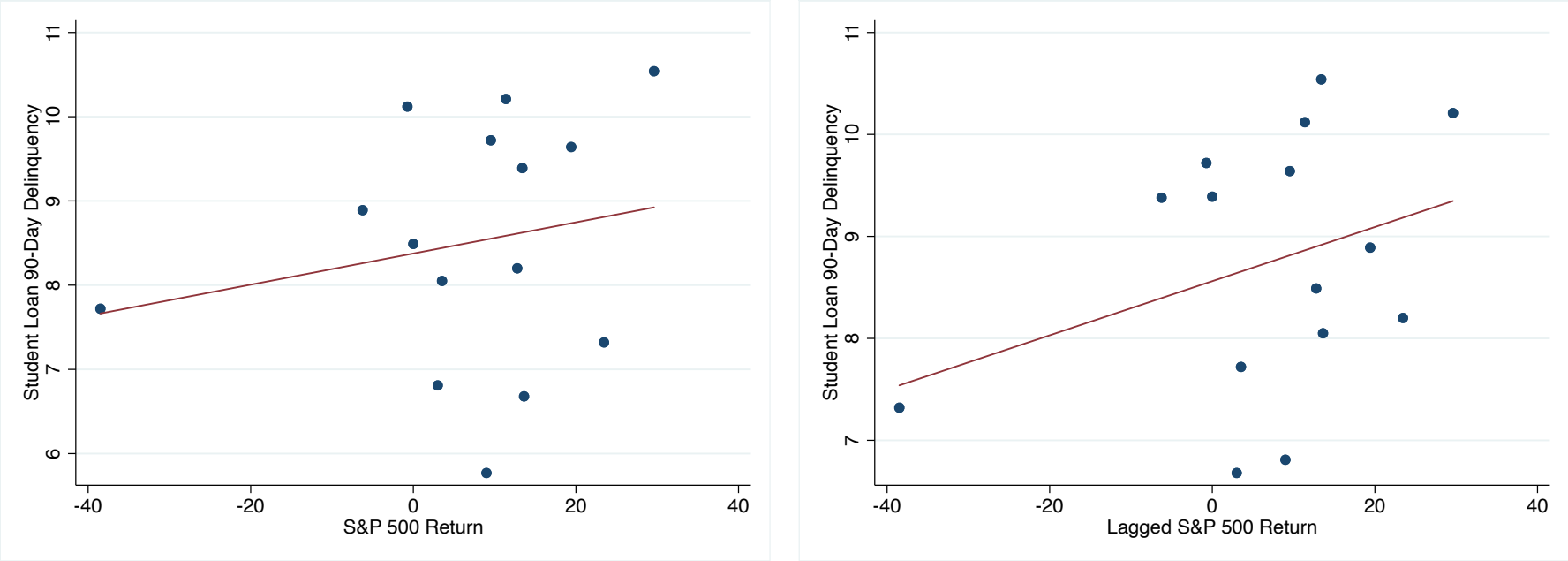


Table A.1: Variable Descriptions

This table describes the main variables used in the analysis. All variables are taken from the Federal Reserve's 2019 Survey of Consumer Finances (SCF). The actual variable labels from SCF are included in the description. Any monetary variables are in terms of 2019 dollars.

Name	Description
Balance	Current balance of each education loan. SCF main dataset: x7824 x7847 x7870 x7924 x7947 x7970
Initial Balance	Original amount borrowed for each education loan, excluding finance charges. SCF main dataset: x7805 x7828 x7851 x7905 x7928 x7951
Payment	Yearly payment on each education loan. Converted to annual payments based on the frequency of payments. SCF main dataset: x7815 x7838 x7861 x7915 x7038 x7961
Interest Rate	The annual rate of interest charged on each education loan. SCF main dataset: x7822 x7845 x7868 x7922 x7945 x7968
Year Left School	The last year that the borrower attends the program that they used each education loan for. SCF main dataset: x7880 x7885 x7890 x7895 x7900 x7995
First Repayment Year	The year that a borrower begins making payments on each education loan. SCF main dataset: x7811 x7834 x7857 x7911 x7934 x7957
Why Zero	Explains why the payments on an education loan are zero. Options include being in forbearance or a job or public service loan forgiveness program, not being able to afford payments, and still being enrolled or in the post-graduation grace period. SCF main dataset: x9300, x9301, x9302, x9303, x9304, x9305
IDR	Indicates whether the payments on an education loan are affected by either being in an income-based repayment program or hardship deferral. SCF main dataset: x7422 x7424 x7426 x7428 x7430 x7432
Family Income	Total income for each household. Taken directly from SCF Survey Extract data.
Number of Adults	Number of adults in each household. Value of either one or two depending on whether the reference person is married. Taken directly from SCF Survey Extract data.
Number of Children	Number of children in each household. Taken directly from SCF Survey Extract data.

Table A.2: Income Decile Cutoffs

This table shows highest level of each earnings decile, by age and earnings decile. Age groups go from youngest to oldest vertically, and earnings deciles go from lowest to highest horizontally. Each observation shows the top income in the group. All data comes from the Federal Reserve's 2019 Survey of Consumer Finances (SCF). Any monetary variables are in terms of 2019 dollars.

Age	**Earnings Decile**									
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
25	0	12,200	21,900	25,500	28,000	33,600	38,200	40,700	47,900	85,500
30	12,200	20,400	25,500	32,600	40,700	49,400	56,000	71,300	87,600	214,800
35	4,400	16,300	20,900	26,500	36,100	47,900	56,000	66,200	73,800	189,400
40	1,000	14,300	23,400	30,000	39,200	49,400	67,200	91,600	119,600	381,800
45	0	15,300	25,500	34,600	40,700	48,900	58,000	74,300	113,000	743,200
50	4,100	13,200	18,800	36,700	39,700	46,300	64,100	87,600	115,600	1,730,800
55	0	0	18,800	30,500	44,300	50,900	66,200	89,100	127,300	7,885,300
60	0	0	13,200	21,400	31,600	36,700	59,100	69,200	130,300	3,563,400

Table A.3: Student Debt by Earnings and Wealth Quartile

This table reports the average student debt per person by quartile of wealth and earnings, including households without debts. Wealth is defined using the SCF "networth" variable, which is the sum of all assets minus liabilities. Quartiles are built within age groups. Panel A reports the average balance while Panel B reports present values.

Panel A. Outstanding Balance

Earnings	Wealth quartile			
quartile	1	2	3	4
1	5,950	1,248	1,887	917
2	12,664	2,338	3,402	2,449
3	30,226	3,634	3,660	3,551
4	45,952	10,907	6,040	3,938

Panel B. Present Value

	1	2	3	4
1	2,216	657	1,012	1,114
2	5,890	2,169	2,020	1,334
3	22,903	3,672	3,838	3,952
4	38,752	11,648	6,357	4,064

B Taxation of Loan Forgiveness

In the main analysis, we assume that loan forgiveness under IDR is untaxed and compute deciles based on pre-tax income. This is consistent with any forgiveness that happens after Dec. 31, 2020, and before Jan. 1, 2026, under the American Rescue Plan Act of 2021. However, under current law forgiveness after Jan. 1, 2026 is still taxed. While many experts believe that these rules will be changed before forgiveness under IDR occurs,[20] under current law loan forgiveness is treated as taxable income. In this appendix we explore the implications of taxes on loan forgiveness programs.

First, we project how much taxes borrowers will pay under the current system. We assume that 2019 tax brackets (Table B.1) will grow at the same rate as consumer prices. For couples, we multiply the cutoffs by two, which is equivalent to assuming that they will file jointly. Taxable income is the sum of a family's earnings and forgiven balances in a given year, minus the standard deduction. Family earnings evolve under the same assumptions as in Section 2.3. As for tax brackets cutoffs, we assume the standard deduction to be twice as large for couples and to grow at the same rate as inflation. We define the tax cost related to balance forgiveness as the increase in taxes resulting from the inclusion of the forgiven balance to its taxable income.

Figure B.1 shows the average present value of these tax cost. The top panel shows amounts for all households, the middle panel shows households with student debt and the bottom panel shows households with any projected tax bill. These tax bills largely mirror the benefits of IDR forgiveness, with the middle of the income distribution paying the largest tax bills. Effectively, taxing loan forgiveness under IDR undoes some of the benefits of IDR loan forgiveness. Panel C reports the average balance by decile and per person for households who will have to pay such taxes. These present values are quite substantial. It is important to note that it is not clear how much the IRS will actually collect from individuals in the bottom 10% if they owe $14,000.

Nonetheless, we can assume that these taxes will be paid and estimate the benefits of combining the policies we previously considered with an end to such taxation. To that purpose, Table B.2 repeats the analysis in Table 2, but assumes that these taxes are removed and reports the results in post-tax dollars. To be specific, we measure the present value gain of each policy, under the assumption that borrowers would have paid taxes when their loan is forgiven under the status-quo, but that all taxes are removed under new policies. The levels of forgiveness increases substantially–because it now includes the benefit from eliminating IDR forgiveness taxes–but the basic patterns regarding progressivity and regressivity of various options do not. Under universal and capped forgiveness plans, the majority of benefits accrue to the top income deciles, while under IDR plans the majority of forgiveness accrues to the middle and bottom of the income distribution.

[20] For example, the Wall Street Journal, June 24, 2018 writes that "the IRS would likely be forced to cut deals or write off taxable amounts altogether, some experts say."

Table B.1: 2019 Tax Brackets

This table displays the tax rates applicable to each income bracket for single individuals. The standard deduction is $12,200 in 2019.

Bracket	Rate
Up to $9,700	10%
$9,701 –$39,475	12%
$39,476 –$84,200	22%
$84,201 –$160,725	24%
$160,726 –$204100	32%
$204,101 –$510,300	35%
Over $510,301	37%

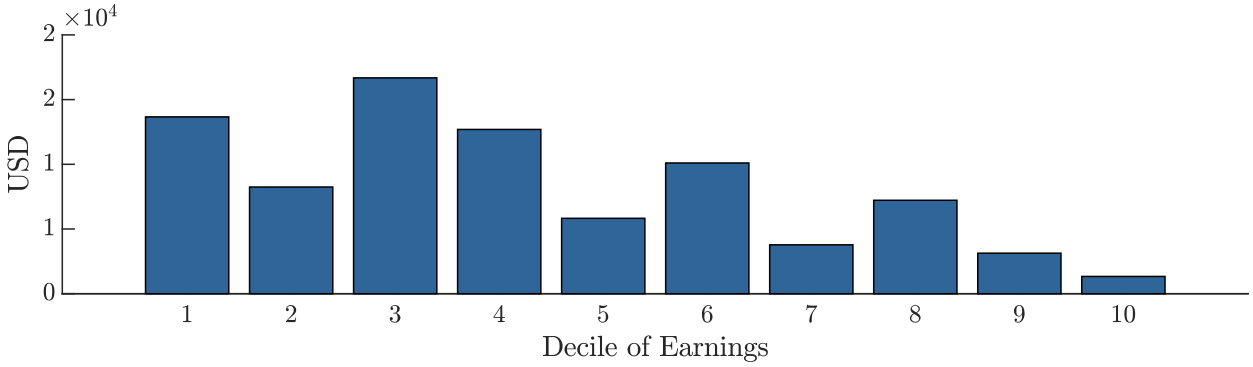
Figure B.1: Present value of taxes on forgiven balances

This figure displays the average present value of projected taxes on balances forgiven in the future, per person and within-cohort decile of earnings. Panel A reports the mean for the entire sample. Panel B reports the mean for households with student debts. Panel C reports the mean for households projected to have to pay such taxes.

Panel A. All households



Panel B. Households with student debt



Panel C. Households with projected tax bill



Table B.2: Present Value Gains from Forgiving Balances and Targeted IDR Enrollment– Post-Tax Dollars

This table reports the total and per capital present value gains of the policies we evaluate, by within-cohort decile of earnings and ethnic group, including households without student debt combined with ending taxation on canceled balances. First, we consider canceling all student loan balances, or only $50,000 or $10,000 per person, or up to $50,000 with a phase out range between $75,000 and $125,000 in earnings. Second, we consider enrolling households who would benefit from income-driven repayment. In IDR policy (a), they pay 10% of their discretionary income, in line with current IDR rules. In policy (b), loans are also forgiven 10 years after the first repayment. In policy (c), discretionary income is limited to earnings above three times the poverty line. In policy (d), payments are reduced to 7.5% of discretionary income. The last two rows report the present value gains and change in balance for the entire population. Unlike in Table 2, we combine these policies with end to forgiveness taxation, including under IDR. All present values are in post-tax dollars and include the benefits of this change in the tax policy.

	Per person ($)								Total ($bn)								Share (%)							
	Balance Forgiveness				IDR Enrollment				Balance Forgiveness				IDR Enrollment				Balance Forgiveness				IDR Enrollment			
Earnings Decile	Full	50K	10K	Cap	(a)	(b)	(c)	(d)	Full	50K	10K	Cap	(a)	(b)	(c)	(d)	Full	50K	10K	Cap	(a)	(b)	(c)	(d)
1	3,309	2,918	2,419	2,918	2,196	3,021	2,680	2,325	38.0	33.5	27.8	33.5	25.2	34.7	30.8	26.7	4.3%	5.0%	7.2%	5.5%	10.3%	5.4%	7.8%	8.8%
2	2,533	1,868	1,458	1,868	1,124	2,179	1,690	1,347	31.6	23.3	18.2	23.3	14.0	27.2	21.1	16.8	3.6%	3.5%	4.7%	3.8%	5.7%	4.2%	5.3%	5.5%
3	5,255	4,523	3,525	4,523	3,100	4,500	4,282	3,416	70.3	60.5	47.1	60.5	41.4	60.2	57.3	45.7	7.9%	9.1%	12.2%	9.9%	17.0%	9.3%	14.4%	15.0%
4	5,750	4,993	3,727	4,993	2,668	4,807	4,136	3,063	76.8	66.7	49.7	66.7	35.6	64.2	55.2	40.9	8.7%	10.0%	12.8%	10.9%	14.6%	9.9%	13.9%	13.4%
5	5,483	4,645	2,810	4,645	1,707	4,229	3,240	2,102	71.7	60.8	36.8	60.8	22.3	55.3	42.4	27.5	8.1%	9.1%	9.5%	9.9%	9.1%	8.6%	10.7%	9.0%
6	9,788	7,103	4,400	7,103	3,002	6,715	4,994	3,842	132.2	95.9	59.4	95.9	40.5	90.7	67.4	51.9	14.9%	14.4%	15.3%	15.7%	16.6%	14.0%	17.0%	17.0%
7	7,795	5,922	2,945	5,922	1,149	4,965	2,657	1,698	106.0	80.5	40.0	80.5	15.6	67.5	36.1	23.1	12.0%	12.1%	10.3%	13.2%	6.4%	10.5%	9.1%	7.6%
8	11,283	7,382	3,814	7,206	2,435	7,947	4,073	3,406	149.6	97.9	50.6	95.5	32.3	105.3	54.0	45.1	16.9%	14.7%	13.0%	15.6%	13.2%	16.3%	13.6%	14.8%
9	9,160	6,393	2,640	5,264	1,029	6,197	1,918	1,564	123.8	86.4	35.7	71.1	13.9	83.7	25.9	21.1	14.0%	13.0%	9.2%	11.6%	5.7%	13.0%	6.5%	6.9%
10	6,581	4,537	1,705	1,841	266	4,329	480	464	86.3	59.5	22.4	24.2	3.5	56.8	6.3	6.1	9.7%	9.0%	5.8%	3.9%	1.4%	8.8%	1.6%	2.0%
Ethnicity																								
White	6,682	5,179	3,003	4,717	1,731	4,829	2,757	2,126	565.9	438.7	254.4	399.5	146.6	409.0	233.5	180.0	63.9%	66.0%	65.6%	65.3%	60.0%	63.4%	58.9%	59.1%
Black	11,062	8,007	4,512	7,542	3,513	8,297	5,919	4,439	208.7	151.1	85.1	142.3	66.3	156.6	111.7	83.8	23.6%	22.7%	22.0%	23.3%	27.1%	24.3%	28.2%	27.5%
Hispanic	4,121	2,990	1,858	2,823	1,211	3,048	2,055	1,539	74.3	53.9	33.5	50.9	21.8	54.9	37.0	27.7	8.4%	8.1%	8.6%	8.3%	8.9%	8.5%	9.3%	9.1%
Other	4,061	2,322	1,602	2,104	1,060	2,740	1,552	1,459	37.2	21.3	14.7	19.3	9.7	25.1	14.2	13.4	4.2%	3.2%	3.8%	3.1%	4.0%	3.9%	3.6%	4.4%
All																								
PV	6,778	5,085	2,965	4,680	1,870	4,938	3,032	2,332	886.1	664.9	387.6	611.9	244.5	645.6	396.5	304.9								
Balance	6,342	4,192	1,440	3,778					829.2	548.1	188.3	493.9												

C Alternative Discount Rates and Earnings Growth

In the main analysis, we assume a discount rate of 3%, and an earnings growth rate of 2%. In this section, we repeat the analysis in Table 2 but vary these assumptions. We vary earnings growth rates from 1 to 3%, and allow discount rates to be 1,3, 5 and 7%. The results are shown in tables C.1 to C.11. Our basic pattern of results and conclusions remain unchanged.

Table C.1: PV Gains from Forgiving Balances and Targeted IDR Enrollment– Earnings Increase: 1% | Discount Rate: 1%

This table reports the total and per capital present value gains of the policies we evaluate, by within-cohort decile of earnings and ethnic group, including households without student debt. First, we consider canceling all student loan balances, or only $50,000 or $10,000 per person, or up to $50,000 with a phase out range between $75,000 and $125,000 in earnings. Second, we consider enrolling households who would benefit from income-driven repayment. In IDR policy (a), they pay 10% of their discretionary income, in line with current IDR rules. In policy (b), loans are also forgiven 10 years after the first repayment. In policy (c), discretionary income is limited to earnings above three times the poverty line. In policy (d), payments are reduced to 7.5% of discretionary income. The last two rows report the present value gains and change in balance for the entire population. In comparison to Table 2, we use alternative earnings growth and discount rate assumptions.

	Per person ($)								Total ($bn)								Share (%)							
	Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment			
Decile	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)
1	1,371	963	419	963	366	1,165	850	497	15.8	11.1	4.8	11.1	4.2	13.4	9.8	5.7	2.24%	2.39%	3.01%	2.73%	9.66%	2.87%	4.72%	5.48%
2	1,519	797	368	797	123	1,174	667	345	18.9	9.9	4.6	9.9	1.5	14.6	8.3	4.3	2.69%	2.15%	2.87%	2.45%	3.53%	3.14%	4.02%	4.12%
3	2,305	1,539	482	1,539	536	1,770	1,632	827	30.8	20.6	6.4	20.6	7.2	23.7	21.8	11.1	4.39%	4.45%	4.03%	5.07%	16.46%	5.08%	10.54%	10.61%
4	2,849	2,047	734	2,047	244	2,170	1,691	611	38.0	27.3	9.8	27.3	3.3	29.0	22.6	8.2	5.41%	5.91%	6.12%	6.74%	7.47%	6.22%	10.91%	7.83%
5	4,160	3,272	1,298	3,272	326	2,938	1,993	716	54.4	42.8	17.0	42.8	4.3	38.4	26.1	9.4	7.74%	9.25%	10.62%	10.56%	9.77%	8.25%	12.60%	8.98%
6	7,443	4,491	1,547	4,491	264	4,324	2,508	1,134	100.5	60.6	20.9	60.6	3.6	58.4	33.9	15.3	14.30%	13.11%	13.06%	14.96%	8.17%	12.53%	16.36%	14.69%
7	7,230	5,206	1,910	5,206	305	4,360	1,992	831	98.3	70.8	26.0	70.8	4.1	59.3	27.1	11.3	13.98%	15.30%	16.23%	17.46%	9.52%	12.72%	13.08%	10.84%
8	10,060	5,745	1,800	5,559	776	6,710	2,559	1,719	133.4	76.2	23.9	73.7	10.3	89.0	33.9	22.8	18.97%	16.47%	14.92%	18.18%	23.60%	19.09%	16.39%	21.85%
9	9,118	6,114	1,951	4,899	287	6,033	1,397	904	123.2	82.6	26.4	66.2	3.9	81.5	18.9	12.2	17.53%	17.86%	16.48%	16.33%	8.91%	17.49%	9.12%	11.71%
10	6,828	4,624	1,543	1,707	97	4,481	355	310	89.6	60.7	20.2	22.4	1.3	58.8	4.7	4.1	12.74%	13.11%	12.65%	5.52%	2.91%	12.62%	2.25%	3.91%
Ethnicity																								
White	5,336	3,711	1,334	3,211	274	3,527	1,368	666	451.9	314.3	113.0	271.9	23.2	298.7	115.9	56.4	64.29%	67.94%	70.62%	67.08%	53.32%	64.10%	56.00%	54.07%
Black	8,682	5,355	1,531	4,854	915	5,965	3,506	1,859	163.8	101.1	28.9	91.6	17.3	112.6	66.2	35.1	23.31%	21.85%	18.06%	22.60%	39.61%	24.15%	31.97%	33.64%
Hispanic	3,158	1,923	693	1,742	139	2,059	1,060	450	56.9	34.6	12.5	31.4	2.5	37.1	19.1	8.1	8.10%	7.49%	7.80%	7.74%	5.76%	7.96%	9.23%	7.77%
Other	3,301	1,373	613	1,144	62	1,925	633	514	30.2	12.6	5.6	10.5	0.6	17.6	5.8	4.7	4.30%	2.72%	3.51%	2.58%	1.31%	3.78%	2.80%	4.52%
All																								
PV	5,376	3,538	1,223	3,101	333	3,564	1,583	797	702.9	462.5	159.9	405.4	43.6	466.0	206.9	104.3								
Balance	6,342	4,192	1,440	3,778					829.2	548.1	188.3	493.9												

Table C.2: PV Gains from Forgiving Balances and Targeted IDR Enrollment– Earnings Increase: 1% | Discount Rate: 3%

This table reports the total and per capital present value gains of the policies we evaluate, by within-cohort decile of earnings and ethnic group, including households without student debt. First, we consider canceling all student loan balances, or only $50,000 or $10,000 per person, or up to $50,000 with a phase out range between $75,000 and $125,000 in earnings. Second, we consider enrolling households who would benefit from income-driven repayment. In IDR policy (a), they pay 10% of their discretionary income, in line with current IDR rules. In policy (b), loans are also forgiven 10 years after the first repayment. In policy (c), discretionary income is limited to earnings above three times the poverty line. In policy (d), payments are reduced to 7.5% of discretionary income. The last two rows report the present value gains and change in balance for the entire population. In comparison to Table 2, we use alternative earnings growth and discount rate assumptions.

	Per person ($)								Total ($bn)								Share (%)							
	Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment			
Decile	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)
1	1,187	834	363	834	321	994	743	436	13.6	9.6	4.2	9.6	3.7	11.4	8.5	5.0	2.2%	2.4%	3.0%	2.7%	9.3%	2.9%	4.6%	5.3%
2	1,303	708	323	708	121	981	596	311	16.2	8.8	4.0	8.8	1.5	12.2	7.4	3.9	2.6%	2.2%	2.9%	2.5%	3.8%	3.1%	4.0%	4.1%
3	1,991	1,310	411	1,310	511	1,496	1,438	757	26.6	17.5	5.5	17.5	6.8	20.0	19.2	10.1	4.3%	4.3%	4.0%	5.0%	17.2%	5.1%	10.4%	10.7%
4	2,465	1,779	638	1,779	235	1,836	1,489	552	32.9	23.8	8.5	23.8	3.1	24.5	19.9	7.4	5.3%	5.9%	6.1%	6.8%	7.9%	6.2%	10.7%	7.8%
5	3,657	2,887	1,142	2,887	304	2,520	1,804	655	47.8	37.8	14.9	37.8	4.0	33.0	23.6	8.6	7.8%	9.3%	10.8%	10.7%	10.0%	8.4%	12.7%	9.1%
6	6,386	3,870	1,324	3,870	241	3,506	2,224	1,010	86.2	52.3	17.9	52.3	3.3	47.3	30.0	13.6	14.0%	12.9%	12.9%	14.9%	8.2%	12.0%	16.2%	14.4%
7	6,359	4,543	1,656	4,543	279	3,680	1,823	768	86.4	61.8	22.5	61.8	3.8	50.0	24.8	10.4	14.0%	15.3%	16.2%	17.6%	9.5%	12.7%	13.4%	11.1%
8	8,731	4,976	1,542	4,802	721	5,603	2,307	1,566	115.7	66.0	20.4	63.7	9.6	74.3	30.6	20.8	18.8%	16.3%	14.7%	18.1%	24.0%	18.8%	16.5%	22.0%
9	8,057	5,344	1,697	4,223	237	5,162	1,265	810	108.9	72.2	22.9	57.1	3.2	69.7	17.1	10.9	17.7%	17.9%	16.5%	16.2%	8.1%	17.7%	9.2%	11.6%
10	6,167	4,152	1,363	1,501	62	3,953	328	280	80.9	54.5	17.9	19.7	0.8	51.9	4.3	3.7	13.1%	13.5%	12.9%	5.6%	2.1%	13.1%	2.3%	3.9%
Ethnicity																								
White	4,709	3,263	1,162	2,805	249	3,017	1,241	612	398.8	276.3	98.4	237.6	21.1	255.5	105.1	51.9	64.8%	68.4%	70.9%	67.5%	52.9%	64.8%	56.7%	54.9%
Black	7,482	4,578	1,297	4,124	838	4,957	3,092	1,661	141.2	86.4	24.5	77.8	15.8	93.5	58.4	31.4	22.9%	21.4%	17.6%	22.1%	39.8%	23.7%	31.5%	33.2%
Hispanic	2,737	1,676	603	1,509	129	1,713	931	392	49.3	30.2	10.9	27.2	2.3	30.9	16.8	7.1	8.0%	7.5%	7.8%	7.7%	5.8%	7.8%	9.0%	7.5%
Other	2,847	1,219	548	1,008	63	1,580	571	451	26.1	11.2	5.0	9.2	0.6	14.5	5.2	4.1	4.2%	2.8%	3.6%	2.6%	1.5%	3.7%	2.8%	4.4%
All																								
PV	4,707	3,091	1,062	2,691	304	3,016	1,418	722	615.4	404.1	138.8	351.8	39.8	394.4	185.5	94.4								
Balance	6,342	4,192	1,440	3,778					829.2	548.1	188.3	493.9												

Table C.3: PV Gains from Forgiving Balances and Targeted IDR Enrollment– Earnings Increase: 1% | Discount Rate: 5%

This table reports the total and per capital present value gains of the policies we evaluate, by within-cohort decile of earnings and ethnic group, including households without student debt. First, we consider canceling all student loan balances, or only $50,000 or $10,000 per person, or up to $50,000 with a phase out range between $75,000 and $125,000 in earnings. Second, we consider enrolling households who would benefit from income-driven repayment. In IDR policy (a), they pay 10% of their discretionary income, in line with current IDR rules. In policy (b), loans are also forgiven 10 years after the first repayment. In policy (c), discretionary income is limited to earnings above three times the poverty line. In policy (d), payments are reduced to 7.5% of discretionary income. The last two rows report the present value gains and change in balance for the entire population. In comparison to Table 2, we use alternative earnings growth and discount rate assumptions.

	Per person ($)								Total ($bn)								Share (%)							
	Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment			
Decile	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)
1	1,040	731	319	731	285	860	658	388	12.0	8.4	3.7	8.4	3.3	9.9	7.6	4.5	2.2%	2.4%	3.0%	2.7%	8.7%	2.9%	4.5%	5.1%
2	1,132	634	287	634	118	832	537	283	14.1	7.9	3.6	7.9	1.5	10.4	6.7	3.5	2.6%	2.2%	2.9%	2.6%	3.9%	3.1%	4.0%	4.0%
3	1,742	1,130	356	1,130	487	1,283	1,280	697	23.3	15.1	4.8	15.1	6.5	17.2	17.1	9.3	4.3%	4.2%	3.9%	4.9%	17.3%	5.1%	10.2%	10.7%
4	2,158	1,565	561	1,565	227	1,573	1,325	505	28.8	20.9	7.5	20.9	3.0	21.0	17.7	6.7	5.3%	5.9%	6.2%	6.8%	8.1%	6.2%	10.5%	7.7%
5	3,251	2,574	1,014	2,574	291	2,189	1,648	609	42.5	33.7	13.3	33.7	3.8	28.6	21.6	8.0	7.8%	9.4%	10.9%	10.9%	10.1%	8.5%	12.8%	9.1%
6	5,548	3,376	1,147	3,376	230	2,880	1,990	909	74.9	45.6	15.5	45.6	3.1	38.9	26.9	12.3	13.8%	12.8%	12.7%	14.8%	8.2%	11.5%	16.0%	14.1%
7	5,651	4,003	1,452	4,003	277	3,144	1,685	739	76.8	54.4	19.7	54.4	3.8	42.7	22.9	10.1	14.1%	15.3%	16.2%	17.6%	10.0%	12.6%	13.6%	11.5%
8	7,665	4,357	1,336	4,193	687	4,735	2,095	1,441	101.6	57.8	17.7	55.6	9.1	62.8	27.8	19.1	18.7%	16.2%	14.6%	18.0%	24.2%	18.6%	16.5%	21.9%
9	7,186	4,716	1,490	3,675	211	4,463	1,166	753	97.1	63.7	20.1	49.7	2.9	60.3	15.8	10.2	17.8%	17.9%	16.5%	16.1%	7.6%	17.8%	9.4%	11.6%
10	5,609	3,753	1,212	1,330	57	3,518	338	287	73.6	49.2	15.9	17.4	0.7	46.1	4.4	3.8	13.5%	13.8%	13.1%	5.7%	2.0%	13.7%	2.6%	4.3%
Ethnicity																								
White	4,198	2,897	1,023	2,477	238	2,611	1,142	579	355.6	245.4	86.6	209.7	20.2	221.1	96.7	49.1	65.3%	68.8%	71.2%	68.0%	53.6%	65.4%	57.4%	56.2%
Black	6,525	3,959	1,113	3,544	779	4,171	2,756	1,503	123.1	74.7	21.0	66.9	14.7	78.7	52.0	28.4	22.6%	20.9%	17.3%	21.7%	39.0%	23.3%	30.9%	32.5%
Hispanic	2,399	1,476	531	1,321	123	1,444	827	348	43.2	26.6	9.6	23.8	2.2	26.0	14.9	6.3	7.9%	7.5%	7.9%	7.7%	5.9%	7.7%	8.8%	7.2%
Other	2,487	1,092	494	898	63	1,317	521	400	22.8	10.0	4.5	8.2	0.6	12.1	4.8	3.7	4.2%	2.8%	3.7%	2.7%	1.5%	3.6%	2.8%	4.2%
All																								
PV	4,166	2,728	931	2,361	288	2,584	1,288	668	544.7	356.7	121.7	308.7	37.7	337.9	168.4	87.4								
Balance	6,342	4,192	1,440	3,778					829.2	548.1	188.3	493.9												

Table C.4: PV Gains from Forgiving Balances and Targeted IDR Enrollment– Earnings Increase: 1% | Discount Rate: 7%

This table reports the total and per capital present value gains of the policies we evaluate, by within-cohort decile of earnings and ethnic group, including households without student debt. First, we consider canceling all student loan balances, or only $50,000 or $10,000 per person, or up to $50,000 with a phase out range between $75,000 and $125,000 in earnings. Second, we consider enrolling households who would benefit from income-driven repayment. In IDR policy (a), they pay 10% of their discretionary income, in line with current IDR rules. In policy (b), loans are also forgiven 10 years after the first repayment. In policy (c), discretionary income is limited to earnings above three times the poverty line. In policy (d), payments are reduced to 7.5% of discretionary income. The last two rows report the present value gains and change in balance for the entire population. In comparison to Table 2, we use alternative earnings growth and discount rate assumptions.

	Per person ($)								Total ($bn)								Share (%)							
	Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment			
Decile	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)
1	921	648	283	648	257	751	589	349	10.6	7.4	3.2	7.4	3.0	8.6	6.8	4.0	2.2%	2.3%	3.0%	2.7%	8.0%	3.0%	4.4%	4.9%
2	996	573	256	573	114	716	488	260	12.4	7.1	3.2	7.1	1.4	8.9	6.1	3.2	2.6%	2.2%	3.0%	2.6%	3.9%	3.0%	3.9%	3.9%
3	1,541	987	313	987	463	1,114	1,151	645	20.6	13.2	4.2	13.2	6.2	14.9	15.4	8.6	4.2%	4.2%	3.9%	4.8%	16.8%	5.1%	10.0%	10.5%
4	1,909	1,390	498	1,390	221	1,364	1,190	465	25.5	18.6	6.6	18.6	3.0	18.2	15.9	6.2	5.2%	5.8%	6.2%	6.8%	8.0%	6.2%	10.3%	7.5%
5	2,917	2,316	908	2,316	286	1,922	1,518	576	38.2	30.3	11.9	30.3	3.7	25.1	19.9	7.5	7.8%	9.5%	11.0%	11.1%	10.1%	8.6%	12.9%	9.2%
6	4,875	2,978	1,003	2,978	224	2,395	1,796	831	65.8	40.2	13.5	40.2	3.0	32.3	24.3	11.2	13.5%	12.7%	12.6%	14.7%	8.2%	11.0%	15.7%	13.6%
7	5,068	3,559	1,284	3,559	287	2,715	1,565	719	68.9	48.4	17.5	48.4	3.9	36.9	21.3	9.8	14.2%	15.2%	16.2%	17.7%	10.6%	12.6%	13.8%	11.9%
8	6,798	3,853	1,169	3,698	670	4,049	1,925	1,345	90.1	51.1	15.5	49.0	8.9	53.7	25.5	17.8	18.5%	16.1%	14.4%	17.9%	24.0%	18.3%	16.5%	21.7%
9	6,464	4,198	1,321	3,228	210	3,897	1,088	720	87.3	56.7	17.8	43.6	2.8	52.6	14.7	9.7	17.9%	17.8%	16.6%	16.0%	7.7%	18.0%	9.5%	11.8%
10	5,134	3,413	1,086	1,185	79	3,156	352	316	67.3	44.8	14.2	15.5	1.0	41.4	4.6	4.1	13.8%	14.1%	13.2%	5.7%	2.8%	14.1%	3.0%	5.0%
Ethnicity																								
White	3,776	2,595	908	2,206	241	2,283	1,059	558	319.8	219.8	76.9	186.9	20.4	193.4	89.7	47.2	65.7%	69.2%	71.4%	68.3%	55.2%	66.1%	58.1%	57.4%
Black	5,751	3,461	966	3,079	730	3,549	2,484	1,378	108.5	65.3	18.2	58.1	13.8	67.0	46.9	26.0	22.3%	20.6%	16.9%	21.2%	37.3%	22.9%	30.4%	31.6%
Hispanic	2,126	1,313	471	1,168	122	1,233	743	320	38.3	23.6	8.5	21.1	2.2	22.2	13.4	5.8	7.9%	7.4%	7.9%	7.7%	5.9%	7.6%	8.7%	7.0%
Other	2,198	987	449	808	66	1,112	480	362	20.1	9.0	4.1	7.4	0.6	10.2	4.4	3.3	4.1%	2.8%	3.8%	2.7%	1.6%	3.5%	2.9%	4.0%
All																								
PV	3,723	2,431	824	2,091	283	2,239	1,181	630	486.8	317.8	107.7	273.4	36.9	292.8	154.4	82.3								
Balance	6,342	4,192	1,440	3,778					829.2	548.1	188.3	493.9												

Table C.5: PV Gains from Forgiving Balances and Targeted IDR Enrollment– Earnings Increase: 2% | Discount Rate: 1%

This table reports the total and per capital present value gains of the policies we evaluate, by within-cohort decile of earnings and ethnic group, including households without student debt. First, we consider canceling all student loan balances, or only $50,000 or $10,000 per person, or up to $50,000 with a phase out range between $75,000 and $125,000 in earnings. Second, we consider enrolling households who would benefit from income-driven repayment. In IDR policy (a), they pay 10% of their discretionary income, in line with current IDR rules. In policy (b), loans are also forgiven 10 years after the first repayment. In policy (c), discretionary income is limited to earnings above three times the poverty line. In policy (d), payments are reduced to 7.5% of discretionary income. The last two rows report the present value gains and change in balance for the entire population. In comparison to Table 2, we use alternative earnings growth and discount rate assumptions.

	Per person ($)								Total ($bn)								Share (%)							
	Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment			
Decile	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)
1	1,480	1,026	447	1,026	360	1,264	872	504	17.0	11.8	5.1	11.8	4.1	14.5	10.0	5.8	2.3%	2.4%	3.1%	2.8%	10.5%	3.0%	5.2%	5.9%
2	1,660	848	387	848	109	1,294	658	345	20.7	10.6	4.8	10.6	1.4	16.1	8.2	4.3	2.8%	2.2%	2.9%	2.5%	3.5%	3.3%	4.2%	4.4%
3	2,542	1,713	533	1,713	482	1,958	1,674	807	34.0	22.9	7.1	22.9	6.4	26.2	22.4	10.8	4.6%	4.7%	4.3%	5.4%	16.4%	5.3%	11.6%	10.9%
4	3,151	2,259	790	2,259	218	2,421	1,733	617	42.1	30.2	10.5	30.2	2.9	32.3	23.1	8.2	5.7%	6.2%	6.3%	7.1%	7.4%	6.6%	12.0%	8.3%
5	4,415	3,443	1,361	3,443	301	3,137	1,890	695	57.7	45.0	17.8	45.0	3.9	41.0	24.7	9.1	7.8%	9.3%	10.6%	10.6%	10.0%	8.3%	12.8%	9.2%
6	7,933	4,773	1,636	4,773	232	4,670	2,309	1,092	107.1	64.4	22.1	64.4	3.1	63.1	31.2	14.7	14.5%	13.3%	13.2%	15.1%	8.0%	12.8%	16.1%	14.9%
7	7,481	5,387	1,987	5,387	272	4,520	1,743	748	101.7	73.2	27.0	73.2	3.7	61.5	23.7	10.2	13.8%	15.1%	16.1%	17.2%	9.4%	12.5%	12.3%	10.3%
8	10,480	5,990	1,883	5,802	683	7,031	2,239	1,585	138.9	79.4	25.0	76.9	9.1	93.2	29.7	21.0	18.9%	16.4%	14.9%	18.0%	23.1%	19.0%	15.4%	21.2%
9	9,368	6,301	2,019	5,079	255	6,216	1,201	825	126.6	85.1	27.3	68.6	3.4	84.0	16.2	11.1	17.2%	17.6%	16.3%	16.1%	8.8%	17.1%	8.4%	11.3%
10	6,937	4,702	1,573	1,735	90	4,554	290	280	91.0	61.7	20.6	22.8	1.2	59.7	3.8	3.7	12.4%	12.7%	12.3%	5.3%	3.0%	12.2%	2.0%	3.7%
Ethnicity																								
White	5,546	3,852	1,386	3,347	241	3,682	1,248	615	469.7	326.3	117.4	283.5	20.4	311.8	105.7	52.1	63.8%	67.4%	70.1%	66.5%	51.9%	63.4%	54.7%	52.6%
Black	9,243	5,732	1,650	5,219	860	6,406	3,386	1,818	174.4	108.2	31.1	98.5	16.2	120.9	63.9	34.3	23.7%	22.3%	18.6%	23.1%	41.3%	24.6%	33.1%	34.7%
Hispanic	3,352	2,029	726	1,848	120	2,210	1,008	435	60.4	36.6	13.1	33.3	2.2	39.8	18.2	7.8	8.2%	7.5%	7.8%	7.8%	5.5%	8.1%	9.4%	7.9%
Other	3,522	1,459	635	1,220	53	2,086	583	516	32.3	13.4	5.8	11.2	0.5	19.1	5.3	4.7	4.4%	2.8%	3.5%	2.6%	1.2%	3.9%	2.8%	4.8%
All																								
PV	5,636	3,705	1,280	3,262	300	3,760	1,477	757	736.8	484.4	167.4	426.4	39.3	491.6	193.0	98.9								
Balance	6,342	4,192	1,440	3,778					829.2	548.1	188.3	493.9												

Table C.6: PV Gains from Forgiving Balances and Targeted IDR Enrollment– Earnings Increase: 2% | Discount Rate: 5%

This table reports the total and per capital present value gains of the policies we evaluate, by within-cohort decile of earnings and ethnic group, including households without student debt. First, we consider canceling all student loan balances, or only $50,000 or $10,000 per person, or up to $50,000 with a phase out range between $75,000 and $125,000 in earnings. Second, we consider enrolling households who would benefit from income-driven repayment. In IDR policy (a), they pay 10% of their discretionary income, in line with current IDR rules. In policy (b), loans are also forgiven 10 years after the first repayment. In policy (c), discretionary income is limited to earnings above three times the poverty line. In policy (d), payments are reduced to 7.5% of discretionary income. The last two rows report the present value gains and change in balance for the entire population. In comparison to Table 2, we use alternative earnings growth and discount rate assumptions.

	Per person ($)								Total ($bn)								Share (%)							
	Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment			
Decile	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)
1	1,114	775	338	775	282	926	675	393	12.8	8.9	3.9	8.9	3.2	10.6	7.8	4.5	2.3%	2.4%	3.1%	2.8%	9.5%	3.0%	4.9%	5.4%
2	1,222	669	300	669	107	906	532	283	15.2	8.3	3.7	8.3	1.3	11.3	6.6	3.5	2.7%	2.2%	3.0%	2.6%	3.9%	3.2%	4.2%	4.2%
3	1,896	1,244	388	1,244	455	1,398	1,316	690	25.4	16.6	5.2	16.6	6.1	18.7	17.6	9.2	4.5%	4.5%	4.1%	5.1%	17.8%	5.3%	11.1%	11.1%
4	2,356	1,705	599	1,705	210	1,730	1,356	508	31.5	22.8	8.0	22.8	2.8	23.1	18.1	6.8	5.5%	6.1%	6.3%	7.0%	8.2%	6.5%	11.4%	8.1%
5	3,426	2,693	1,058	2,693	273	2,317	1,578	592	44.8	35.2	13.8	35.2	3.6	30.3	20.6	7.7	7.9%	9.5%	10.9%	10.9%	10.4%	8.6%	13.0%	9.3%
6	5,876	3,564	1,207	3,564	198	3,092	1,865	881	79.3	48.1	16.3	48.1	2.7	41.7	25.2	11.9	14.0%	12.9%	12.8%	14.9%	7.8%	11.8%	15.8%	14.3%
7	5,831	4,137	1,505	4,137	240	3,247	1,507	669	79.3	56.2	20.5	56.2	3.3	44.1	20.5	9.1	14.0%	15.1%	16.1%	17.4%	9.5%	12.5%	12.9%	10.9%
8	7,957	4,526	1,392	4,361	613	4,944	1,895	1,354	105.5	60.0	18.5	57.8	8.1	65.5	25.1	18.0	18.6%	16.1%	14.5%	17.9%	23.8%	18.5%	15.8%	21.5%
9	7,377	4,859	1,539	3,810	186	4,595	1,025	696	99.7	65.7	20.8	51.5	2.5	62.1	13.9	9.4	17.5%	17.7%	16.4%	15.9%	7.4%	17.5%	8.7%	11.3%
10	5,701	3,819	1,238	1,354	46	3,577	276	250	74.8	50.1	16.2	17.8	0.6	46.9	3.6	3.3	13.2%	13.5%	12.8%	5.5%	1.8%	13.2%	2.3%	3.9%
Ethnicity																								
White	4,347	2,999	1,060	2,573	210	2,713	1,057	541	368.2	254.0	89.8	217.9	17.8	229.8	89.5	45.8	64.8%	68.3%	70.8%	67.4%	52.0%	64.8%	56.3%	54.9%
Black	6,907	4,216	1,190	3,792	740	4,454	2,687	1,475	130.3	79.6	22.5	71.6	14.0	84.0	50.7	27.8	22.9%	21.4%	17.7%	22.1%	40.8%	23.7%	31.9%	33.4%
Hispanic	2,528	1,548	553	1,393	108	1,537	792	338	45.6	27.9	10.0	25.1	1.9	27.7	14.3	6.1	8.0%	7.5%	7.9%	7.8%	5.7%	7.8%	9.0%	7.3%
Other	2,633	1,147	510	946	56	1,414	487	403	24.1	10.5	4.7	8.7	0.5	13.0	4.5	3.7	4.2%	2.8%	3.7%	2.7%	1.5%	3.7%	2.8%	4.4%
All																								
PV	4,346	2,845	971	2,473	262	2,711	1,216	638	568.2	372.0	126.9	323.3	34.2	354.5	159.0	83.4								
Balance	6,342	4,192	1,440	3,778					829.2	548.1	188.3	493.9												

Table C.7: PV Gains from Forgiving Balances and Targeted IDR Enrollment– Earnings Increase: 2% | Discount Rate: 7%

This table reports the total and per capital present value gains of the policies we evaluate, by within-cohort decile of earnings and ethnic group, including households without student debt. First, we consider canceling all student loan balances, or only $50,000 or $10,000 per person, or up to $50,000 with a phase out range between $75,000 and $125,000 in earnings. Second, we consider enrolling households who would benefit from income-driven repayment. In IDR policy (a), they pay 10% of their discretionary income, in line with current IDR rules. In policy (b), loans are also forgiven 10 years after the first repayment. In policy (c), discretionary income is limited to earnings above three times the poverty line. In policy (d), payments are reduced to 7.5% of discretionary income. The last two rows report the present value gains and change in balance for the entire population. In comparison to Table 2, we use alternative earnings growth and discount rate assumptions.

	Per person ($)								Total ($bn)								Share (%)							
	Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment			
Decile	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)
1	983	685	298	685	255	806	603	354	11.3	7.9	3.4	7.9	2.9	9.3	6.9	4.1	2.2%	2.4%	3.1%	2.8%	8.6%	3.0%	4.7%	5.1%
2	1,070	602	268	602	106	774	484	260	13.3	7.5	3.3	7.5	1.3	9.6	6.0	3.2	2.6%	2.3%	3.0%	2.6%	3.9%	3.1%	4.1%	4.1%
3	1,669	1,081	338	1,081	439	1,206	1,184	642	22.3	14.5	4.5	14.5	5.9	16.1	15.8	8.6	4.4%	4.4%	4.0%	5.1%	17.3%	5.3%	10.8%	10.8%
4	2,074	1,506	529	1,506	206	1,491	1,218	469	27.7	20.1	7.1	20.1	2.8	19.9	16.3	6.3	5.5%	6.1%	6.3%	7.0%	8.1%	6.5%	11.1%	7.9%
5	3,065	2,417	946	2,417	269	2,028	1,461	562	40.1	31.6	12.4	31.6	3.5	26.5	19.1	7.3	7.9%	9.6%	11.0%	11.1%	10.4%	8.7%	13.0%	9.3%
6	5,149	3,134	1,053	3,134	196	2,563	1,696	808	69.5	42.3	14.2	42.3	2.6	34.6	22.9	10.9	13.7%	12.8%	12.7%	14.8%	7.8%	11.3%	15.6%	13.8%
7	5,223	3,676	1,330	3,676	256	2,800	1,418	660	71.0	50.0	18.1	50.0	3.5	38.1	19.3	9.0	14.0%	15.1%	16.1%	17.5%	10.2%	12.4%	13.1%	11.3%
8	7,047	3,997	1,216	3,840	608	4,221	1,764	1,278	93.4	53.0	16.1	50.9	8.1	56.0	23.4	16.9	18.4%	16.0%	14.4%	17.8%	23.7%	18.3%	15.9%	21.4%
9	6,632	4,325	1,363	3,345	188	4,011	972	674	89.6	58.4	18.4	45.2	2.5	54.2	13.1	9.1	17.7%	17.7%	16.4%	15.8%	7.5%	17.7%	8.9%	11.5%
10	5,219	3,474	1,109	1,207	66	3,211	297	284	68.5	45.6	14.5	15.8	0.9	42.1	3.9	3.7	13.5%	13.8%	13.0%	5.5%	2.6%	13.7%	2.7%	4.7%
Ethnicity																								
White	3,904	2,683	940	2,289	216	2,369	990	527	330.7	227.2	79.6	193.9	18.3	200.6	83.8	44.6	65.3%	68.7%	71.0%	67.8%	53.8%	65.5%	57.1%	56.3%
Black	6,072	3,677	1,029	3,287	700	3,780	2,433	1,358	114.6	69.4	19.4	62.0	13.2	71.3	45.9	25.6	22.6%	21.0%	17.3%	21.7%	38.8%	23.3%	31.3%	32.4%
Hispanic	2,233	1,373	490	1,228	109	1,308	714	310	40.2	24.7	8.8	22.1	2.0	23.6	12.9	5.6	7.9%	7.5%	7.9%	7.7%	5.8%	7.7%	8.8%	7.1%
Other	2,318	1,032	463	847	60	1,189	452	364	21.2	9.5	4.2	7.8	0.5	10.9	4.1	3.3	4.2%	2.9%	3.8%	2.7%	1.6%	3.6%	2.8%	4.2%
All																								
PV	3,876	2,530	857	2,186	260	2,344	1,122	605	506.7	330.8	112.1	285.8	34.0	306.4	146.8	79.1								
Balance	6,342	4,192	1,440	3,778					829.2	548.1	188.3	493.9												

Table C.8: PV Gains from Forgiving Balances and Targeted IDR Enrollment– Earnings Increase: 3% | Discount Rate: 1%

This table reports the total and per capital present value gains of the policies we evaluate, by within-cohort decile of earnings and ethnic group, including households without student debt. First, we consider canceling all student loan balances, or only $50,000 or $10,000 per person, or up to $50,000 with a phase out range between $75,000 and $125,000 in earnings. Second, we consider enrolling households who would benefit from income-driven repayment. In IDR policy (a), they pay 10% of their discretionary income, in line with current IDR rules. In policy (b), loans are also forgiven 10 years after the first repayment. In policy (c), discretionary income is limited to earnings above three times the poverty line. In policy (d), payments are reduced to 7.5% of discretionary income. The last two rows report the present value gains and change in balance for the entire population. In comparison to Table 2, we use alternative earnings growth and discount rate assumptions.

	Per person ($)								Total ($bn)								Share (%)							
	Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment			
Decile	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)
1	1,594	1,090	476	1,090	350	1,368	889	507	18.3	12.5	5.5	12.5	4.0	15.7	10.2	5.8	2.4%	2.5%	3.1%	2.8%	11.4%	3.0%	5.7%	6.2%
2	1,812	904	405	904	94	1,425	642	350	22.6	11.3	5.0	11.3	1.2	17.8	8.0	4.4	2.9%	2.2%	2.9%	2.5%	3.3%	3.4%	4.5%	4.7%
3	2,790	1,896	590	1,896	423	2,155	1,687	775	37.3	25.3	7.9	25.3	5.7	28.8	22.6	10.4	4.8%	5.0%	4.5%	5.7%	16.1%	5.6%	12.7%	11.1%
4	3,468	2,482	850	2,482	190	2,686	1,753	615	46.3	33.1	11.3	33.1	2.5	35.9	23.4	8.2	6.0%	6.6%	6.5%	7.4%	7.2%	6.9%	13.1%	8.8%
5	4,664	3,603	1,423	3,603	279	3,330	1,760	674	61.0	47.1	18.6	47.1	3.7	43.6	23.0	8.8	7.9%	9.3%	10.7%	10.6%	10.4%	8.4%	12.9%	9.4%
6	8,406	5,048	1,722	5,048	205	4,999	2,079	1,052	113.5	68.2	23.3	68.2	2.8	67.5	28.1	14.2	14.7%	13.5%	13.3%	15.3%	7.9%	13.1%	15.8%	15.2%
7	7,705	5,543	2,052	5,543	247	4,656	1,490	670	104.8	75.4	27.9	75.4	3.4	63.3	20.3	9.1	13.6%	14.9%	16.0%	16.9%	9.5%	12.3%	11.4%	9.8%
8	10,875	6,220	1,959	6,029	602	7,326	1,933	1,449	144.2	82.4	26.0	79.9	8.0	97.1	25.6	19.2	18.7%	16.3%	14.9%	17.9%	22.6%	18.8%	14.4%	20.6%
9	9,589	6,459	2,076	5,232	223	6,371	1,014	737	129.6	87.3	28.0	70.7	3.0	86.1	13.7	10.0	16.8%	17.3%	16.1%	15.8%	8.5%	16.7%	7.7%	10.7%
10	7,033	4,772	1,600	1,757	83	4,616	239	251	92.3	62.6	21.0	23.0	1.1	60.6	3.1	3.3	12.0%	12.4%	12.0%	5.2%	3.1%	11.7%	1.8%	3.5%
Ethnicity																								
White	5,750	3,986	1,435	3,476	211	3,830	1,126	566	486.9	337.6	121.6	294.4	17.9	324.4	95.4	47.9	63.3%	66.8%	69.7%	65.9%	50.8%	62.8%	53.6%	51.3%
Black	9,788	6,093	1,764	5,568	799	6,830	3,219	1,761	184.7	115.0	33.3	105.1	15.1	128.9	60.7	33.2	24.0%	22.8%	19.1%	23.5%	42.8%	25.0%	34.1%	35.6%
Hispanic	3,540	2,130	758	1,948	103	2,356	942	416	63.8	38.4	13.7	35.1	1.9	42.5	17.0	7.5	8.3%	7.6%	7.8%	7.9%	5.3%	8.2%	9.5%	8.0%
Other	3,744	1,556	654	1,309	45	2,247	533	513	34.3	14.3	6.0	12.0	0.4	20.6	4.9	4.7	4.5%	2.8%	3.4%	2.7%	1.2%	4.0%	2.7%	5.0%
All																								
PV	5,887	3,864	1,335	3,416	270	3,949	1,361	714	769.7	505.2	174.5	446.6	35.3	516.3	178.0	93.4								
Balance	6,342	4,192	1,440	3,778					829.2	548.1	188.3	493.9												

Table C.9: PV Gains from Forgiving Balances and Targeted IDR Enrollment– Earnings Increase: 3% | Discount Rate: 3%

This table reports the total and per capital present value gains of the policies we evaluate, by within-cohort decile of earnings and ethnic group, including households without student debt. First, we consider canceling all student loan balances, or only $50,000 or $10,000 per person, or up to $50,000 with a phase out range between $75,000 and $125,000 in earnings. Second, we consider enrolling households who would benefit from income-driven repayment. In IDR policy (a), they pay 10% of their discretionary income, in line with current IDR rules. In policy (b), loans are also forgiven 10 years after the first repayment. In policy (c), discretionary income is limited to earnings above three times the poverty line. In policy (d), payments are reduced to 7.5% of discretionary income. The last two rows report the present value gains and change in balance for the entire population. In comparison to Table 2, we use alternative earnings growth and discount rate assumptions.

	Per person ($)								Total ($bn)								Share (%)							
	Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment			
Decile	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)
1	1,370	939	409	939	309	1,159	776	445	15.7	10.8	4.7	10.8	3.6	13.3	8.9	5.1	2.3%	2.5%	3.1%	2.8%	11.0%	3.1%	5.5%	6.0%
2	1,534	795	355	795	95	1,176	576	311	19.1	9.9	4.4	9.9	1.2	14.7	7.2	3.9	2.9%	2.3%	2.9%	2.6%	3.7%	3.4%	4.4%	4.6%
3	2,380	1,596	495	1,596	426	1,795	1,494	724	31.8	21.3	6.6	21.3	5.7	24.0	20.0	9.7	4.7%	4.9%	4.4%	5.5%	17.6%	5.5%	12.4%	11.4%
4	2,963	2,130	732	2,130	191	2,241	1,543	555	39.5	28.4	9.8	28.4	2.6	29.9	20.6	7.4	5.9%	6.5%	6.5%	7.4%	7.9%	6.9%	12.8%	8.7%
5	4,072	3,162	1,245	3,162	263	2,833	1,614	615	53.3	41.4	16.3	41.4	3.4	37.1	21.1	8.1	7.9%	9.4%	10.8%	10.7%	10.7%	8.5%	13.1%	9.5%
6	7,170	4,321	1,467	4,321	182	4,032	1,885	932	96.8	58.3	19.8	58.3	2.5	54.4	25.5	12.6	14.4%	13.3%	13.1%	15.1%	7.6%	12.5%	15.8%	14.8%
7	6,760	4,833	1,775	4,833	216	3,918	1,395	626	91.9	65.7	24.1	65.7	2.9	53.3	19.0	8.5	13.7%	14.9%	16.0%	17.0%	9.1%	12.3%	11.7%	10.0%
8	9,408	5,368	1,673	5,191	553	6,098	1,795	1,332	124.7	71.2	22.2	68.8	7.3	80.8	23.8	17.7	18.6%	16.2%	14.7%	17.8%	22.7%	18.6%	14.7%	20.8%
9	8,467	5,648	1,804	4,512	182	5,449	935	675	114.4	76.3	24.4	61.0	2.5	73.6	12.6	9.1	17.1%	17.4%	16.2%	15.8%	7.6%	16.9%	7.8%	10.7%
10	6,356	4,288	1,416	1,549	51	4,074	214	218	83.4	56.2	18.6	20.3	0.7	53.4	2.8	2.9	12.4%	12.8%	12.3%	5.3%	2.1%	12.3%	1.7%	3.4%
Ethnicity																								
White	5,055	3,495	1,248	3,028	192	3,261	1,036	525	428.2	296.0	105.7	256.5	16.2	276.2	87.7	44.4	63.8%	67.3%	70.0%	66.4%	50.3%	63.6%	54.3%	52.3%
Black	8,390	5,185	1,484	4,711	735	5,647	2,872	1,577	158.3	97.8	28.0	88.9	13.9	106.6	54.2	29.8	23.6%	22.3%	18.6%	23.0%	43.0%	24.5%	33.6%	35.1%
Hispanic	3,046	1,845	657	1,677	98	1,945	834	364	54.9	33.2	11.8	30.2	1.8	35.0	15.0	6.6	8.2%	7.6%	7.8%	7.8%	5.4%	8.1%	9.3%	7.7%
Other	3,204	1,363	583	1,137	46	1,829	488	450	29.4	12.5	5.3	10.4	0.4	16.8	4.5	4.1	4.4%	2.8%	3.5%	2.7%	1.3%	3.9%	2.8%	4.9%
All																								
PV	5,130	3,362	1,154	2,952	247	3,324	1,235	649	670.7	439.6	150.9	386.0	32.3	434.5	161.4	84.9								
Balance	6,342	4,192	1,440	3,778					829.2	548.1	188.3	493.9												

Table C.10: PV Gains from Forgiving Balances and Targeted IDR Enrollment– Earnings Increase: 3% | Discount Rate: 5%

This table reports the total and per capital present value gains of the policies we evaluate, by within-cohort decile of earnings and ethnic group, including households without student debt. First, we consider canceling all student loan balances, or only $50,000 or $10,000 per person, or up to $50,000 with a phase out range between $75,000 and $125,000 in earnings. Second, we consider enrolling households who would benefit from income-driven repayment. In IDR policy (a), they pay 10% of their discretionary income, in line with current IDR rules. In policy (b), loans are also forgiven 10 years after the first repayment. In policy (c), discretionary income is limited to earnings above three times the poverty line. In policy (d), payments are reduced to 7.5% of discretionary income. The last two rows report the present value gains and change in balance for the entire population. In comparison to Table 2, we use alternative earnings growth and discount rate assumptions.

	Per person ($)								Total ($bn)								Share (%)							
	Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment			
Decile	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)
1	1,192	820	356	820	277	995	687	397	13.7	9.4	4.1	9.4	3.2	11.4	7.9	4.6	2.3%	2.4%	3.1%	2.8%	10.3%	3.1%	5.3%	5.8%
2	1,319	706	314	706	96	985	522	283	16.4	8.8	3.9	8.8	1.2	12.3	6.5	3.5	2.8%	2.3%	3.0%	2.6%	3.9%	3.3%	4.4%	4.5%
3	2,059	1,362	422	1,362	421	1,519	1,335	676	27.5	18.2	5.6	18.2	5.6	20.3	17.9	9.0	4.7%	4.7%	4.3%	5.4%	18.1%	5.5%	12.0%	11.4%
4	2,564	1,851	638	1,851	192	1,895	1,373	507	34.2	24.7	8.5	24.7	2.6	25.3	18.3	6.8	5.8%	6.4%	6.5%	7.3%	8.2%	6.8%	12.3%	8.6%
5	3,597	2,805	1,100	2,805	255	2,442	1,493	574	47.0	36.7	14.4	36.7	3.3	31.9	19.5	7.5	8.0%	9.5%	10.9%	10.9%	10.8%	8.6%	13.1%	9.5%
6	6,195	3,746	1,265	3,746	173	3,293	1,721	846	83.6	50.6	17.1	50.6	2.3	44.5	23.2	11.4	14.2%	13.1%	13.0%	15.0%	7.5%	12.0%	15.6%	14.4%
7	5,993	4,256	1,552	4,256	212	3,336	1,325	604	81.5	57.9	21.1	57.9	2.9	45.4	18.0	8.2	13.8%	15.0%	16.0%	17.2%	9.3%	12.2%	12.1%	10.4%
8	8,234	4,686	1,444	4,519	544	5,138	1,689	1,257	109.1	62.1	19.1	59.9	7.2	68.1	22.4	16.7	18.5%	16.1%	14.5%	17.8%	23.3%	18.4%	15.1%	21.1%
9	7,547	4,984	1,582	3,928	163	4,710	886	636	102.0	67.3	21.4	53.1	2.2	63.6	12.0	8.6	17.3%	17.4%	16.2%	15.7%	7.1%	17.2%	8.1%	10.9%
10	5,784	3,879	1,261	1,374	38	3,629	220	216	75.9	50.9	16.5	18.0	0.5	47.6	2.9	2.8	12.8%	13.2%	12.6%	5.3%	1.6%	12.9%	1.9%	3.6%
Ethnicity																								
White	4,492	3,096	1,095	2,665	186	2,811	970	502	380.4	262.2	92.8	225.7	15.7	238.1	82.1	42.5	64.4%	67.8%	70.4%	66.9%	50.7%	64.3%	55.3%	53.7%
Black	7,279	4,464	1,265	4,032	695	4,726	2,588	1,437	137.4	84.2	23.9	76.1	13.1	89.2	48.8	27.1	23.2%	21.8%	18.1%	22.6%	42.3%	24.1%	32.9%	34.3%
Hispanic	2,654	1,617	575	1,460	95	1,628	748	324	47.8	29.1	10.4	26.3	1.7	29.3	13.5	5.8	8.1%	7.5%	7.9%	7.8%	5.5%	7.9%	9.1%	7.4%
Other	2,778	1,208	524	1,001	50	1,510	452	401	25.5	11.1	4.8	9.2	0.5	13.8	4.1	3.7	4.3%	2.9%	3.6%	2.7%	1.5%	3.7%	2.8%	4.6%
All																								
PV	4,521	2,957	1,008	2,580	237	2,833	1,137	605	591.1	386.6	131.8	337.3	31.0	370.4	148.6	79.2								
Balance	6,342	4,192	1,440	3,778					829.2	548.1	188.3	493.9												

Table C.11: PV Gains from Forgiving Balances and Targeted IDR Enrollment– Earnings Increase: 3% | Discount Rate: 7%

This table reports the total and per capital present value gains of the policies we evaluate, by within-cohort decile of earnings and ethnic group, including households without student debt. First, we consider canceling all student loan balances, or only $50,000 or $10,000 per person, or up to $50,000 with a phase out range between $75,000 and $125,000 in earnings. Second, we consider enrolling households who would benefit from income-driven repayment. In IDR policy (a), they pay 10% of their discretionary income, in line with current IDR rules. In policy (b), loans are also forgiven 10 years after the first repayment. In policy (c), discretionary income is limited to earnings above three times the poverty line. In policy (d), payments are reduced to 7.5% of discretionary income. The last two rows report the present value gains and change in balance for the entire population. In comparison to Table 2, we use alternative earnings growth and discount rate assumptions.

	Per person ($)								Total ($bn)								Share (%)							
	Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment				Balance forgiveness				Targeted IDR enrollment			
Decile	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)	Full	50,000	10,000	Cap	(a)	(b)	(c)	(d)
1	1,049	723	314	723	251	864	614	358	12.1	8.3	3.6	8.3	2.9	9.9	7.1	4.1	2.3%	2.4%	3.1%	2.8%	9.3%	3.1%	5.1%	5.4%
2	1,149	634	280	634	97	837	477	260	14.3	7.9	3.5	7.9	1.2	10.4	5.9	3.2	2.7%	2.3%	3.0%	2.7%	3.9%	3.3%	4.3%	4.3%
3	1,803	1,178	365	1,178	413	1,302	1,203	633	24.1	15.8	4.9	15.8	5.5	17.4	16.1	8.5	4.6%	4.6%	4.2%	5.3%	17.7%	5.4%	11.6%	11.2%
4	2,245	1,627	561	1,627	191	1,623	1,233	469	30.0	21.7	7.5	21.7	2.5	21.7	16.5	6.3	5.7%	6.3%	6.4%	7.3%	8.2%	6.8%	11.9%	8.3%
5	3,209	2,513	982	2,513	254	2,129	1,390	546	42.0	32.9	12.8	32.9	3.3	27.9	18.2	7.1	8.0%	9.6%	11.0%	11.0%	10.7%	8.7%	13.1%	9.4%
6	5,415	3,285	1,102	3,285	173	2,723	1,579	781	73.1	44.4	14.9	44.4	2.3	36.8	21.3	10.5	13.9%	12.9%	12.8%	14.9%	7.5%	11.5%	15.4%	13.9%
7	5,364	3,780	1,370	3,780	229	2,873	1,267	602	72.9	51.4	18.6	51.4	3.1	39.1	17.2	8.2	13.9%	15.0%	16.0%	17.3%	10.0%	12.2%	12.4%	10.8%
8	7,283	4,132	1,260	3,974	545	4,381	1,600	1,203	96.5	54.8	16.7	52.7	7.2	58.1	21.2	15.9	18.3%	16.0%	14.4%	17.7%	23.2%	18.2%	15.3%	21.1%
9	6,784	4,436	1,401	3,449	167	4,111	857	624	91.7	59.9	18.9	46.6	2.3	55.5	11.6	8.4	17.4%	17.5%	16.3%	15.7%	7.2%	17.4%	8.4%	11.1%
10	5,296	3,530	1,130	1,227	56	3,259	249	253	69.5	46.3	14.8	16.1	0.7	42.7	3.3	3.3	13.2%	13.5%	12.8%	5.4%	2.4%	13.4%	2.4%	4.4%
Ethnicity																								
White	4,029	2,767	970	2,368	193	2,450	918	494	341.2	234.3	82.2	200.6	16.4	207.5	77.8	41.9	64.9%	68.3%	70.7%	67.4%	52.5%	64.9%	56.2%	55.3%
Black	6,385	3,885	1,091	3,488	664	4,002	2,357	1,329	120.5	73.3	20.6	65.8	12.5	75.5	44.5	25.1	22.9%	21.4%	17.7%	22.1%	40.3%	23.6%	32.2%	33.1%
Hispanic	2,338	1,431	508	1,285	98	1,380	678	298	42.1	25.8	9.2	23.1	1.8	24.9	12.2	5.4	8.0%	7.5%	7.9%	7.8%	5.7%	7.8%	8.8%	7.1%
Other	2,438	1,081	475	891	54	1,265	422	363	22.3	9.9	4.3	8.2	0.5	11.6	3.9	3.3	4.2%	2.9%	3.7%	2.7%	1.6%	3.6%	2.8%	4.4%
All																								
PV	4,024	2,626	889	2,277	238	2,444	1,058	579	526.1	343.3	116.3	297.7	31.1	319.5	138.3	75.7								
Balance	6,342	4,192	1,440	3,778					829.2	548.1	188.3	493.9												