APPENDIX A

Data Sources:

NSLDS

The main data source in this paper is the National Student Loan Data System (NSLDS) which is the primary system used to administer student loan programs. The Department of Education is required to administer the NSLDS by the Higher Education Act of 1965. The NSLDS links information on loans and grants from students, borrowers, lenders, guaranty agencies, schools, and servicers. As of January 2014, the NSLDS contained over 30 billion records on 84,629,538 students and 386,943,660 loans.\textsuperscript{1} The data used in this analysis was assembled pursuant to an agreement between the US Treasury and the Department of Education to improve tax administration, to improve education-related tax and fiscal policy, and enhance forecasts and projections of tax and educational policy.

Lenders, guaranty agencies, schools, and servicers are required to report information to the NSLDS within 30 and 120 days of new information arriving. For example, defaults must be reported within 90 days of a loan entering default and changes in enrollment must be reported within 30 days of a change in enrollment status. Updates can be done either electronically or by mail, but today are usually done online. Information in the NSLDS is used to determine eligibility for Title IV programs under rules such as Gainful Employment report standards.

The analysis in this paper is based on a 4 percent random sample of student loan borrowers matched to individual earnings records. The raw loan and demographic data is used to construct a person-by-year individual panel providing information on student characteristics, institutional information, and federal loan information as of the close of each federal fiscal year.

The educational records are sampled as of the end of fiscal years from 1970 to 2013 from transactions records from FSA’s operational database. The sample is intended to reflect loan balances and status as of the close of the fiscal year and to reflect characteristics of borrowers and institutions as reported on aid applications and by institutions corresponding to the years in which loans were disbursed. The sample was initially created by the Department of Education’s Budget Service Division to be used in budget projections. The sample includes federal direct and federally guaranteed students loans, including both the Federal Family Education Loan Programs and the Direct Loan Program. The sample does not include Perkins loans. Parent PLUS loans are included in the analysis but the outcomes of parent borrowers are excluded from our analysis of the outcomes of borrowers after entering repayment. Private student loans are not included in the analysis sample if they were not made under the FFEL program. The NSLDS contains the vast majority of direct student loans, as private

\textsuperscript{1} For more information on the NSLDS see The Department of Education (2014).
Most basic loan information is available from all sample borrowers since 1970 including loan balances, type of loan, the institution the loan was disbursed to (including the type and control of the institution, and the academic level of the borrower), and information regarding whether the student completed the program, and the dates borrowing was initiated, when repayment on each loan began, and whether the loan was in deferment, forbearance, default, or in certain alternative repayment plans. In general, borrowers join the sample in the year when they receive their first loan. Borrower information from the FAFSA is generally only available for loans originated after the 1995 fiscal year. Estimates from these data match up closely to aggregate statistics published by the department of Education, regarding the total volume of existing loans over time, the number of borrowers, and estimated cohort default rates. Repayment is defined as the date at which a borrowers' last loan enters repayment, as some borrowers take out multiple loans for different programs.

The main NSLDS file has been matched to information from the Free Application for Federal Student Aid (FAFSA), in the years those data were available for the first completed FAFSA for each borrower (except for borrowers in 1995, this is generally when their first loan is disbursed). The FAFSA contains detailed information on student demographics and family background. Students are required to fill out the FAFSA in each year that they receive aid or loans. The NSLDS has also been matched to Pell Grant records which contain additional grant applications and receipt. The main NSLDS sample is merged to a panel of administrative tax and earnings records that span the period from 1999-2013.

**Administrative Tax and Earnings Records**

The main source of earnings records is tax records spanning the period from 1999 to 2013. These records contain data from federal income tax records between 1996-2013, compiled from individual returns and W-2 information returns. Income is measured at the tax unit level; earnings at the individual level.

**Loan Volumes**: Loan volumes refer to the last loan balance recorded in the NSLDS in each calendar year. Outstanding balances are reported to the NSLDS and updated within 120 days of loans being disbursed. Dollar values are in 2014 dollars unless noted otherwise.

**Default**: Default rates are defined as an indicator of whether an individual enters into default with a certain number of years since repayment begins. The last recorded repayment and default rates are used for an individual. A loan goes into default if payments are more than 270 days late. Servicers have 90 days to report default to the NSLDS after a loan goes into default.

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2 For more information on private student loans, see Bricker, Brown, Hannon and Pence (2015),
Dependency Status: This variable is constructed from the FAFSA. A students’ first recorded dependency status is recorded, from the first FAFSA filed.

Family Income: Family income is obtained from the FAFSA. A students’ first recorded family income is used, from the first FAFSA filed.

Active Borrower: Active borrowers are borrowers who have received loan disbursements in the fiscal year determined by the NSLDS.

Poverty: Federal poverty guidelines are used to determine distance for poverty line thresholds as defined by HHS. Earnings and family size are determined by tax returns using the CDW.

Pell Grants: Pell grants awarded are determined from Pell Grant records.

Earnings: Earnings are defined as Medicare wages plus self-employment earnings.

Enrollment: Enrollment is determined by the NSLDS. Schools are required to report enrollment through the Student Status Confirmation Report within 30 days of a change in enrollment status according to Federal Regulation 34 CFR 682.610.

School Types: Are identified using the ownership control type of the first institution at which a student borrowed. School types are defined as public, private, or for-profit and two or four year and by the institution to which the loan was originated.

Entry/Repayment Year: Entry years are assigned based on the fiscal year during which the borrower’s first loans were originated. Repayment year is defined by the fiscal year during which the borrower’s last loan enters into repayment, and all loans are in repayment.


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3 See HHS Poverty Guidelines for details.
4 For more on enrollment compliance, see the Enrollment Reporting Guide.
APPENDIX B

Data Appendix

The tabulations of NSLDS data underlying most of the charts and tables or otherwise described in the text and the program files that produce the charts and tables are available as a data appendix. These databases summarize the information on borrowers included in the merged ED/Treasury database by institutional type using three temporal concepts: the time of entry (characteristics of new borrowers in the year the borrower first entered the loan system), by fiscal year (characteristics of all borrowers with outstanding loan balances), and by repayment cohort (characteristics of borrowers in the year they entered repayment plus loan and economic outcomes subsequent to entering repayment).

Most figures in the text are derived directly from these databases, and readers may use the same data (and programs) to recreate those figures and to construct alternatives (e.g. means instead of medians; comparisons between alternative or multiple years etc.) These databases also provide a broader range of demographic, institutional, economic, and loan-related variables than directly described in the text. In particular, these data provide detail on:

**New Borrowing and Entry into Repayment**

The appendix data provide information on the number of borrowers, the amount borrowed, the number entering into borrowing for the first time, and when they entered into repayment. For instance, the data show that the number of borrowers entering repayment increased sharply from 1.4 million in 2007 to 2.4 million in 2011 and 2.9 million in 2013. As a result, the volume of debt entering repayment in 2013 ($89 billion) was almost three times the amount in 2007 ($33 billion).

**Educational Outcomes of Borrowers**

The NSLDS data include institution-reported indicators of whether a borrower has completed (graduated) from their program of study or withdrawn (i.e. without a degree). While most institutions appear to report completion and withdrawal accurately, the sole purpose of the reporting is to indicate to FSA that a student is no longer enrolled and there is no consequence to differentiating between the two options. Some institutions appear to use them interchangeably or to report only withdrawals. To supplement this measure, we also estimate the fraction of new borrowers who enter repayment within one year of starting borrowing. These borrowers are unlikely to have completed their programs, even at 2-year institutions (Bound, Lovenheim and Turner (2010)). These data show that more than half of borrowers at 2-year for-profit institutions have attended for a year or less, as had about 35 percent of borrowers at 2-year public and 4-year for-profit institutions. In contrast, less than 15 percent of borrowers at 4-year public and private institutions dropped out after one year. Because borrowers may re-enter school, some spells of enrollment are censored in the last several years, increasing the share of short-term
enrollments. As a result of the shifting enrollment patterns, many more borrowers have attended institution types where dropping out is the norm, hence, the fraction of borrowers in recent cohorts who have not completed their programs has increased.

*Loan Amounts*

The data appendix provides the estimates of the average and median loan balances of borrowers in their first year by entry cohort, in the year that the loan entered repayment (by repayment cohort), and for the overall stock of borrowers in each fiscal year. This also includes the 25th, 75th, and 95th percentiles. In addition, it provides the average and median amount owed by students for undergraduate and graduate loans.

For instance, appendix Table A.1 shows median borrowing per student. Borrowers from for-profit schools owed about $12,700 in 2013. Borrowers who last attended non-selective institutions owed about $20,100, compared to $26,400 for borrowers who attended the most selective institutions. Borrowers at 2-year colleges owed considerably less: on average $10,435. These differences in levels are even more striking because the average for-profit school borrower has borrowed for a shorter period of time. Over the period from 2000 to 2011, the increase in median balances (for borrowers entering repayment those years) was 39 percent at for-profit institutions, 35 percent among 2-year borrowers, and 37 percent among non-selective 4-year public and private borrowers. In contrast, balances among borrowers from the most selective 4-year schools increased 11 percent and 19 percent among graduate-only borrowers. The increase within individual school types was much larger than the overall increase in median balances (9 percent) since the overall increase in the median balance also captures the fact that borrowers shifted into non-traditional sectors, where typically students borrow less.

*Characteristics of Borrowers*

The data appendix provides additional information on the characteristics of borrowers at entry, repayment, and in each fiscal year. These data are drawn from information provided as of the first FAFSA application provided by the student. Figure 4 provides further information on the age and income distribution of borrowers and provides further demographic information.

*Labor market outcomes*

The data tables by repayment cohort and for borrowers by fiscal year provide estimates of mean and median earnings and income (based on modified AGI defined as AGI plus adjustments) and the fraction not employed or in poverty (based on their income and filing status) for repayment cohorts two years after entering repayment and for the stock of borrowers in repayment.
APPENDIX C: Other Indicators of Outcomes in the Student Loan Market

This section examines three other dimensions of stress, burden, and wellbeing in the student loan market. First, we examine the distribution of debt, earnings, and income to better understand the characteristics and ability to pay of borrowers and to inform who is disproportionately burdened by debt. Second, we examine the characteristics of borrowers with very large balances. While large loan burdens were historically largely confined to graduate borrowers and borrowers at the most selective institutions, a rising share of large loan balances are owed by undergraduate borrowers, often "independent" borrowers, and at less-selective institutions. Finally, we examine whether and how ability to pay may evolve over the career of a borrower to help understand whether two factors identified above—the surge of recent borrowers into repayment post-recession and the disproportionate effect of the recession on those borrowers—are likely to be transitory or persistent shocks to borrowers’ long-term ability to pay. We show how DE ratios have evolved for successive cohorts of borrowers both from cohort to cohort and within cohorts over time. Indeed, the first several years of borrowing are particularly risky.

The relationship between Labor Market Outcomes and Debt Burdens

Borrowers who attend relatively more selective institutions and graduate schools tend to borrow more, to come from higher-income families, and to earn more after entering repayment. We formalize these relationships in Table A2, which examines the distribution of debt, income, and earnings. The top panel of Table A2 divides the pool of borrowers in repayment on federal student loans in 2013 into quintiles based on their total debt burdens. The second and third columns show the median earnings and income of each group of borrowers. Borrowers with larger debts have higher incomes and earnings. The last column shows that the top 20 percent of borrowers owe 62 percent of all federal student loan debt.

The middle panel of Table A2 categorizes these same borrowers by their place in the national income distribution in 2013 (based on total income for married and unmarried filers plus information returns for non-filers). Column 6 shows that while 21 percent of borrowers are in the bottom 20 percent of the (national) income distribution, borrowers in general tend to fall into the higher income groups. For instance, almost 26 percent of borrowers fall into the top 20 percent of the income distribution. The last column shows that 35 percent of all student loan debt is held by borrowers with incomes that put them in the top 20 percent of the distribution, and almost 60 percent is held by the top 40 percent.

The final panel provides a comparable analysis based on individual earnings. Each borrower is assigned to an earnings quintile based on their relative rank in the national earnings distribution, estimated from the 2013

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5 Because borrowers tend to be younger than the tax-filing population, we re-weight the total filing population based on the age distribution of student loan borrowers.
Annual Social and Economic Supplement to the Current Population survey and adjusted for the age- and gender-distribution of student-loan borrowers. Again, about 25 percent of borrowers are in the top 20 percent of all wage earners; these borrowers hold about 36 percent of all student-loan debt.

These tables include both traditional and non-traditional borrowers, who experience very different economic outcomes. For instance, more than 30 percent of non-traditional borrowers are in the bottom 20 percent of the earnings distribution and only 13 percent in the top 20 percent. Among traditional borrowers, the pattern is reversed, with 35 percent in the top 20 percent and only 13 percent in the bottom 20 percent. And about half of all student loan debt is owed by traditional borrowers in the top 40 percent of the income distribution.

**Borrowers with Large Balances**

An increasing portion of students have very high loan burdens, with the fraction of borrowers who owed more than $50,000 in real terms almost doubling between 2000 and 2013. Figure A1 shows that the distribution of loan burdens across borrowers has become more skewed over time and the number of extremely large balances has increased. While loan burdens over $50,000 were once relatively rare—the portion of borrowers with balances over $50,000 and even $100,000 has increased over time.

Table A3 shows the characteristics of borrowers with large balances. The first two columns present characteristics for all borrowers in 2000 and 2014 respectively, while the second two columns present characteristics for borrowers entering repayment in 2000 and 2014. The first two rows show the share of borrowers with balances above $50,000 and $100,000 respectively. The share of borrowers with large balances increased sharply between 2000 and 2014. In 2000, 5 percent of borrowers had balances above $50,000, in real terms, and only 1 percent of borrowers had balances above $100,000 dollars. By 2010, these percentages increased to 14 percent and 4 percent respectively. While large loan balances receive substantial attention, the implications of large balances depend crucially on the returns to borrowing and education, a point made by Avery and Turner (2012). The last 5 rows present labor market outcomes. On average, borrowers with more than $50,000 in debt have reasonably high incomes of nearly $70,000. This likely reflects the characteristics of these borrowers—many of them enrolled in graduate programs, where earnings tend to be high.

Table A3 indicates that the majority of borrowers with large balances borrowed to pay for graduate school, and individuals with graduate degrees tend to have high incomes and low loan non-repayment rates. Still, in 2000 nearly a fifth of borrowers with balances above $50,000 borrowed for only undergraduate programs, and this fraction rose to almost a third in 2014. Most of these borrowers are independent undergraduate students, typically at for-profit schools. The share of borrowers taking out large loan balances to go to graduate school has declined between 2000 and 2014. Moreover, there has been a rise in graduate borrowing at for-profit institutions, with the share of graduate borrowers with large balances at for-profit institutions rising from 5 to 15
percent between 2000 and 2014. There were also large increases in the share of borrowers with large balances at for-profit and non-selective schools.

**The Evolution of Debt Burdens over a Career**

Another important question is whether today’s high debt burdens are likely to be temporary or permanent. While one important factor is the labor market, which has improved gradually for many (but not all) borrowers, another potential temporary factor is that earnings are temporarily low in their first years after entering repayment, and in recent years there have been a disproportionate share of new entrants. This means that many recent entrants’ debt burdens will naturally improve as they progress in their careers. Indeed, this pattern is an important justification for providing facilities like income-based repayment, which is intended to aid students who are ‘solvent’ in the sense that their long-run earnings are sufficient to repay their loans but ‘illiquid’ because their loan obligations must be paid out of current income, which can start off at low levels.

Figure A2 illustrates how loan burdens evolve over their careers after entering repayment, and provides a longer-term perspective of the combined effect of rising indebtedness and lower earnings on borrowers' debt-to-earnings ratios. The estimates of DE ratios are based on a 10-year amortizing loan (using actual starting balances and interest rates) and the empirical earnings of borrowers from each cohort. The figure shows that, across all cohorts, burdens are highest in the initial repayment years and fall over time as earnings improve. Prior to the Great Recession, starting DE ratios were increasing slightly but, for cohorts that entered repayment during and after the Great Recession, initial DE ratios increased sharply. Despite starting at high levels, within a few years DE ratios converged to historical norms after several years in repayment. The results in Figure A2 suggest that liquidity issues play an important role in non-repayment and default among borrowers early in their careers, despite the likelihood that over a longer horizon their debt burdens are likely to be manageable. Indeed, this pattern is a primary motivation for income-based repayment programs, which make repayment schedules adapt to swings in income by deferring or reducing (with interest) loan payments. A full welfare analysis of the effects of delaying repayment and increasing loan balances is beyond the scope of this analysis. On the one hand, delaying repayment will result in the accrual of interest and an increase in the total amount paid by a borrower. On the other hand, there may be consumption smoothing benefits if borrowers delay payments in early years when incomes are lower and repay their loans later on in the lifecycle when incomes rise.

**Loan Limits and Borrowing**

Figure A4 presents results on the relationship between loan limits and borrowing across school types. Figure A4 shows how these increases in loan limits allowed borrowers to take out more federal loans and shows the median annual loan disbursement amount per active undergraduate borrower by institution type where the loan
was disbursed. Borrowers from for-profit institutions, because they were predominantly independent borrowers, tended to have higher loan limits and took out larger loan amounts. Because of the jump in annual accruals, as borrowers subject to the higher limits entered repayment after subsequent years of borrowing, they entered repayment with higher balances. The chart excludes graduate borrowers, whose annual borrowing is much greater.
APPENDIX D: Decomposition Method

To determine the effect of individual characteristics, we use variations on the Oaxaca-Blinder decomposition. The standard Blinder (1973); Oaxaca (1973) framework for decomposition analysis imposes a linear framework. Let $Y^j$ be the default rate in year $j$, and let $X^j$ be a vector of explanatory variables including a constant row of ones in year $j$, and moreover let $\hat{\beta}^{11}$ be the coefficient from the regression $Y^{11} = \hat{\beta}^{11} X^{11} + \epsilon$.\(^6\)

In this case, the analysis is straightforward and the effect of a particular explanatory variable between 2011 and 2000 is measured using the change in the mean of an explanatory variable multiplied by the coefficient from a linear regression: $[\bar{X}^{11} - \bar{X}^{00}]\hat{\beta}^{11}$.

The decomposition is used to determine what default rates would have been in 2011 if the cohort had the same characteristics as individuals who were repaying loans in 2011. The estimated composition effects due to changes in observable characteristics solely reflect the effect of differences in the distribution of characteristics between borrowers in 2000 and 2011 under the following assumptions: (i) simple counterfactual treatment (ii) overlapping support and (iii) conditional independence.\(^7\)

The linear framework is not ideal for decomposing the change in student loan defaults for two reasons. First, the gap in loan defaults lies in the tail of the distribution, where linear estimators tend to perform poorly. Second, there are large gaps between different years in a number of explanatory variables such as the total amount borrowed. This can lead to predicted probabilities below zero or above one in the linear framework. In a nonlinear framework, the change in the mean of an explanatory variable cannot be multiplied by the regression coefficient because for any non-linear function it is not necessarily true that for any $F(.)$, $E[Y] = F(E[X\hat{\beta}])$.

Simulating the change in all observables can be done using a logit decomposition, assuming that the dependent variable is of the form $Y = F(X\beta) = \frac{e^{X\hat{\beta}}}{1+e^{X\hat{\beta}}}$.\(^8\) The procedure is implemented by first estimating the default logit regression $Y = F(\hat{\beta}X)$ using the pooled data and then using the predicted $\hat{\beta}$ to simulate the counterfactual predicted default rate using the 2011 explanatory variables. The decomposition can thus be written as

$$\bar{Y}^{11}_F - \bar{Y}^{00}_F = \left[ \sum_{i=1}^{N^{11}} \frac{F(\hat{\beta}^{11}X^{11}_i)}{N^{11}} - \sum_{i=1}^{N^{00}} \frac{F(\hat{\beta}^{11}X^{00}_i)}{N^{00}} \right] + \left[ \sum_{i=1}^{N^{00}} \frac{F(\hat{\beta}^{00}X^{00}_i)}{N^{00}} - \sum_{i=1}^{N^{00}} \frac{F(\hat{\beta}^{00}X^{00}_i)}{N^{00}} \right]$$

\(^6\) $Y^j$ is an $N^j \times 1$ vector, $X^j$ is an $N^j \times K$ matrix of independent variables and $\hat{\beta}^j$ is a $K \times 1$ vector of coefficients. $K$ denotes the number of variables $N^j$, the number of observations and $j$ the year.

\(^7\) The logit model has the desirable property that if a constant term is included, the predicted values of the logit model in year $i$ will be $\bar{Y}^i$. 

\(^8\)
The first term in brackets is the part of the change in defaults due to changes in the distribution of observables X between 2000 and 2011. The second term in brackets is the part of the change in defaults that is not explained by changes in the distribution of observables. The default logit regression also provides a framework for analyzing the factors that influence the default decision, and whether or not they have changed since the seminal study on student loans by Knapp and Seaks (1992). The above framework allows us to estimate the total change in defaults due to compositional changes in observables; it is also possible to estimate the effect of changes in individual explanatory variables such as the total amount borrowed and earnings following Yun (2004).\footnote{An alternative is the Fairlie (1999) or Bound, Lovenheim and Turner (2010) counterfactual simulation procedure.}

Contributions of a single variable can be obtained by weighing the contribution of each variable, constructing weight by evaluating the value of a function using mean characteristics and then linearizing the coefficients and characteristics around the predicted values in each year. The decomposition equation is thus given by

\[
\hat{Y}_f^{11} - \hat{Y}_f^{00} = \sum_{t=1}^{K} W_{\Delta X}^t \left[ \sum_{i=1}^{N_{11}} F(\hat{\beta}_{11} X_{i1}) - \sum_{i=1}^{N_{00}} F(\hat{\beta}_{11} X_{i0}) \right] + \sum_{t=1}^{K} W_{\Delta \beta}^t \left[ \sum_{i=1}^{N_{00}} F(\hat{\beta}_{11} X_{i0}) - \sum_{i=1}^{N_{00}} F(\hat{\beta}_{00} X_{i0}) \right]
\]

Where \(K\) is the number of variables and \(W_{\Delta X}^t = \frac{(\bar{X}_{11}^t - \bar{X}_{00}^t) \beta_{11}}{(\bar{X}_{11}^t - \bar{X}_{00}^t) \beta_{11}}\). Note that the \(t\) subscript refers to an individual characteristic.

The aim of the decomposition is to determine what default rates would have been in 2011 if the cohort had the same characteristics as individuals who were repaying loans in 2000. In regard to this point, the estimated composition effects due to changes in observable characteristics solely reflect the effect of differences in the distribution of characteristics between borrowers in 2000 and 2011 if the following assumptions are met: (i) simple counterfactual treatment (ii) overlapping support and (iii) conditional independence. Overlapping support is trivially satisfied in the context of the NSLDS as no single variable predicts whether or not an individual was surveyed in the 2000 cohort or the 2011 cohort. The simple counterfactual assumption, whether or not another counterfactual default structure exists, is also satisfied as there are unlikely to be significant general equilibrium effects between individuals across the two surveys,\footnote{The validity of the simple counterfactual assumption rests on whether or not another counterfactual default structure exists. Other counterfactuals may exist due to general equilibrium effects, for example, Fortin, Lemeiux, and Firpo (2010) use the example of a counterfactual wage structure in which there are no unions in the labor market. This could violate the simple counterfactual assumption as the presence of unions is likely to have general equilibrium effects on wages.} The conditional independence assumption, often called unconfoundedness or selection on observables is a somewhat stronger assumption and warrants further discussion.
The conditional independence assumption is satisfied if the errors are independent of belonging to each year of the NSLDS conditional on observables. This is a threat to identification if unobservable determinants of default have changed between 2000 and 2011, or if individuals have selected into borrowing across years based on different unobservable characteristics. While it is impossible to observe unobservables, the results in table 9 provide some evidence that at least the relationship between observables and default has remained similar during the two sample periods. Table 8 indicates that the relationship between observable characteristics remains similar in sign and magnitude between 2000 and 2011. The framework and incentives of student loan programs also remained largely similar in both samples, making it unlikely that students selected into borrowing based on different unobserved characteristics in 2000 and in 2011.\textsuperscript{11} Table 9 indicates that, there is no evidence that the relationship between observables and default has changed.

\textsuperscript{11} The Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 reformed private student loans, where this study focuses on default in Federal student loans. Wage garnishment rates increased from 10 percent to 15 percent in 2006 as part of the Deficit Reduction Act of 2005, however we focus on loans taken in the first year of enrollment prior to the increase in garnishment amounts. If the garnishment had any effect on the adverse selection of riskier borrowers, this would cause the decomposition results to underestimate the impact of the increase in total borrowing on default rates.
**Figure A1:** Increases in Large Balances: The Distribution of Loan Balances by Cohort

Notes: This figure shows the percentage of federal borrowers at each level of indebtedness (defined on the x-axis) for the 2003 (medium blue), 2007 (dark blue) and 2013 (light blue) repayment cohorts. Cohorts are defined by fiscal year entered repayment. Dollar values adjusted for inflation to 2014. Source: Treasury tabulations of 4 percent NSLDS sample.
Figure A2: The Evolution of Debt Burdens over a Career: Median Debt-Service to Earnings

All Borrowers

Traditional Borrowers

Notes: This figure shows the debt-service to earnings ratio of the median borrower by repayment cohort and fiscal year. Debt service is defined using a fixed 10-year amortizing loan payment and the applicable student loan interest rate for each student calculated in the year each student entered repayment on all loans. The ratio is defined using the fixed debt service level to the actual earnings of the borrowers in each subsequent year. For instance, the lightest blue line shows the estimated debt-service to earnings of the 1999 repayment cohort in each year from 1999 to 2013 using the fixed debt service amount and the empirical earnings for each of those years. Cohorts are defined by fiscal year entered repayment. The figure illustrates that debt-service to earnings ratios are relatively high in the first and second year of repayment (when earnings are relatively low) and then decline more slowly thereafter. In addition, it shows that initial debt-service to earnings ratios were relatively constant between 1999 and 2006, but then increased sharply, particularly after 2010 as debt levels increased and earnings declined. The left panel shows all borrowers, and the right panel shows traditional borrowers at four-year institutions. Source: Treasury tabulations of 4 percent NSLDS sample matched to de-identified tax records.
**Figure A3:** Slowing Rates of Repayment: Median Balance Remaining by Cohort and Year

All Borrowers

Traditional Borrowers

Notes: This figure shows the fraction of the initial federal loan balance remaining in each subsequent fiscal year for the median borrower in selected repayment cohorts from 1997 to 2011. Cohorts are defined by fiscal year entered repayment. The figure shows that the median borrower in the 1997 repayment cohort had repaid his or her loan in the 9th year after entering repayment; for the 1999 cohort it took 10 years. The left panel shows all borrowers, and the right panel shows traditional borrowers at four-year institutions. Source: Treasury tabulations of 4 percent NSLDS sample.
Figure A4: Annual Borrowing Amounts by Institution Type (Nominal Dollars)

Notes: This figure shows the median amount of federal loans students borrowed each year by institution type for undergraduate students. The levels of annual borrowing closely reflect changes in dependent and independent federal loan limits. All dollar values are in nominal terms. Source: Treasury tabulations of 4 percent NSLDS sample.