Trends in Student Loan Repayment*

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Abstract

We document changes in the rate at which borrowers repay their student loans by calculating a borrower-level loan paydown rate – the percent change in outstanding debt relative to debt at repayment entry. The typical borrower entering repayment in 2005 repaid 26 percent of their loan within 5 years versus 5 percent for the typical borrower entering repayment in 2014. Paydown rate declines vary by educational attainment, school type, outstanding debt at repayment entry, and repayment plan. Shifts in repayment plan and debt can explain some of the shift in the distribution of paydown rates over time but most remains unexplained.

Keywords: Student loans, debt repayment.
JEL codes: I22, H52, G51

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1 Introduction

Increased reliance on student loans for financing postsecondary investments by students in the United States as well as growth in outstanding student loan debt underscore the importance of understanding student loan repayment. In this paper, we provide new evidence on this topic by studying student loan repayment using administrative records on federal student loans from the U.S. Department of Education (ED). We use focus on a measure of repayment progress – a borrower's "paydown rate" – that represents the percent of their outstanding balance they have paid down since entering repayment. We study the evolution of student loan paydown for 10 cohorts of borrowers who entered repayment between 2005 and 2014, with several key findings.

First, we show that median student loan paydown rates, measured up to 10 years after repayment entry, decreased for recent cohorts of former students. For instance, the typical borrower who entered repayment in 2005 had repaid 26 percent of their loan 5 years later compared to 5 percent for the typical borrower in the 2014 cohort. Past research has highlighted the mismatch between the timing of student loan payments and returns to postsecondary education and thus the patterns may reflect improved alignment between payment burdens and earnings (Dynarski and Kreisman, 2013; Dynarski, 2021). Indeed, we find evidence of improvements in another, less ambiguous measure of repayment distress – student loan default rates – starting with the 2012 cohort.

We leverage data from the Equifax Consumer Credit Panel (CCP) — which incorporates both federal and private student loans — to document a similar evolution of student loan paydown rates. We also use the CCP to examine changes in paydown rates for another common installment loan taken out to finance the purchase of an automobile. Among auto loans with typical terms in each year, paydown rates have remained essentially constant over this time period. With the caveat that there are differences in loan terms and borrower characteristics across the two credit products, the difference in paydown rates suggests that the patterns we document are specific to student loan debt rather changes in loan repayment across all credit products.

Next, we document cohort-level changes in loan repayment by borrower characteristics such as educational attainment (e.g., undergraduate versus graduate, completer versus non-completer), school sector (e.g., public versus nonprofit versus for-profit), outstanding debt at repayment entry,

repayment plan, and parental education status. Within a given cohort, student loan paydown rates vary along these dimensions in expected ways, although paydown rates for almost all groups declined between 2005 and 2014. Cross cohort decreases in paydown rates are largest for borrowers who attended for-profit and community colleges, noncompleters, borrowers with the lowest balances at repayment entry, and first-generation students.

Finally, we show that the secular decline in student loan repayment and shift in the distribution of paydown rates cannot be fully explained by changes in a rich set of observable borrower characteristics (e.g., family income prior to college entry, parental education, age when entering repayment, attainment), nor by the growth in the for-profit college sector (which tends to have worse outcomes). About 61 percent of the decline in average paydown rate remains unexplained after accounting for observable student and institutional characteristics. The largest predictor of the decline in paydown is the shift in borrowers' choice of repayment plan towards options that offer a longer-time horizon of repayment and those in which payments are based on income. This is consistent with the increased use of income-driven repayment plans during the time period we study.

Past research on borrower outcomes has primarily focused on student loan default rates. Looney and Yannelis (2015) document increases in student loan cohort default rates during the 2000s and early 2010s and provide evidence on the student and institutional factors associated with the increase. Their findings suggest that increased enrollment and borrowing among older, nontraditional students at for-profit and community colleges was the main contributor. Consistent with these findings but focusing on older cohorts of borrowers who entered repayment in the 1980s and 1990s, Looney and Yannelis (2022) find that expansions and contractions to for-profit institutions' federal student aid program eligibility are the primary drivers of changes in student loan default during these decades. In contrast and likely reflecting the divergence in default and repayment outcomes across cohorts, we find that changes in enrollment across sectors only explains a small share of paydown rate drop between the 2005 and 2014.

Student loan repayment outcomes may also be related to the repayment plans that borrowers have access to, in particular the time horizon over which loans are repaid and whether payments are linked to borrowers' incomes, as is the case with income-driven repayment (IDR) plans. Focusing

on the increase in student loan defaults during the Great Recession, Mueller and Yannelis (2019) show that although changes in the composition of borrowers and rapid decreases in housing prices contributed to rising defaults, increased IDR plan participation prevented even larger increases. Herbst (2023) finds reductions in short-run default risk for student loan borrowers who enroll in an IDR plan but increases in student loan payments. Increased IDR plan take-up is consistent with our finding of declining default rates and slower repayment for cohorts that entered repayment after the peak of the Great Recession, paydown rates continued to decline.

Few studies look specifically at loan repayment as an outcome. In work closest to our own, Looney and Yannelis (2019) document default and cohort repayment rates for borrowers with Direct Loans entering repayment in the 1990s and early 2000s. These authors find that more than half of borrowers who entered repayment with low and moderate balances (i.e., less than $50,000) repaid their loans within 10 years. Although borrowers who entered repayment with over $50,000 in outstanding debt had lower default rates than those with balances below $50,000, this group also had lower repayment rates. Further, repayment rates fell for more recent cohorts of high balance borrowers, with more than half of those who entered repayment in 2010 experiencing increases in loan balances over the next 4 years. Our results are consistent with this finding and show that the degree of balance growth for borrowers with the highest debt (those with $27,000 or more in outstanding debt at repayment entry) continued to increase for cohorts in the mid-2010s.

A handful of other papers consider an alternative paydown rate measure: the probability that a borrower reduced their original (at repayment entry) balance by at least $1 (hereafter, "$1 repayment rate").[1] As is the case with the threshold nature of student loan default, differences in $1 repayment rates across students, institutions, and other contexts will only capture variation in repayment success for a subset of borrowers on the margin of reducing their principal below their original balance, making the measure easier to improve by targeting only a small subset of borrowers (U.S. Government Accountability Office, 2018).[2] Our paydown rate measure provides

[1] College-level $1 repayment rates are reported in the College Scorecard.

[2] Kelchen and Li (2017) finds overlap in the factors that predict default and $1 repayment rates at the institution-level. Conzelmann et al. (2019) show that 2008 bachelor's degree recipients had lower $1 repayment rates when they also used IDR for repayment of their student loans. Lau (2020) studies the increased time horizon over which cohort default rates (CDR) used for accountability requirements from 2 to 3 years and finds positive effects on $1 repayment rates measured 3 years after repayment entry but no effect on 5 year $1 repayment rates. Mangrum (2022) studies the effect of high school personal finance course requirements and finds that although these mandates did not affect how

a more expansive perspective on the extent to which borrowers' reduce their balances over time.

2 Student Loans and Repayment Options

Student loans are an important source of household debt with outstanding debt equalling $1.6 trillion at the end of 2023 (Federal Reserve Bank of New York, 2024), similar in magnitude to auto loan debt and only exceeded by outstanding housing debt ($12.6 trillion). The federal government is the predominant source of federal student loans in the U.S., providing around 90 percent of annual loan disbursements over the past two decades (Ma and Pender, 2023). Remaining student loans come from a mix of state, institutional, and private sources.

2.1 Federal student loan eligibility and terms

Federal student loans are authorized by Title IV of the 1965 Higher Education Act as amended. Students must complete a Free Application for Federal Student Aid (FAFSA) to access federal student loans, but eligibility and many terms are largely independent of student income and assets. Instead, in most cases, borrowing limits, interest rates, origination fees, and repayment plan options are set by legislation or regulations and only vary by type of loan and student degree level.[3]

Prior to 2010, two federal student loan programs operated in parallel. Through the Federal Family Education Loan (FFEL) Program, borrowers could receive federally guaranteed loans from private lenders. Through the Direct Loan (DL) program, students could borrow directly from the federal government. Institutions could choose whether to offer loans from the FFEL, DL, or both programs. From the student's perspective, at the time of borrowing, the two programs were effectively equivalent with the same limits, origination fees, and interest rates. As described in the following subsection, borrowers' access to some loan repayment options depended on whether they had

much undergraduates borrowed, students subject to the mandates had higher $1 repayment rates.

[3]Undergraduate students have access to Stafford Loans, parents of dependent undergraduate students can borrow Parent PLUS loans, and graduate students have access to graduate Stafford and, beginning in July 2006, Grad PLUS loans. Undergraduate students (and graduate students before July 2012) with unmet need could receive subsidized Stafford Loans, which do not accrue interest while the student is enrolled. Annual Stafford Loan limits for undergraduates vary with dependency status and level (i.e., freshman, sophomore, upper level) and annual limits for graduate Stafford Loans only vary depending on whether a student is in a designated health program. Lifetime undergraduate Stafford Limits only vary with dependency status and graduate Stafford Limits only vary with health program designation. There are no lifetime limits for Parent and Grad PLUS Loans and on an annual basis, borrowing is only limited by the cost of attendance not covered by grant and other loan aid. See Hegji (2021) for additional details.

FFEL or DL loans, with fewer options for FFEL borrowers.[4]

2.2 Student loan repayment options

Options for repayment of federal student loans can be grouped into three broad categories: standard, extended/graduated, and income-driven repayment plans. The standard plan is a fixed payment, mortgage-style repayment plan in which interest is amortized over 10 years and borrowers who do not actively choose a different plan at repayment entry are defaulted into the standard plan. Extended repayment plans are also mortgage-style with fixed payments but allow for a longer repayment period of up to 25 years. In the graduated repayment plan, payments increase on a set schedule with a longer repayment period (also up to 25 years). Standard, extended, and graduated repayment plans have been available to borrowers since at least the early 1990s.

Remaining repayment options fall into the category of income-driven repayment (IDR) plans. In all of these plans, payments are set to $0 below a threshold level of income and above this threshold, payments are linked to income (generally through a marginal rate structure). Additionally, in all IDR plans, any remaining balance is forgiven after a set number of payments (including $0 payments). The first (and least generous) IDR plan, "income-contingent repayment" or ICR, was created in 1993 and implemented a few years later. The 2007 College Cost Reduction and Access Act created the "income-based repayment" or IBR plan, which was implemented in 2009. Two new IDR plans – "pay as you earn" or PAYE and "revised pay as you earn" or REPAYE – were established through regulation in 2012 and 2015, respectively. Finally, in 2023, the newest and most generous IDR plan, "Saving for A Valuable Education" or SAVE, subsumed and expanded REPAYE.[5] Between 2013-Q4 and 2023-Q4, the share of borrowers with outstanding Direct Loans in repayment in the standard 10-year repayment plan decreased 15 percentage points (from 62 to 47 percent), the share in an extended/graduated plan fell by over 4 percentage points (from 21 to

[4] A portion of outstanding FFEL loans were purchased by ED in 2008 and 2009 through the Ensuring Continued Access to Student Loans Act (ECASLA). Borrowers with "ED-held FFEL loans" had access to a subset of the repayment plan options and other benefits as borrowers with loans from the DL program. Further, most borrowers with "commercial FFEL loans" can consolidate their outstanding debt into a DL consolidation loan to gain access to these benefits.

[5] Eligibility for IDR plans is linked to the type of loan (DL, ED-held FFEL, commercial FFEL) and, in some cases, the timing of when a borrower first and last borrowed. See https://studentaid.gov/manage-loans/repayment/plans/income-driven for additional details on eligibility requirements. Monarrez and Turner (2024), Appendix B provides additional details on features and terms of IDR plans.

17 percent), and the share in an IDR plan grew by 22 percentage points (from 10 to just over 32 percent) (U.S. Department of Education, 2024).[6]

3 Data and Analysis Sample

We use administrative data from ED to examine changes in repayment and student- and institution-level correlates of loan paydown rates across cohorts. The underlying data cover the universe of individuals who received federal student aid; our analyses focus on those who borrowed. We also use administrative data to measure enrollment and graduation. Finally, we draw upon records of borrowers' first federal student aid applications to measure their demographic and other characteristics, including gender, age at repayment entry, dependency status, family income prior to enrollment (separately for students classified as dependent and independent), and parental education.

Our primary analysis sample includes borrowers who entered repayment in the 2005 through 2014 calendar years. These cohorts were chosen because 2005 is the earliest cohort for whom we can track students entering repayment in more readily accessible data. Because we want to observe at least 5 years of repayment outcomes, the 2014 cohort is the last one we can use before cohorts become affected by the COVID-19 student loan payment pause in early 2020. We first assign each borrower to a unique loan repayment cohort based on the maturity (i.e., repayment entry) date of their last disbursed student loan. We aggregate outstanding principal, interest, and fees across all loans to the borrower by month level beginning with the month of repayment entry.[7] Borrowers with only cancelled loans (i.e., those that are never disbursed) and those with only Parent PLUS loans are excluded. This latter exclusion is to focus on repayment of the student borrower. All analyses are based on a 5 percent random sample drawn from each repayment cohort.[8]

[6] These statistics are based on publicly available data from the FSA data center (U.S. Department of Education, 2024). Information on repayment plans for ED-held FFEL borrowers is not available before 2016 in the FSA data center. Repayment plans for commercial FFEL borrowers is not provided to ED.

[7] The data aggregation step from loan level to borrower level is important, given the prevalence of loan consolidations. When borrowers first take out their student loans, the servicer reporting data show a separate loan for each academic year, so that a person who receives subsidized and unsubsidized loans for 4 years of college could have 8 loans open by the time they leave college. A borrower can consolidate these original loans into a single one. Consolidation can serve various purposes, including changes to loan terms, changes to repayment plan, and exit out of default. Because the balances from the underlying loans get aggregated and reflected in the balance of the consolidation loan, the aggregation step to the borrower level ensures that balances are linked properly across consolidation events.

[8] Our repayment cohort definition differs from the cohort definition used by ED for the purpose of calculating cohort

In some cases, we classify borrowers as FFEL or DL borrowers, based on the type of loans the borrower had at repayment entry.[9] Although we observe repayment outcomes for both borrowers with FFEL Loans and those with Direct Loans, we do not observe repayment plan choice for FFEL borrowers. The FFEL program ended in 2010, and thus, when we limit our sample to only borrowers with ED-held loans, the composition of borrowers within each repayment cohort is potentially changing over time. However, whenever possible, we show that our results are similar for all borrowers and borrowers with DL loans at repayment entry entering.

3.1 Characteristics of borrowers in analysis sample

Table 1 shows characteristics of borrowers in our main analysis sample. Across all cohorts, the average outstanding student loan debt at repayment entry was $29,700. Five years after repayment entry, borrowers had reduced their outstanding debt by 24 percent, on average, 27 percent had loans in default, and borrowers had spent 15 percent of their time in repayment with defaulted loans. Turning to borrowers' highest level of educational attainment, 39 percent had not completed an undergraduate degree, 44 percent had completed an associate or bachelor's degree, 3 percent had enrolled in but not completed a graduate degree, and the remaining 14 percent had completed a graduate degree.

Over their first 5 years of repayment, the modal repayment plan was the standard 10-year plan for 72 percent of borrowers, a graduated or extended repayment plan for 13 percent of borrowers, and an IDR plan for 15 percent. Looking at last institution attended, 34 percent of borrowers entering repayment last enrolled in a public baccalaureate-granting school, 17 percent had attended a sub-baccalaureate public or nonprofit institution, 21 percent were last enrolled in a nonprofit baccalaureate-granting institution, and 28 percent attended a for-profit school. On average, borrowers entering repayment were 29 years old, and 57 percent were women. Around 54 percent were classified as dependent students when they first applied for federal student aid and family

default rates in several ways (see https://fsapartners.ed.gov/knowledge-center/topics/default-management/cohort-default-rate-guide (accessed 4/25/2024) for details. First, we assign each borrower to a single unique repayment cohort whereas borrowers may be included in multiple cohorts defined for the purpose of calculating CDRs if they reenroll and borrow after entering repayment for the first time. Similarly, borrowers who enter repayment with loans borrowed from multiple schools will be included in each school's cohort for the purpose of calculating CDRs. Second, our cohorts are based on the calendar year of reentry whereas ED cohorts are based on the federal fiscal year.

[9] Because most FFEL borrowers can consolidate their debt into a Direct Consolidation Loan, some borrowers we classify as FFEL (based on their loans at repayment entry) may eventually fall under the DL program.

income just prior to applying for federal aid was $74,600 for students classified as dependent at entry and $31,900 for those classified as independent. Around 46 percent did not have a college educated parent (i.e., were first-generation students).

The remaining columns of Table 1 show these same characteristics for early repayment entry cohorts (2005 through 2010) and later cohorts (2011 through 2014). Average outstanding debt at repayment entry increased by 32 percent and we find a distinct drop in the average repayment rate for later cohorts compared to early cohorts, from 31 to 20. In contrast, the share of borrowers with defaulted loans 5 years after repayment entry increased only slightly, from 24 to 28 percent. We find only small changes in educational attainment, student demographic characteristics, and family income prior to first enrollment. However, we find moderate shifts in the distribution of borrowers across sectors of higher education, namely a reduction in the share who attended a 4-year public or nonprofit institution and an increase in 2-year not-for-profit and for-profit attendance. We also find notable changes in the modal repayment plan, with the percent of borrowers in an IDR plan increasing from 5 to 17 percent.[10]

3.2 CCP data and analysis sample

We leverage credit bureau data from the Federal Reserve Bank of New York Consumer Credit Panel/Equifax data (CCP). The CCP is an anonymized dataset containing consumer-level and tradeline-level quarterly credit bureau records for a 5 percent random sample of individuals with a credit file (Lee and Van der Klaauw, 2010). The CCP contains consumer-level information about individuals' credit, including loan balances, public records, inquiries, and delinquencies. It also contains tradeline-level data on origination date, high credit, current balance, and loan status for several common tradeline types, including automobile loans financed by a bank or a dealership, mortgages, credit cards, and student loans. Both consumer-level and tradeline-level snapshots are updated on a quarterly basis.

[10] In Appendix Table A.1, we further separate Table 1, columns (2) and (3) by loan program. Around 17 percent of the 2005-2009 cohorts borrowed through the DL program versus 72 percent of the 2010-2014 cohorts. We find some modest differences in outcomes and characteristics of borrowers by loan program. DL borrowers had higher paydown rates and lower (higher) default rates in the earlier (later) cohorts. DL borrowers were less likely to borrowed for graduate school, more likely to have attended a 4-year public institution in 2005-2009, and less likely to have attended a public or nonprofit 4-year institution in 2010-2014. Age, income, dependency status, and parental income are similar for borrowers in the two programs.

We use tradeline-level data on auto loans and student loans from 2004 to 2019 to calculate repayment rates based on a consumer's most recently originated loan. Auto loans are a common installment loans with similar aggregate outstanding balances; however, they also differ from student loans due to underwriting standards and shorter repayment time frames. Auto loan borrowers are grouped into cohorts based on their most recent date of auto loan origination. Because auto loan terms vary significantly, we categorize auto loan terms into six-month intervals and identify the modal auto loan term for each year. We then restrict our analysis of auto loans to loans whose term falls within the modal term for a given year. This makes sure that variation in repayment rates for auto loans is not driven by changes to the typical loan term over time.

4 Descriptive Results

We measure a borrower-level cumulative student loan paydown rate by comparing their outstanding debt (principal and accumulated interest) after a set number of years since repayment entry to their outstanding debt at repayment entry. Specifically, the paydown rate for borrower i measured t years after repayment entry is a function of their balance at year t (Bal_{it}) and their balance at repayment entry (Bal_{i0}):

$$LPR_{it} = \frac{Bal_{i0} - Bal_{it}}{Bal_{i0}}$$

A borrower's loan paydown rate will equal 0 if the borrower has not made any progress in paying down their balance. Borrowers who have paid down their entire balance will have a paydown rate equal to 1. Finally, borrowers that have a higher balance in year t than at repayment entry will have a negative loan paydown rate.

Several related repayment rate measures have been examined in previous research. The first is the \$1 repayment rate reported in the College Scorecard, which measures the percent of all borrowers who reduced their principal balance by \$1, aggregated to the institution-level. The second repayment rate measure is a school- or cohort-level aggregate balance based repayment rate, which is calculated similar to LPR_{it} except that outstanding debt is aggregated across borrowers within the

cohort and school/program before the ratio of current to initial debt is taken.[11]

4.1 Student and auto loan repayment by cohort

Figure 1 shows median student loan paydown rates by cohort. Focusing first on our main analysis sample constructed using ED data (Panel A), we find substantial variation in median paydown rates over time and across cohorts. After five years – the halfway point for a borrower repaying through the standard 10-year plan – a typical borrower who started repayment in 2005 had reduced their balance by about 26 percent. The median borrower entering repayment in 2014, however, had a 5-year paydown rate of 5 percent. Measured over longer time horizons, the gaps in median paydown rates across cohorts widen.[12] Differences in repayment across cohorts follow a similar pattern when we use CCP data and analysis sample, although within cohort-levels are slightly higher (Panel B).

Underlying declining median paydown rates are changes in the entire distribution of borrower paydown rates. As can be seen in Figure 2, which shows the distribution of paydown rates measured at 3 years (Panel A) and 5 years (Panel B) for the 2005 and 2014 cohorts, the biggest difference is the sizeable share of borrowers with balance growth in 2014. In 2005, although there were borrowers with balance growth, they represented a much smaller fraction of the cohort. A comparison of 3 and 5 year paydown rate distributions shows that with more time elapsed since repayment entry, there is more time for some borrowers to catch up after balance growth, but a sizeable share continue to have balances larger than at repayment entry.

We also use the CCP data to test whether the median paydown rate for another major source of consumer debt – auto loans – follows a similar pattern. Figure 3 shows median paydown rates for auto loans in a manner analogous to Figure 1. We find no indication that the typical auto loan borrower falls behind in repayment in the same manner as the typical student loan borrower. There is no evidence of large shifts in repayment across cohorts. Across all cohorts of auto loan borrowers, the median borrower had fully repaid their loan four years after the start of repayment.[13]

[11] See, for instance, Chou et al. (2017) and Matsudaira and Turner (2020) for analyses using the aggregate balance repayment rate at the institution- and program-levels, respectively.

[12] We focus much of our discussion on cohorts at the beginning (2005) and end (2014) of our analysis period, but recognize that the Great Recession could have had an appreciable effect on not only the cohorts that entered repayment during the Great Recession itself, but also subsequent cohorts.

[13] This analysis is based on tradeline level data from the FRBNY Consumer Credit Panel on auto loans. Borrowers are

4.2 Student loan default by cohort

We next examine whether the evolution of student loan default across cohorts reflects increased repayment difficulties over a similar time period. We consider both a point-in-time measure – the percent of months in the calendar year spent in default (hereafter, annual default rate) – and a cumulative measure – the probability of defaulting on a loan measured since the start of repayment entry (hereafter, cumulative default rate). Neither measure will be comparable to ED's official cohort default rates (which represents the fraction of borrowers who default within 2 or 3 years of entering repayment) because of differences in how we define repayment entry cohorts.

Panel A of Figure 4 shows the evolution of the median annual default rate. Default occurs after 360 days of nonpayment, thus, relatively few borrowers have defaulted by the end of their first year.[14] Across all cohorts, annual default risk increases sharply in the second year since repayment entry and levels out around the fifth year. For the 2005 through 2011 cohorts, the median annual default rate increases, mirroring the fall in the median paydown rate. Over the remaining cohorts, however, annual default rates for the median borrower fall, such that the 2015 cohort resembles that 2008. Panel B of Figure 4 shows the evolution of cumulative default rates by cohort and years since repayment entry. Differences across cohorts and over time largely reflect patterns found when using the annual default rate, although absolute levels are higher.[15]

Several studies document the rise in student loan defaults for borrowers who entered repayment during the Great Recession. Looney and Yannelis (2015) provide evidence that increased default rates were attributable to increased enrollment and borrowing within for-profit institutions, and, to a lesser extent, community colleges, and changes in the characteristics of borrowers and their family finances. The improvement in economic conditions during the recovery and declining for-profit sector due to regulatory actions likely contributed to the drop in defaults we observe after 2011.

grouped into repayment cohorts based on their most recent date of auto loan origination. Because auto loan terms vary significantly, we categorize auto loan terms into six-month intervals and identify the modal auto loan term for each year. We restrict our analysis of to auto loans whose term falls within the modal term for a given year.

[14] Our default measure is based on loan servicers' reporting on the status of a loan. We mark a borrower as currently defaulted if they have at least one open loan in a default status. Supplementary analysis suggests that there is variation in the number of days a loan is delinquent before a servicer changes its status to default.

[15] Although larger in magnitude than official cohort default rates, likely due to differences in our definition of repayment cohorts, they are similar to defaults by repayment cohort found by Burk and Perry (2020).

4.3 Heterogeneity

There are numerous candidate explanations for the decline in paydown rates, including changes in the composition of individuals pursuing postsecondary education and borrowing to do so, changes in which schools these students attended, changes in how much debt these students took on (both borrowing and associated interest accumulation), and changes in how borrowers repay their loans. We first explore the extent to which these factors contributed to the decline in paydown rates by examining heterogeneity along these dimensions.

Existing research suggests that one of the most important factors for borrowers' repayment success is completion (e.g., Looney and Yannelis, 2015; Scott-Clayton, 2018). Figure 5 shows median 5-year student loan paydown rates by cohort and highest educational attainment in Panel A and borrowers' attainment levels by repayment cohort in Panel B. All borrowers experienced sizeable declines in paydown rates between 2005 and 2014 but the drop was largest for undergraduate noncompleters, who had essential the same median paydown rate as undergraduate completers in 2005 (30 percent) but a paydown rate of -6 percent (134 percent lower than undergraduate completers) in 2014. Graduate completers and noncompleters saw relatively similar declines in paydown rates. We find relatively modest changes in the attainment of borrowers between 2005 and 2014, with small increases in the share of borrowers entering repayment who completed their degree programs.

We next examine heterogeneity by the sector of the institution last attended by borrowers. Researchers have documented important differences in debt, earnings, and repayment outcomes for students who attended for-profit and those who attended other institutions (e.g., Looney and Yannelis, 2015; Cellini and Darolia, 2017; Cellini and Turner, 2019). Consistent with these findings, former for-profit and community college borrowers experienced the largest drops in median paydown rates, from 24 to 13 percent and 43 to 1 percent, respectively (Figure 6, Panel A). In contrast, median paydown rates for borrowers who last attended four-year public and nonprofit institutions before entering repayment declined only slightly, from 26 to 21 percent and 23 to 17 percent, respectively. Mirroring the growth in for-profit enrollment during the financial crisis, Panel B shows increases in the share of borrowers entering repayment from this sector between 2009 and 2011, followed by a drop back to the initial enrollment share of 25 percent in 2014. The

share of borrowers who last attended a community college steadily increased between 2009 and 2014, from 13 to 19 percent, while enrollment in four-year public and nonprofit institutions saw small declines.

To examine paydown rate differences by levels of debt borrowed, we divide borrowers into four groups based on quartiles of student loans at repayment entry for the 2005 repayment cohort (inflation adjusted to 2021$).[16] Panel A of Figure 7 shows that borrowers with the smallest balances saw the largest paydown rate drop. The typical borrower who entered repayment in 2005 with debt in the bottom quartile had full repaid their loans 5 years later whereas in 2014, they had only reduced their balance by 54 percent. That said, shifts in the distribution of debt held by borrowers reduced the relative representation of this group, which made up 25 percent of borrowers who entered repayment in 2005 but only 14 percent of borrowers entering repayment in 2014 (Panel B). The decline in paydown rates for borrowers with the highest debt was smaller in absolute magnitude but by 2011, the median borrower was negatively amortizing five years after repayment entry.

Figure 8 divides borrowers into three groups based on the highest level of parental attainment, as measured on borrowers' first FAFSA.[17] First-generation students – those with parents whose highest attainment was high school or less – saw the largest drop in paydown rates between 2008 (the first cohort in which parental education is observed for over 50 percent of borrowers) and 2014, from 4 to -6 percent and 13 to -3 percent, respectively (Panel A). Although the median paydown rate for borrowers with a college educated parent declined over this same period, the 11 pp drop was much smaller. Changes in the composition of borrowers by parental education – shown in Panel B – are relatively small in the years in which this information is observed for most students.

Finally, we explore differences in the evolution of paydown rates by repayment plan. Because borrowers can switch between plans while in repayment, we classify borrowers based by their modal repayment plan (defined on a monthly basis). We distinguish between borrowers' whose

[16] The range of debt for each quartile is: <$6,100 (Q1), $6,100 - $13,500 (Q2), $13,500 - $27,200 (Q3), and >$27,200 (Q4).

[17] Unfortunately, parental education is missing for up to 80 percent of borrowers entering repayment in the 2005 through 2007 cohorts. We draw information on the highest level of parental attainment from a borrower's first FAFSA. Older cohorts are more likely to have their first FAFSA come from years in whcih parental education is not available in the administrative data. Median paydown rates and borrower shares by parental education are denoted by hollow markers and thin lines in these years in Figure 8.

modal plan was the standard plan 10-year plan (mortgage-style, interest amortized over 10 years), graduated or extended (repayment period up to 25 years), and those on an income-driven repayment (IDR) plan. Pre-pandemic IDR plans allowed for negative amortization if required payments were less than interest accumulation. Although Herbst (2023) finds that borrowers who switch to an IDR plan make larger loan payments over the following years, Panel A of Figure 9 shows that most borrowers in IDR saw their balances grow in the first 5 years of repayment. There is very little variation in the median loan paydown rate for borrowers on IDR across cohorts despite the increased take-up (Panel B) and generosity of IDR options available to later cohorts. We also find small declines in the median paydown rate for borrowers in the standard 10-year plan between 2005 and 2014 (from 46 to 37 percent). Growth in IDR plan participation was steady over this period, from 2 percent of borrowers in the 2005 cohort to 21 percent who entered repayment in 2014. Standard and graduated/extended plan take-up fell over this period.

5 Decomposing Changes in Loan Paydown Rates

We next decompose the proximate drivers of the downturn in repayment rates. While descriptive in nature, these decompositions can help inform hypotheses concerning the features of the loan system most closely linked to the decline in repayment.

5.1 Analytic approach

We explore changes in the distribution of 5-year paydown rates in the 2005 versus 2014 repayment entry cohorts (as earlier shown in Figure 2). We first estimate a propensity score using a logit model of the probability of being in the 2005 cohort, based on borrower characteristics when first enrolled (gender, marital status, dependency status, family income interacted with dependency status) and at repayment entry (a quadratic in age and highest attainment), the sector of the last institution attended (public 4-year, nonprofit 4-year, public or nonprofit 2-year, or for-profit), and modal repayment plan (standard, extended/graduated, or IDR) for the pooled sample from the 2005 and 2014 cohorts. We next use propensity score re-weighting to reweight borrowers in the 2014 cohort to account for shifts in the observed characteristics of borrowers, using the approach of Dinardo et al. (1996).

We only observe repayment plan choice for borrowers with ED-held loans. Our preferred specification for estimating the propensity score includes repayment plan and thus, we can only reweight the distribution of paydown rates for borrowers who entered repayment with Direct Loans. We also estimate a propensity score using variables that are available for all borrowers. As discussed below, the reweighted distribution of paydown rates for DL borrowers is quite similar to the reweighted distribution for all borrowers using this modified propensity score.

5.2 Results

Figure 10 displays kernel density functions of the distribution of 5-year median repayment rates for the 2005 and 2014 cohorts (dark solid and lighter solid lines, respectively) and reweighted 2014 cohort (dashed lines) when the propensity score is estimated without and with repayment plan indicators (short dashed and long dashed lines, respectively). Panel A is limited to borrowers with Direct Loans and Panel B includes both DL and FFEL borrowers.

As was seen in Figure 2, there is a much larger mass of borrowers with balance growth in the 2014 cohort than the 2005 cohort. Above the point where $LPR = 0$, there were more borrowers with positive repayment rates in 2005 than in 2014 at almost every point in the distribution of loan paydown rates. Accounting for changes in borrowers' characteristics excluding repayment plan does not appreciably shift the counterfactual distribution of repayment rates. Panel A shows that, at least for DL borrowers, some of the increase in balance growth can be explained by increased use of IDR. However, much of the change in distribution of paydown rates remains unexplained.

To summarize these results, we look at whether differences in repayment outcomes between the 2005 and 2014 cohorts fall when we reweight the 2014 cohort based on 2005 cohort for various subsets of observable characteristics. Table 2 shows these estimates for DL borrowers (Panel A) and all borrowers (Panel B). Educational attainment, sector, and borrowers' demographic characteristics explain very little of the 18 percentage point raw gap in the average paydown rate for DL borrowers or the 12 percentage point gap for all borrowers. In contrast, changes in the modal repayment plan alone can account for 10 percentage points (56 percent) of the raw gap among DL borrowers. Adding in the remaining characteristics leads to a 9 percentage points reduction in the share of the DL borrower gap explained, suggesting that after accounting for changes in repayment

plans, the characteristics of 2014 borrowers changed in ways that would predict a slightly higher repayment rate in 2005.

Column (9) of Table 2 shows results when we includes additional controls for ventile of debt at repayment entry. Because the paydown rate is a function of debt at repayment entry, this control is not included in our preferred construction of the propensity score. Given the shifts in repayment entry balance shown in Figure 7, however, we view this as a useful exercise for understanding the importance of higher student debt levels.[18] Indeed, adding these controls to our main specification increases the amount of the average repayment rate gap explained by 8 percentage points (27 percent) for DL borrowers and 9 percentage points (43 percent) for all borrowers.

The second and third rows of Table 2 repeat this exercise for two additional measures of repayment success: the share of borrowers with balance growth ($LPR < 0$) and the share of borrowers who have fully repaid their outstanding debt within 5 years ($LPR = 1$). Patterns are largely similar, with attainment, sector, and demographic characteristics explaining relatively little of differences in these outcomes between the 2005 and 2014 cohorts, repayment plan choice explaining 38 to 56 percent, and controls for outstanding debt at repayment entry closing the gap in outcomes between cohorts even further.

6 Conclusion

We document changes in student loan repayment outcomes for borrowers who entered repayment between 2005 and 2014. After peaking at the height of the Great Recession default rates have fallen for cohorts who started repaying their loans after 2010. In contrast, the rate at which the typical borrower repays their loan has continued to decline. Changes in the distribution of borrowers across repayment plans – with steady increases in IDR participation and declining use of the standard 10-year plan and, to a lesser extent, graduated and extended repayment options – provides the most explanatory power for declining paydown rates. Borrowers in IDR have more protection against default due to low income and unaffordable loan payments, but may also have longer

[18] Even though changes in educational attainment between the 2005 and 2014 cohorts explains a negligible share of the shift in the distribution of paydown rates, to the extent that increases in debt levels are driven by higher levels of debt for students who borrowed to attend graduate school, the increase in graduate enrollment documented by Monarrez and Matsudaira (2023) could indirectly contribute to the fall in paydown rates.

repayment terms and lower required payments in the initial years following repayment entry. We leave investigation of welfare implications of declining paydown rates decreases to future research.

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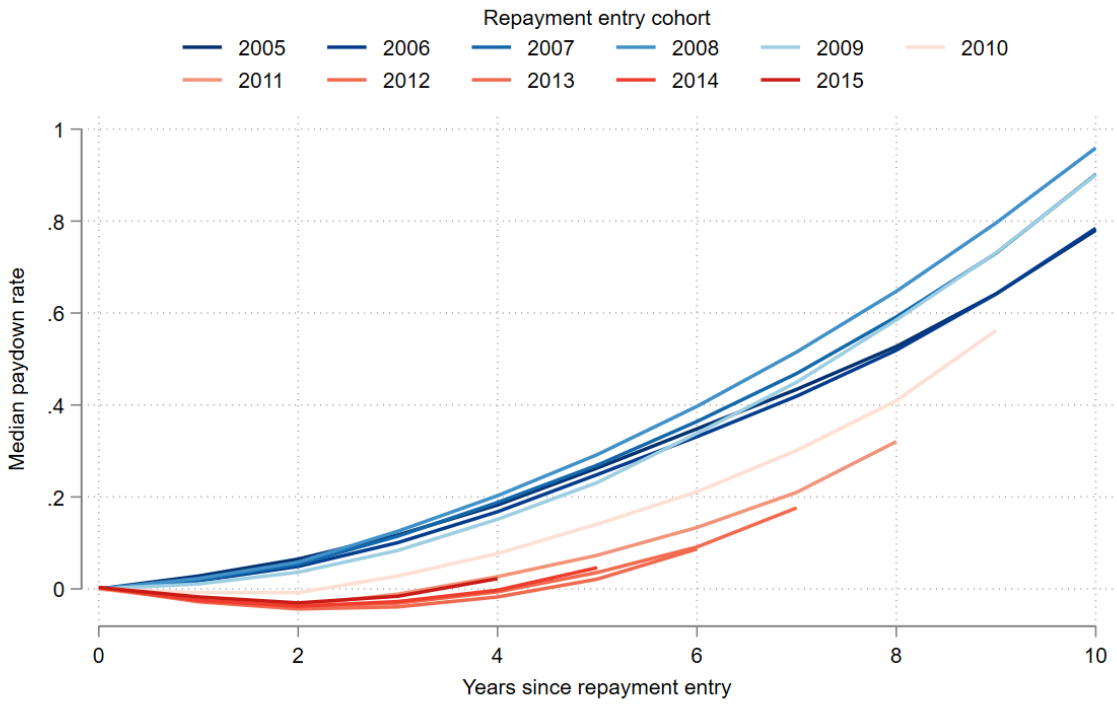
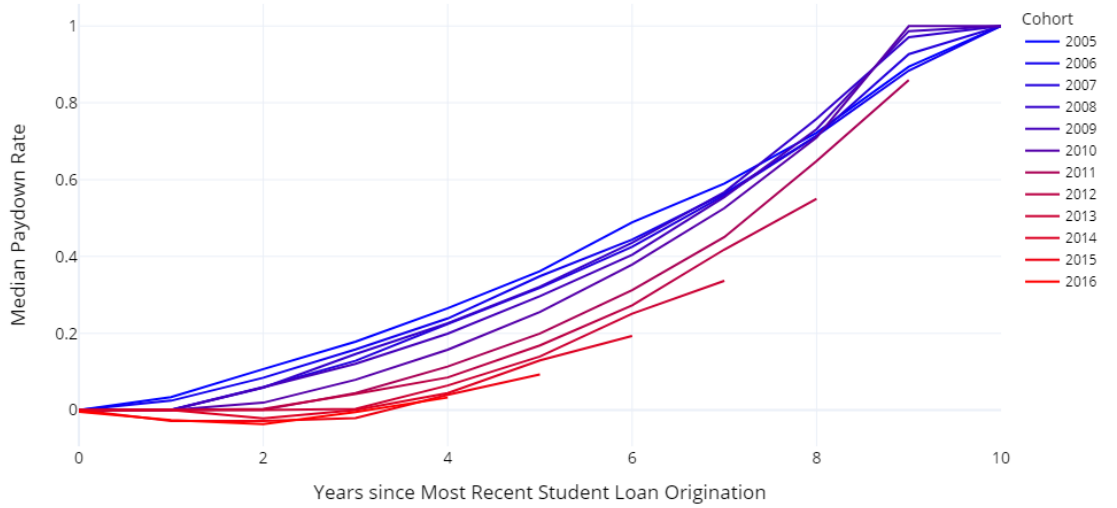
Figures and Tables

Figure 1: Median Student Loan Paydown Rates by Cohort

A. Department of Education administrative records



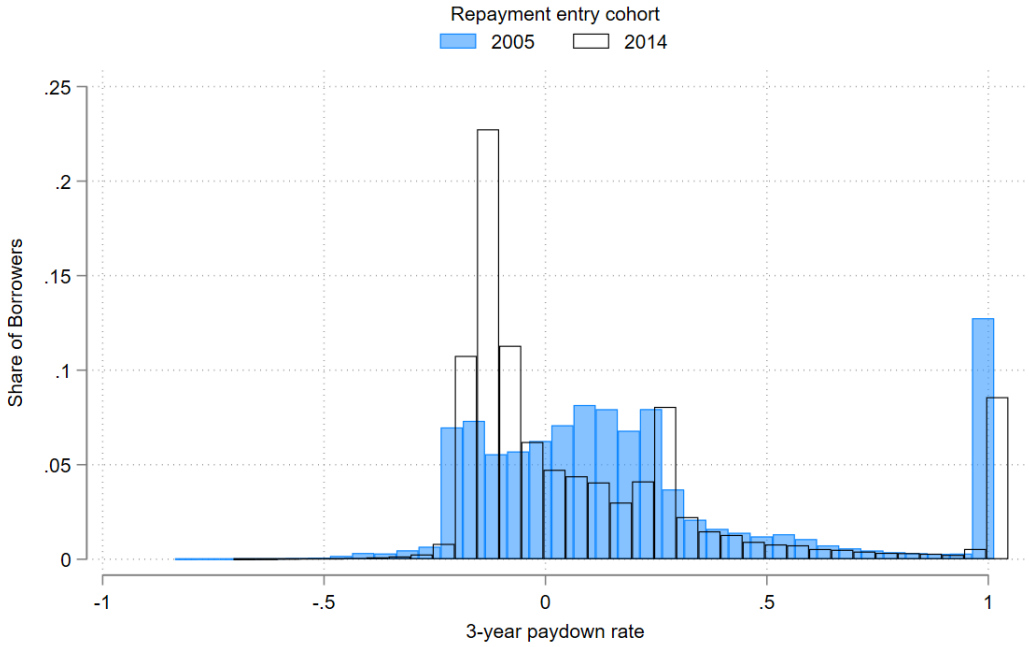
B. FRBNY Consumer Credit Panel



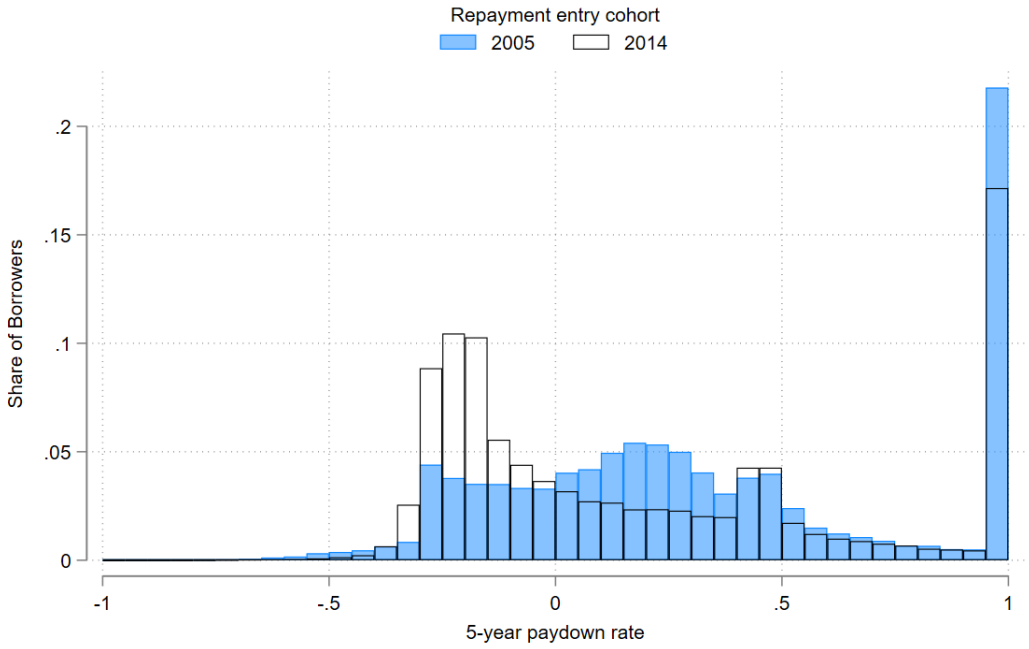
Notes: Panel A samples based on Department of Education administrative data, borrowers entering repayment 2005-2014 (5% random sample). Paydown rate is defined as (Balance at Repayment Entry– Current Balance) / Balance at Repayment Entry. Repayment entry dates based on the most recent date of maturity (grace exit). Years since repayment entry based on months elapsed since the month of most recent loan maturity. Panel B sample based on the Federal Reserve Bank of New York Consumer Credit Panel/Equifax data (CCP), borrowers with public or private student loans; grouped into cohorts based on most recent date of origination.

Figure 2: The Distribution of Student Loan Paydown Rates, 2005 and 2014 Cohorts

A. 3-year Paydown Rate

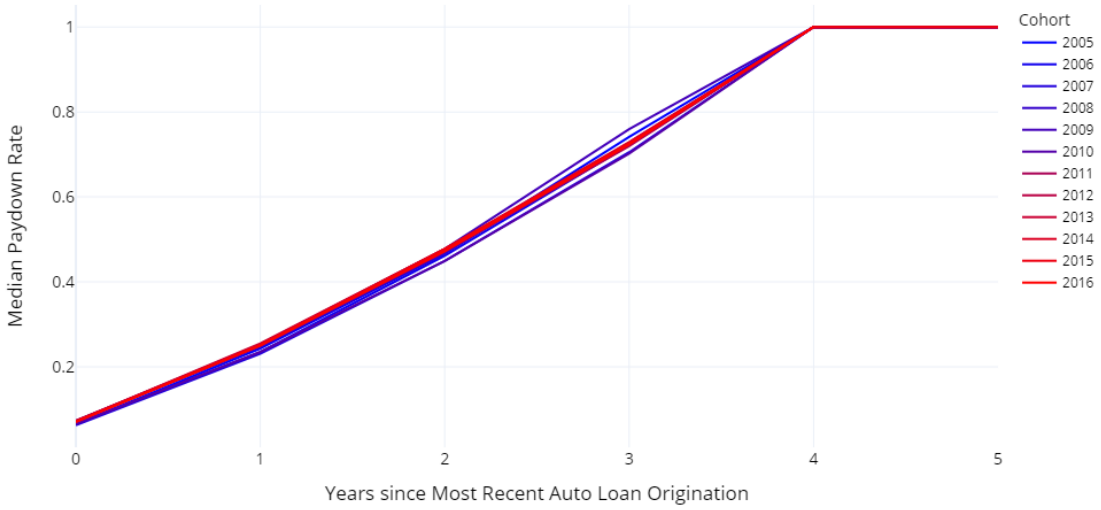


B. 5-year Paydown Rate



Notes: Department of Education administrative data, borrowers entering repayment in 2005 and 2014 (5% random sample). Panel A shows the distribution of paydown rate after 37 months since most recent date maturity. Panel B shows the distribution after 61 months in repayment.

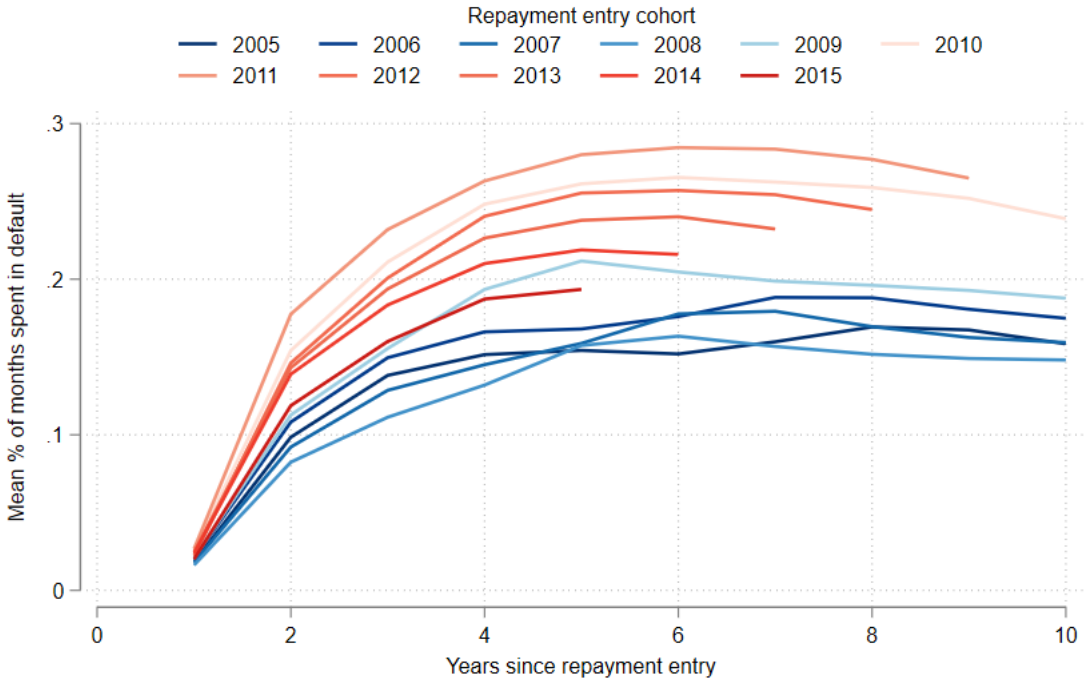
Figure 3: Median Auto Loan Paydown Rates by Cohort



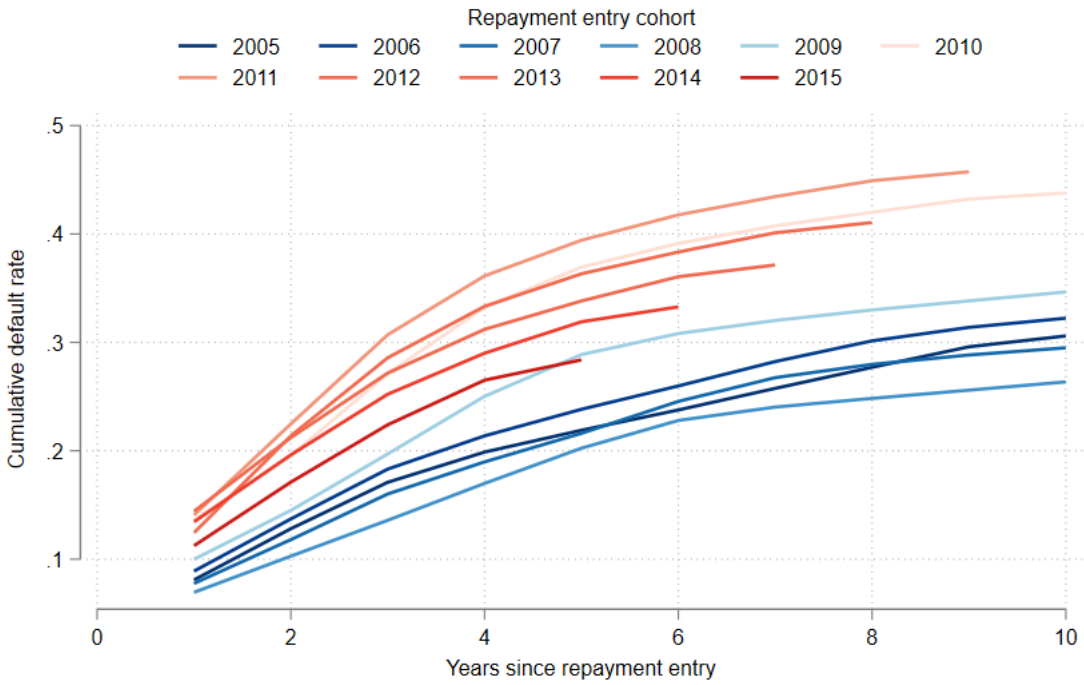
*Note*s: Federal Reserve Bank of New York Consumer Credit Panel/Equifax data (CCP), borrowers with auto loans; grouped into cohorts based on most recent date of origination. Sample includes borrowers with modal auto loan term within each cohort. Between 2005 and 2009 the modal term was 51 months, from then on, the modal term was 57 months. Loan term is inferred based on scheduled payment and credit amount.

Figure 4: Evolution of Student Loan Default by Cohort

A. Current Default Rate



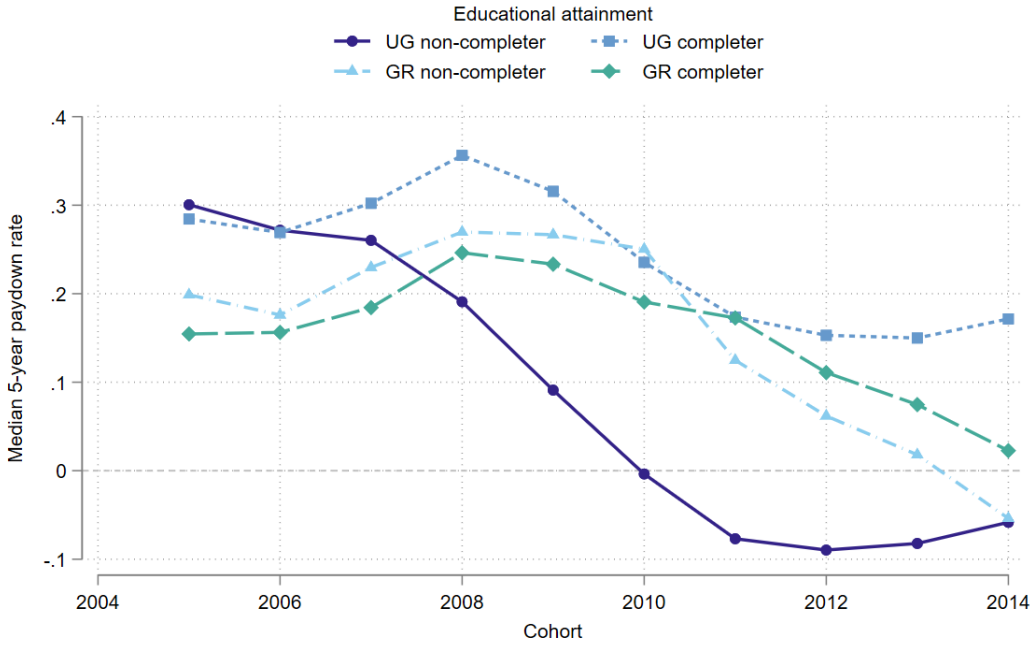
B. Cumulative Default Rate



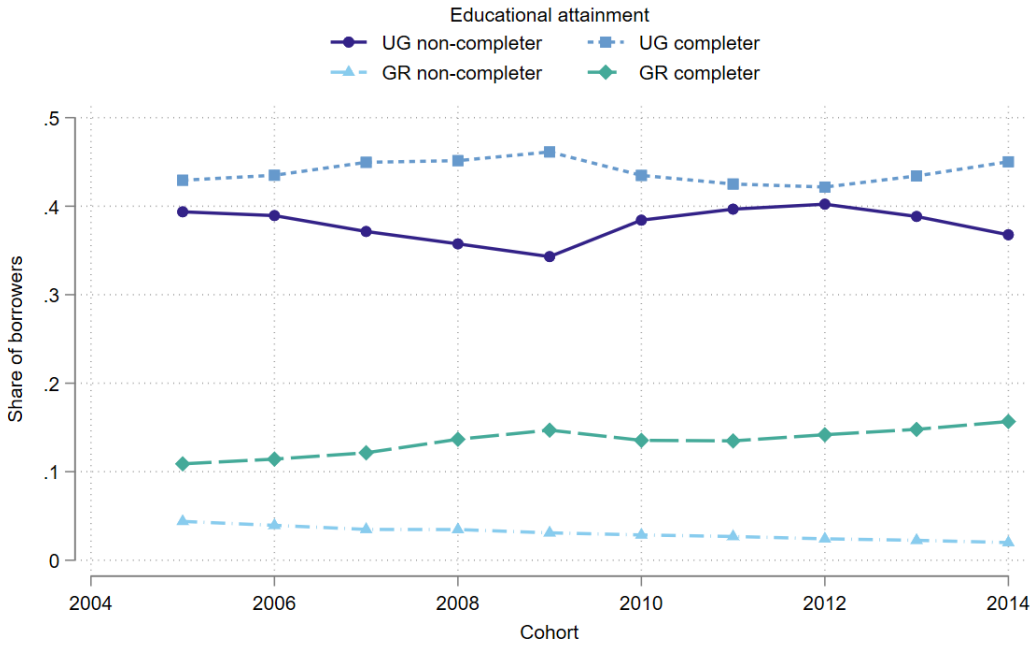
Notes: Department of Education administrative data, borrowers entering repayment 2005-2014 (5% random sample). Cumulative default rate does not reflect official cohort default rates because of differences in the definition of cohorts. Percent of months spent in default is defined as average of an indicator for default status for every 12-month interval after repayment entry. Cumulative default is defined as ever having been reported in default in 12-month interval after repayment entry.

Figure 5: Student Loan Paydown Rate by Educational Attainment

A. Median 5-year Paydown Rate



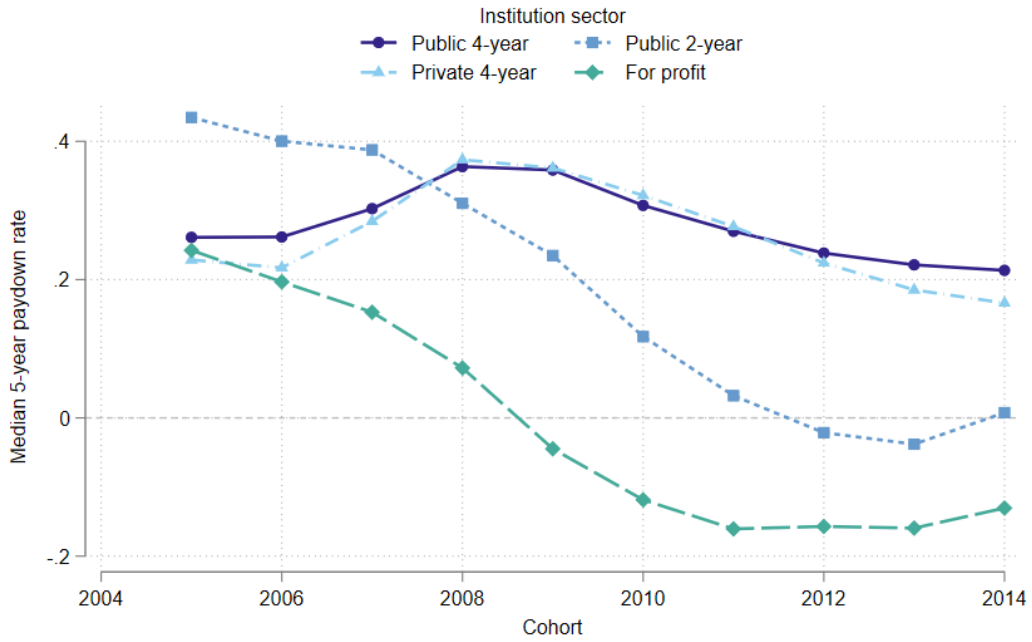
B. Educational attainment by cohort



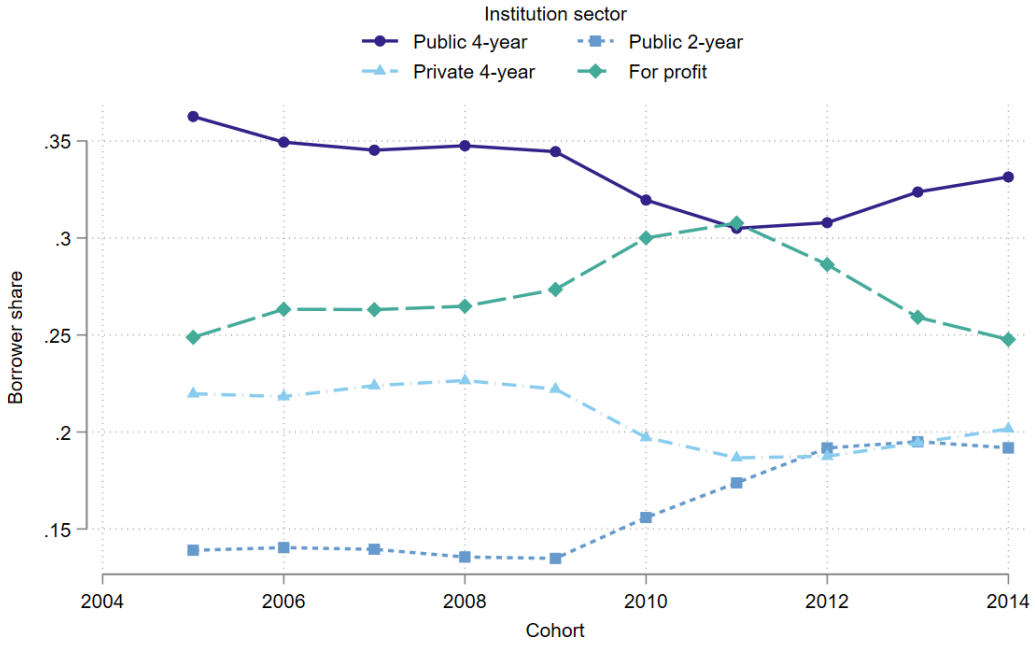
Notes: Department of Education administrative data, borrowers entering repayment 2005-2014 (5% random sample). Educational attainment based on loan level reporting on student grade level at the time of origination. Completion data comes from NSLDS enrollment reporting on student program completion for Title IV recipients.

Figure 6: Student Loan Paydown Rate by Sector of Last Higher Education Institution

A. Median 5-year Paydown Rate



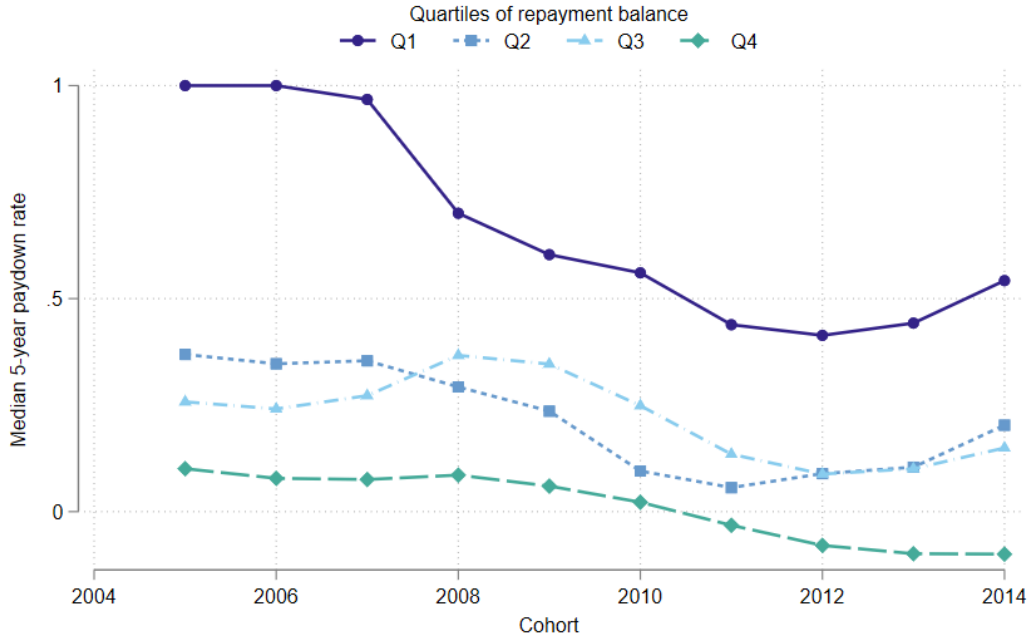
B. Sector of last institution attended by cohort



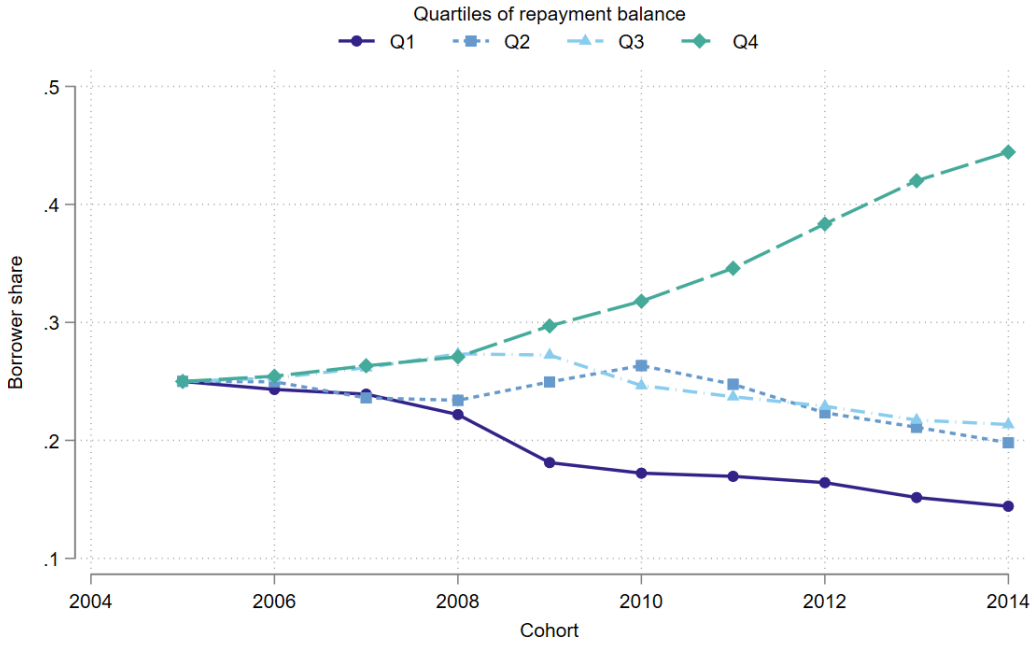
Notes: Department of Education administrative data, borrowers entering repayment 2005-2014 (5% random sample). Data on institution sector based on most recent College Scorecard classifications of institution control and predominant degree, combined with loan level records on college of attendance.

Figure 7: Student Loan Paydown Rate by Debt at Repayment Entry

A. Median 5-year Paydown Rate



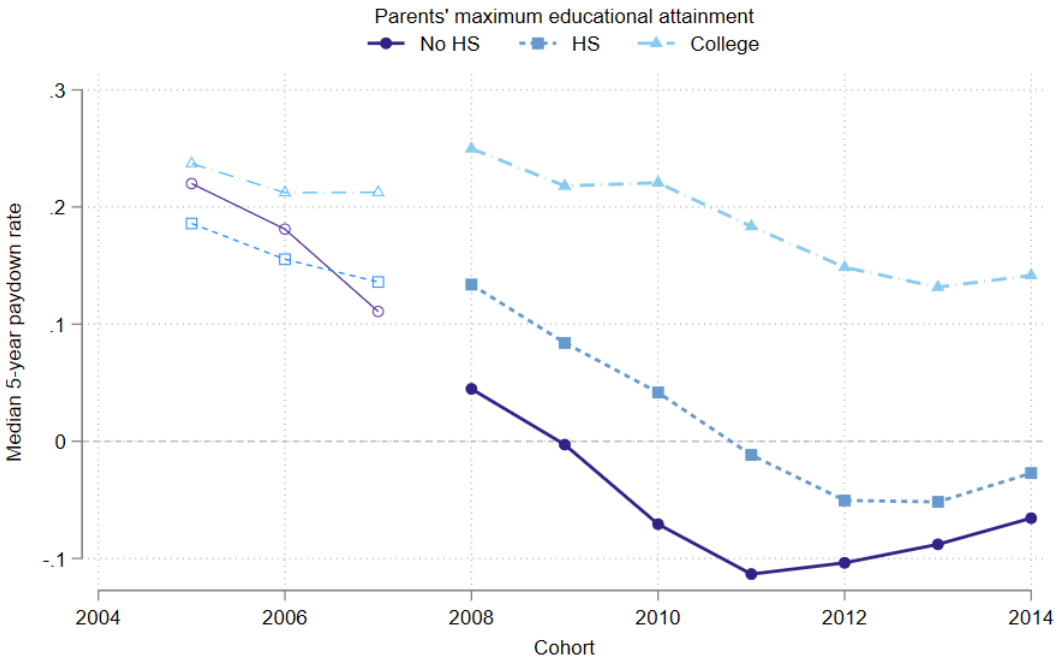
B. Outstanding debt by cohort



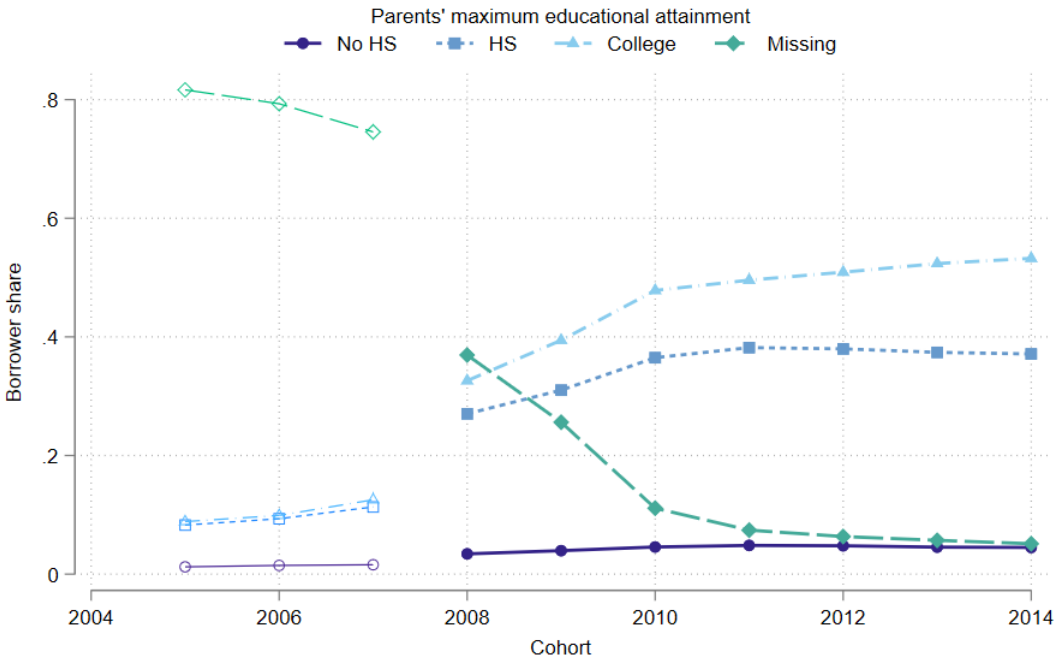
Notes: Department of Education administrative data, borrowers entering repayment 2005-2014 (5% random sample). Quartiles of outstanding debt at repayment entry are based on the 2005 distribution of outstanding debt at repayment entry (2021$) and fixed for subsequent cohorts. The range of debt for each quartile is: ¡ $6,087 (Q1), $6,088 - $13,519 (Q2), $13,520 - $27,207 (Q3), and ¿$27,208 (Q4).

Figure 8: Student Loan Paydown Rate by Parental Attainment

A. Median 5-year Paydown Rate



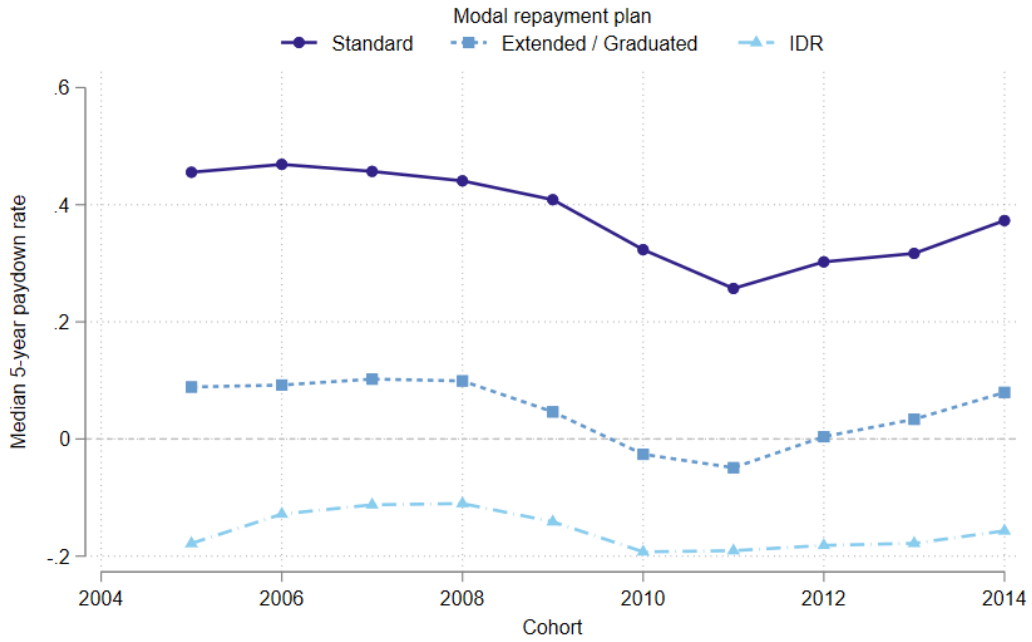
B. Parental attainment by cohort



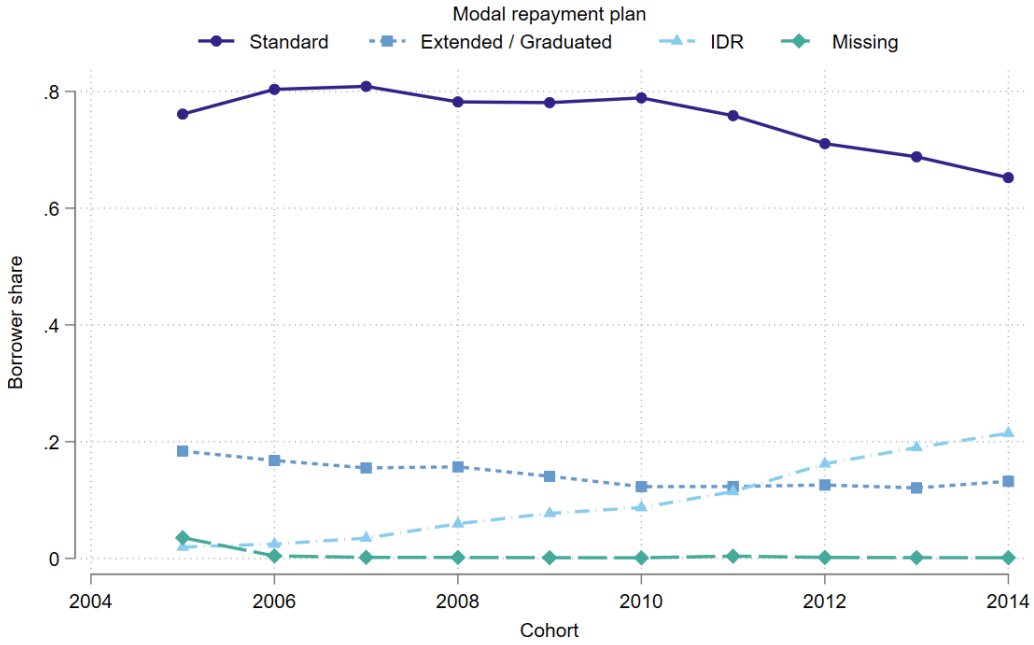
Notes: Department of Education administrative data, borrowers entering repayment 2005-2014 (5% random sample). Parental educational attainment based on borrowers' first FAFSA on record. Thin lines with hollow markers indicate cohorts for which the majority of borrowers have missing parental education.

Figure 9: Student Loan Paydown Rate by Modal Repayment Plan

A. Median 5-year Paydown Rate



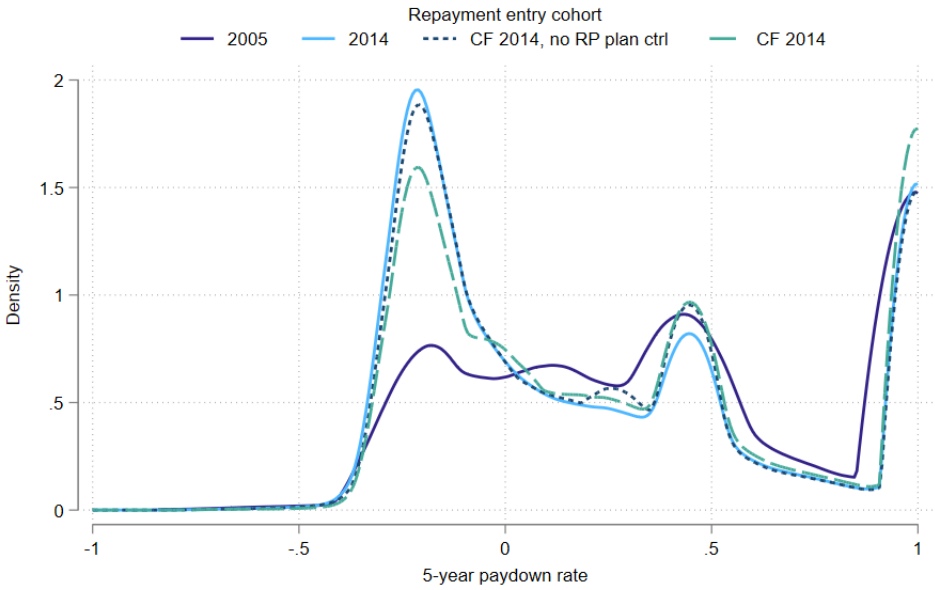
B. Modal repayment plan by cohort



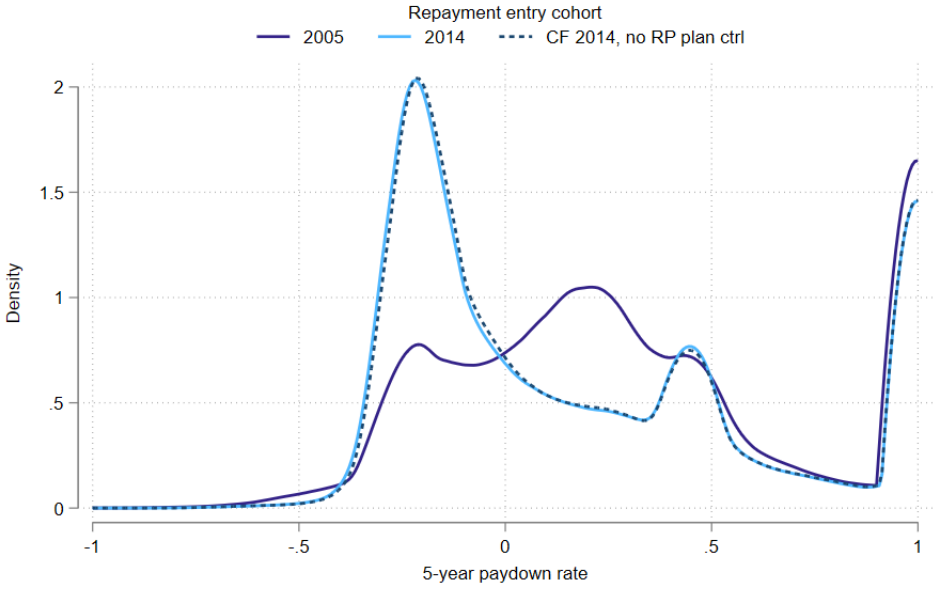
Notes: Department of Education administrative data, borrowers entering repayment 2005-2014 (5% random sample). DL and ED held FFEL borrowers only. A borrower's modal repayment plan is the repayment plan in which a borrower spends the largest number of months in the 5 years after repayment entry. Income-driven repayment plans include ICR, IBR, PAYE and REPAYE, including both with and without partial financial hardship variants of these plans.

Figure 10: Distribution of 5-year Paydown Rate for 2005, 2014, and Reweighted 2014 Cohorts

A. Borrowers with ED-held loans



B. All borrowers



Notes: Department of Education administrative data, borrowers entering repayment in 2005 and 2014 (5% random sample). Each figure shows the distribution of paydown rates after 61 months in repayment. Panel A includes borrowers with loans held by ED (N = 111,500), for which repayment plan is observed. Panel B shows the 2005 and 2014 5-year paydown rate distributions for all loans (including commercial FFEL, N =172,200). Sample sizes rounded to nearest 100. The short-dashed dark line ("CF 2014, no RP plan ctl") is the inverse propensity score reweighted 2014 counterfactual distribution where the propensity score is estimated via a logistic regression of a 2005 cohort indicator as a function of the following borrower characteristics: educational attainment, institution sector, a quadratic in age (recentered relative to 25 years of age), female indicator, marriage indicator, and a dependence indicator interacted with family AGI (recentered relative to $37,000, the median income in the sample). The long-dashed light line in Panel A ("CF 2014") is the inverse propensity score reweighted 2014 counterfactual distribution where the propensity score is estimated via a logistic regression of a 2005 cohort indicator as a function of the above characteristics plus indicators for the type of repayment plan in which a borrower spent the largest number of months in the 5 years after repayment entry: standard 10-year, extended or graduated, and IDR.

Table 1: Summary Statistics of Sample of Borrowers Entering Repayment

	All Borrowers	2005 - 2009 Cohorts	2010 - 2014 Cohorts
	(1)	(2)	(3)
Balance at repayment entry (real)	$29,653	$24,516	$32,471
	(39742)	(32101)	(43107)
Repayment outcomes			
5-year paydown rate	0.24	0.31	0.20
5-year default rate	0.27	0.24	0.28
% of months in default	0.15	0.12	0.16
Educational attainment			
UG non-completer	0.39	0.38	0.39
UG completer	0.44	0.46	0.44
GR non-completer	0.03	0.04	0.02
GR completer	0.14	0.13	0.15
Modal repayment plan			
Standard	0.72	0.79	0.71
Extended / Graduated	0.13	0.16	0.13
IDR	0.15	0.05	0.17
College sector			
Pub 4-year	0.34	0.36	0.33
Pub/NFP 2-year	0.17	0.14	0.19
NFP 4-year	0.21	0.23	0.20
For-Profit	0.28	0.27	0.29
First FAFSA demographics			
Age at repayment entry	29	28	29
	(9)	(8)	(9)
Female	0.57	0.57	0.57
Dependent student	0.54	0.50	0.55
Family income, dependents	$74,604	$76,164	$73,846
	(68008)	(64590)	(69596)
Family income, independents	$31,907	$33,731	$30,820
	(39044)	(38274)	(39456)
Parent educational attainment (excl. missing)			
No HS	0.05	0.06	0.05
HS	0.41	0.43	0.40
College	0.54	0.51	0.55
Observations	920,400	326,000	594,400

*Note*s: Department of Education administrative data, borrowers entering repayment 2005-2014 (5% random sample). Means and standard deviations of continuous variables in parentheses. All dollar amounts are adjusted for inflation using the CPI-U and shown in constant 2021$. Repayment plan information is not available for borrowers with commercial FFEL loans. Parental educational attainment shown for non-missing values only (col (1) N = 694,200; col (2) N = 140,900; col (3) N = 553,300). All sample sizes are rounded to the nearest 100.

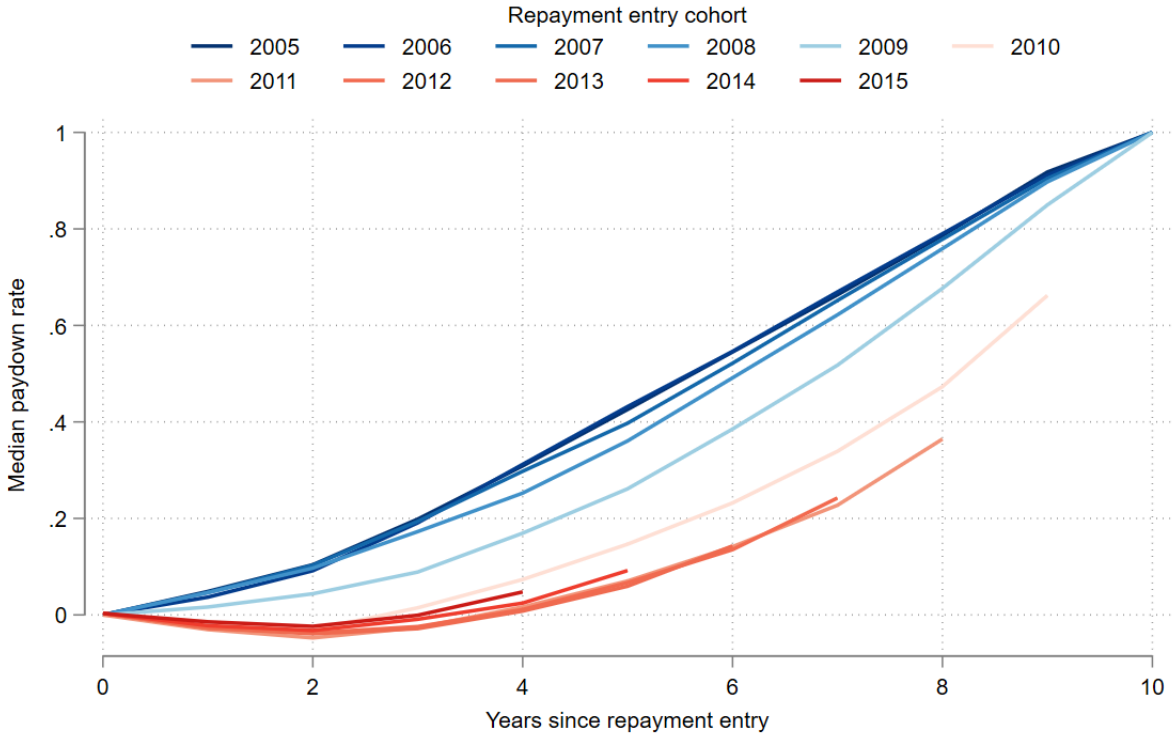
Table 2: Repayment Outcomes, 2005, 2014, and Reweighted 2014 Cohorts

	2005	2014	2014, Reweighted to 2005 Characteristics						
			Ed. Att.	Sector	Ed. Att. + Sector	FAFSA Chars.	Modal RP Plan	Preferred Spec.*	+ RP Bal Ventile
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A. DL borrowers only									
Mean 5-year RP Rate	0.41	0.23	0.23	0.25	0.24	0.24	0.31	0.30	0.38
% Negative 5-year RP Rate	0.23	0.44	0.45	0.42	0.43	0.43	0.36	0.36	0.31
% Fully Paid-off	0.26	0.17	0.17	0.18	0.17	0.16	0.21	0.21	0.27
B. All borrowers									
Mean 5-year RP Rate	0.33	0.21	0.20	0.21	0.21	0.21	--	0.21	0.30
% Negative 5-year RP Rate	0.25	0.47	0.47	0.46	0.47	0.48	--	0.47	0.39
% Fully Paid-off	0.20	0.16	0.16	0.16	0.16	0.16	--	0.16	0.22

*Note*s: Panel A sample is limited to borrowers with Direct Loans (col (1) N = 7600, col (2) – (9) N = 103,800). Panel B sample includes borrowers with Direct Loans and FFEL loans (col (1) N = 50,100, col (2) – (9) N = 122,100). Sample sizes rounded to the nearest 100. Columns (3) – (9) show inverse propensity score reweighted outcomes for 2014 repayment cohort where the propensity score is the predicted probability of being in the 2005 cohort from a logit regression of the probability of being in the 2005 cohort on the characteristics indicated in the column heading. Educational attainment categories are undergraduate noncompleter, undergraduate completer, graduate noncompleter, graduate completer. Sector categories are: 4-year public, 2-year public or nonprofit, 4-year nonprofit, for-profit. FAFSA characteristics are quadratic in (recentered) age at repayment entry, gender, married (first FAFSA), dependent student (first FAFSA), and family income by dependency status (first FAFSA). * Preferred specification varies by panel because repayment plan is not observed for commercial FFEL borrowers. Panel A preferred specification includes educational attainment, sector, FAFSA characteristics, and modal repayment plan. Panel B preferred specification includes educational attainment, sector, and FAFSA characteristics. Column (9) specification includes indicators for ventile of outstanding debt at repayment entry (across all repayment cohorts).

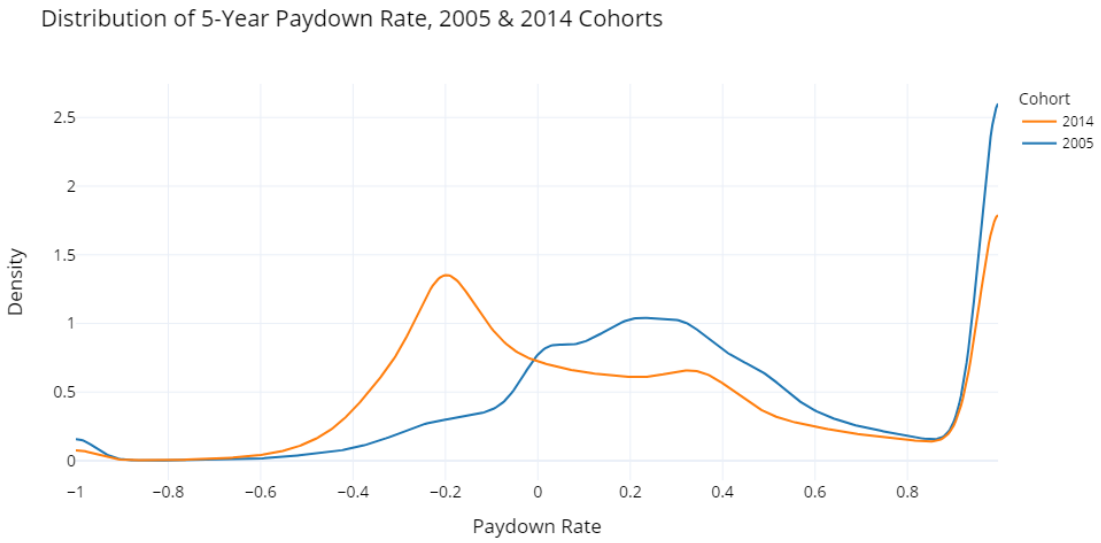
Appendix A: Additional Figures

Figure A.1: Median Student Loan Repayment Rate by Cohort, DL Loans Only



Notes: Department of Education administrative data, borrowers entering repayment 2005-2014, 5% random sample. Sample restricted to borrowers with Direct Loans.

Figure A.2: Distribution of 5-Year Student Loan Paydown Rate, FRBNY Consumer Credit Panel



Notes: Federal Reserve Bank of New York Consumer Credit Panel/Equifax data (CCP), borrowers with public or private student loans; grouped into cohorts based on most recent date of origination.

Table A.1: Characteristics of Borrowers Entering Repayment by Loan Program

	2005 - 2009 Cohorts		2010 - 2014 Cohorts	
	FFEL Borrowers	*DL Borrowers*	*FFEL Borrowers*	*DL Borrowers*
	(1)	(2)	(3)	(4)
Balance at repayment entry (real)	$25,912	$17,707	$51,446	$24,961
	(33607)	(22173)	(53667)	(35423)
Repayment outcomes				
5-year paydown rate	0.30	0.36	0.15	0.22
5-year default rate	0.24	0.21	0.24	0.30
% of months in default	0.12	0.12	0.14	0.17
Educational attainment				
UG non-completer	0.37	0.39	0.27	0.44
UG completer	0.45	0.50	0.45	0.43
GR non-completer	0.04	0.03	0.04	0.02
GR completer	0.14	0.09	0.24	0.11
Modal repayment plan				
Standard	--	0.79	--	0.71
Extended / Graduated	--	0.16	--	0.13
IDR	--	0.05	--	0.17
College sector				
Pub 4-year	0.32	0.54	0.37	0.31
Pub/NFP 2-year	0.15	0.10	0.13	0.21
NFP 4-year	0.25	0.13	0.27	0.17
For-Profit	0.28	0.23	0.22	0.31
First FAFSA demographics				
Age at repayment entry	28	27	30	29
	(8)	(8)	(8)	(9)
Female	0.57	0.55	0.61	0.56
Dependent student	0.49	0.58	0.57	0.55
Family income, dependents	$75,461	$79,026	$75,876	$73,016
	(64176)	(66171)	(65087)	(71341)
Family income, independents	$34,415	$29,687	$33,629	$29,766
	(38613)	(35932)	(37580)	(40086)
Parent educational attainment				
No HS	0.06	0.05	0.04	0.05
HS	0.44	0.39	0.39	0.41
College	0.50	0.56	0.57	0.54
Observations	270,600	55,500	168,500	425,800

Notes: Department of Education administrative data, borrowers entering repayment 2005-2014. Means and standard deviations of continuous variables in parentheses. All dollar amounts are adjusted for inflation using the CPI-U and shown in constant 2021$. Repayment plan information is not available for borrowers with commercial FFEL loans. Parental educational attainment shown for non-missing values only (col (1) N = 111,0700; col (2) N = 29,900; col (3) N = 154,900; col (4) N = 398,400). All sample sizes rounded to nearest 100.