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Data Point:

Final Student Loan Payments and Broader Household Borrowing

The Bureau of Consumer Financial Protection's Office of Research



This is another in an occasional series of publications from the Bureau of Consumer Financial Protection's Office of Research. These publications are intended to further the Bureau's objective of providing an evidence-based perspective on consumer financial markets, consumer behavior, and regulations to inform the public discourse. *See* 12 U.S.C. §5493(d)*

* This report prepared by Thomas Conkling and Nicholas Tremper.

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1. Introduction

Student loans make up an increasing share of consumer debt in the U.S., particularly for younger borrowers. Research has shown that borrowers vary greatly in their ability to pay off their loans, and in how quickly they can do so.¹ This Data Point provides a closer look at borrowers' use of credit as they approach and make their final student loan payments, and in the months that follow.

Studying how borrowers transition out of their student debt provides insights into how households manage their finances over time, what impacts student borrowing may have on the broader economy, and the possible effects of policies that change student loan terms, payments, or balances. The findings and patterns described in this Data Point highlight the interlinked nature of borrowers' balance sheets, as repayment of one type of debt directly affects payments and borrowing on other types of debt. Given these patterns, policies and products that change repayment terms or balances for one type of debt are likely to have spillover effects on others, either enhancing the intended effects (e.g. payment relief, increased credit access) or leading to compensating shifts (e.g. reallocated payments or borrowing).

The typical student loan has a term of ten years, with equal monthly scheduled payments. However, borrowers can prepay at any time either by taking out a new loan to refinance the old or by using savings, gifts, employer benefits, and the like. This Data Point looks at repayment patterns and how borrowers who have repaid use credit thereafter. The analyses focus on borrowers when they first pay off individual student loans, recognizing that many borrowers have multiple student loans.

¹ See Christa Gibbs, "CFPB Data Point: Student Loan Repayment" (August 2017), available at https://www.consumerfinance.gov/documents/5148/201708_cfpb_data-point_student-loan-repayment.pdf.

Key findings include:

- Most borrowers paying off a student loan do so before the final payment is due, often with a single large final payment. The median final payment made on a student loan is 55 times larger than the scheduled payment (implying a payoff at least 55 months ahead of schedule). Overall, 94 percent of final payments exceed the scheduled payment and only 6 percent of loans are paid off with the final few payments equal to the scheduled payments. Even among loans within five years of their scheduled payoff date, for which refinancing is uncommon, the median final payment is more than seven times larger than the scheduled payments made immediately prior.
- Borrowers paying off a student loan early are 31 percent more likely to take out their first mortgage loan in the year following the payoff than during the year preceding the payoff. In the same month as the payoff, these borrowers also reduce their credit card balances and make large payments on their other student loans. While this is evidence of a link between the timing of student loan payoffs and home purchases, the simultaneous reduction in credit card and other student loan balances suggests that increased wealth or income could be influencing when borrowers pay off student loans, reduce credit card balances, and purchase homes.
- The smaller share of borrowers who pay off a loan according to the scheduled payments pay down, rather than take on, other debt in the months following payoff. Paying off a loan reduces borrowers' monthly payment obligations, and those with additional student loans put 24 percent of these savings toward paying down their other student loans faster. Borrowers use 16 percent of the drop in their required payments to reduce credit card balances. Unlike for borrowers paying off a student loan early, those paying off on schedule are not more likely to take out a mortgage for the first time.

Taken together, the results suggest that most borrowers approaching their final student loan payments prefer to, and are able to, pay off the loans in full with a single large payment. The exact timing of this payment coincides with a broader reduction in existing debts, and is followed by increased home purchases. However, for those borrowers who are unable to, or choose not to, pay off their loans early, the reduction of other debts that follows their final payment suggests that their required monthly student loan payments constrained their ability to pay down other debts.

Understanding why borrowers predominantly use large lump sum payments to pay off student loans, as opposed to gradual increases in monthly payments, could help better predict how the student loan market evolves as a whole, and warrants additional research. The results suggest that the timing of many student loan payoffs may be determined by life events such as household formation or jumps in income or wealth (which cannot be observed in this study), though transaction costs, rules of thumb, or inertia may also play a role.

2. Data

The Bureau of Consumer Financial Protection’s Consumer Credit Panel (CCP) is a panel of de-identified credit records for a 1-in-48 nationally representative sample of consumers with a credit record from one of the three nationwide credit reporting companies. These credit records provide the outstanding balances and payment histories of all tradelines (loans and revolving credit accounts) for each consumer in the sample. For each student loan, the CCP contains the origination date, term length, deferment status, delinquency status, payment amount, and balance throughout the life of the loan. These data also include the year of birth and commercially available credit score for each consumer in the panel, updated each quarter.

To explore the timing and effects of student loan payoffs, this Data Point uses monthly data from January 2013 through October 2017 for a subsample of borrowers who paid off at least one student loan during this period.² In addition to student loans, this study examines borrowers’ broader use of credit through their balances on credit cards and whether they have a first-lien mortgage loans. The scheduled (minimum) required monthly payments are available for most loan types, and the actual payments made are available for student loans.³ When looking at borrowers’ loans over time, “months since payoff” is defined as the number of months that have passed since the borrower first paid off a student loan during the January 2013 to October 2017

² January 2013 is the first month for which monthly data are available in the CCP.

³ In the limited number of cases where actual payments are not available for student loans, the changes in balances from the month prior are used as an approximation. In addition, the within-month top 0.1 percent of payments and balances are winsorized for each loan type.

period.⁴ Months since payoff is a positive number in the months after payoff, zero in the month the final payment was made, and a negative number in the months before payoff.

In total, the subsample includes approximately 270,000 student loan borrowers who paid off a loan, representing over a quarter of all consumers with any open student loans in repayment in the full CCP sample during this period.

Finally, average neighborhood incomes are compared between groups of borrowers in the data based on publicly available median household incomes by census tract, from the Census Bureau's American Community Survey.

⁴ Borrowers who have paid off another student loan prior to January 2013 are included in the subsample.

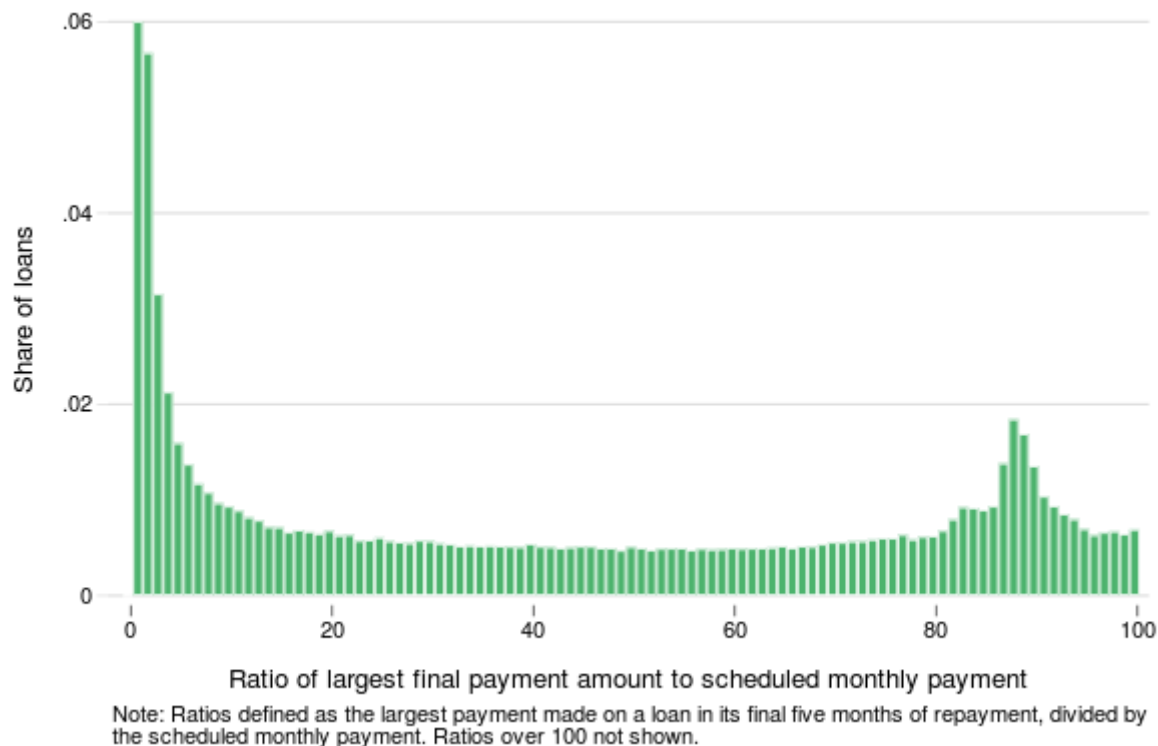
3. Final student loan payments

Among borrowers who successfully pay off a student loan, most pay off their final balance early with a small number of large payments. Specifically, 94 percent of loans are paid off with at least one large payment ahead of schedule, and only the remaining 6 percent of loans are paid off according to the scheduled monthly payments.

Looking at the largest of these ahead-of-schedule payments made in the final few months of repayment, Figure 1 shows the ratio of how many times larger this payment was relative to a borrower's scheduled monthly payment.⁵ A ratio of 1 indicates a borrower's final payments were made exactly according to her scheduled payments, while a ratio of 20 indicates that she paid off approximately 20 months early. The median ratio is 55, though some of the earliest payoffs are due to refinancing or loan consolidation.

⁵ These ratios use a borrower's largest actual payment in their final five months of repayment relative to her largest scheduled payment, to capture attempted final payments that leave a small leftover balance which is paid off (or forgiven) in the months that follow. Note that loans with scheduled monthly payments of \$0 (due to deferments, forbearances, or some income-driven repayment plans) when they are paid off are excluded from these figures and statistics, as the number of payments remaining cannot be calculated. These cases represent roughly 15 percent of payoffs. In addition, the approximations given for the number of months loans are paid off early are underestimates as they ignore interest accrual.

FIGURE 1: RATIO OF FINAL PAYMENTS TO SCHEDULED MONTHLY PAYMENTS

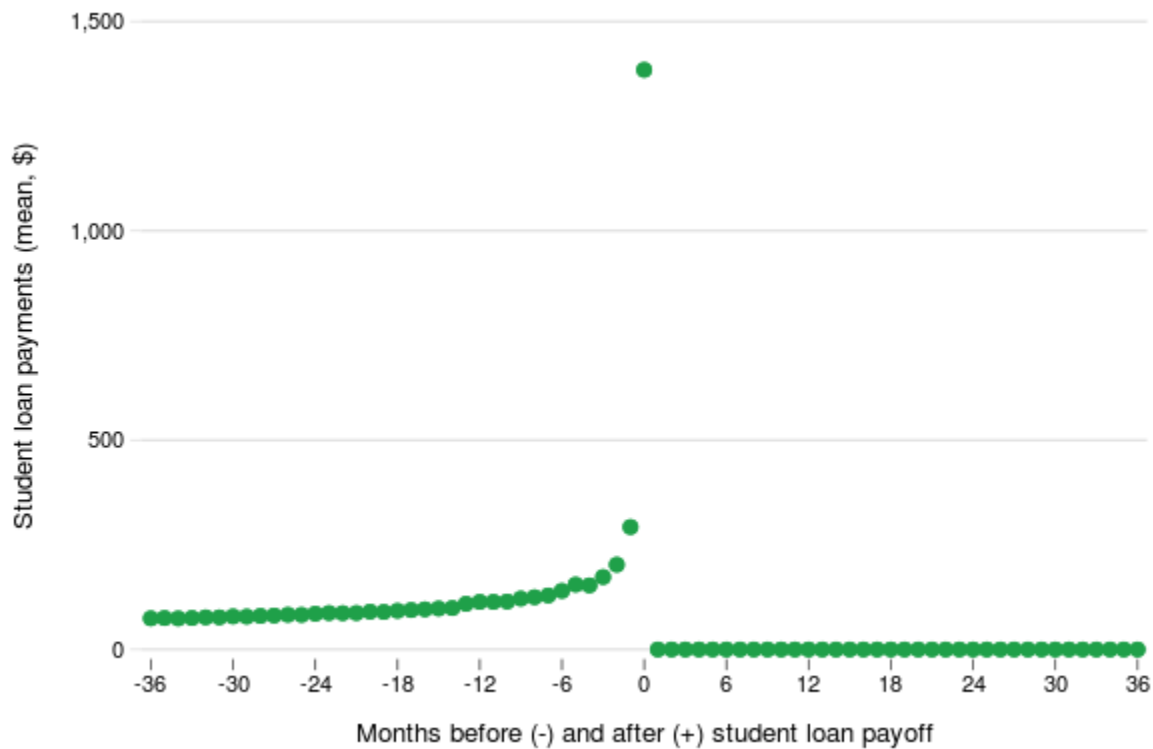


The next two figures focus on loans paid off within approximately five years of their scheduled payoff date—those with a ratio of 60 or below in the previous figure—for which repayment through student loan refinances and consolidations is negligible (see Appendix A).

For these loans, Figure 2 shows average actual payments rising in the months before payoff, culminating with a single large payment roughly ten times the size of the payments a few months earlier.

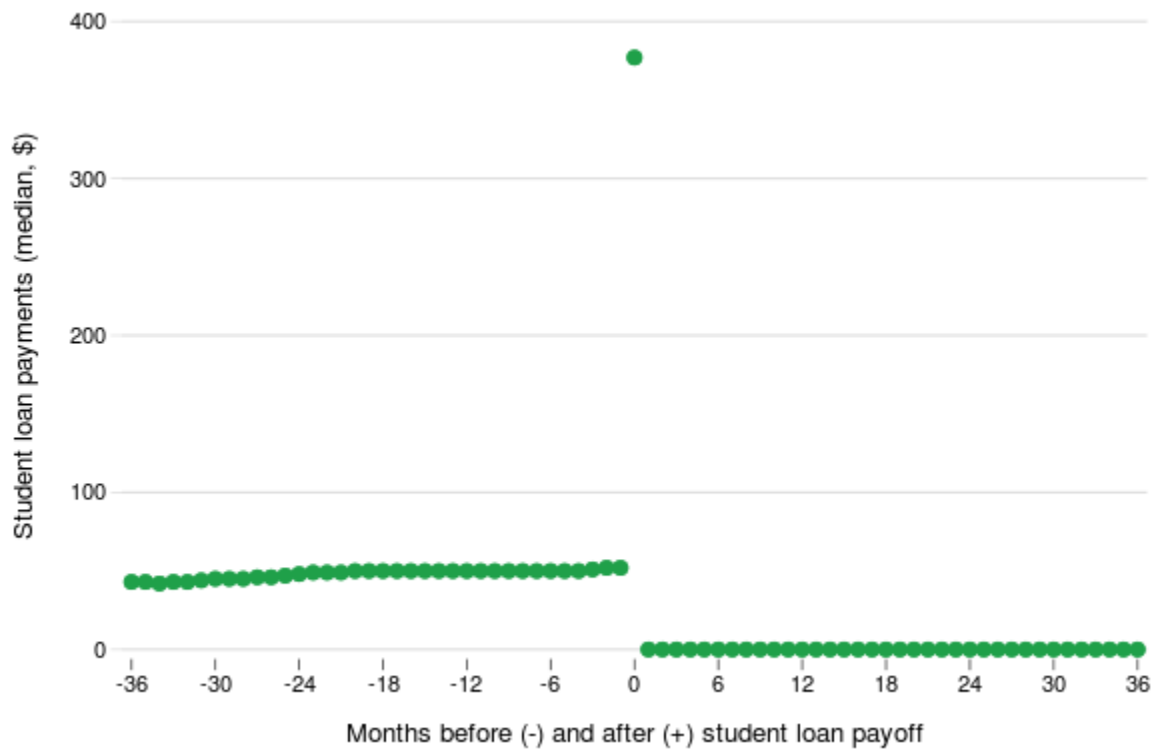
Figure 3 features the median actual payments for this same set of loans, again showing that the typical loan payoff occurs in a single lump sum payment, following many months of consistent smaller payments. Compared to the average (mean) payments, the median payments show almost no rise prior to the final payment. For these loans, the median actual payment in the final month is over seven times the payment just one month earlier.

FIGURE 2: AVERAGE PAYMENTS ON STUDENT LOANS IN MONTHS AROUND PAYOFF (WITHIN FIVE YEARS OF SCHEDULED PAYOFF)



There are many possible reasons for borrowers to abruptly pay off their loans early. If they have received a jump in available wealth or income, or accumulated enough savings, they may be newly able to pay off the loan. Even if their circumstances are unchanged, they may wish to save on borrowing costs, enjoy the satisfaction of paying the debt off completely, prepare their finances for obtaining new credit, or just avoid the inconvenience and other costs of making monthly payments. Understanding exactly *why* borrowers pay off loans when they do is a complex question which this analysis aims to inform by studying how borrowers use credit in the months leading up to and following a student loan payoff.

FIGURE 3: MEDIAN PAYMENTS ON STUDENT LOANS IN MONTHS AROUND PAYOFF (WITHIN FIVE YEARS OF SCHEDULED PAYOFF)



To do so, this analysis first looks at the broad group of borrowers who pay off a student loan no more than five years before their scheduled payoff date, and then investigates the narrower subgroup that pays off according to their monthly scheduled payments. Studying borrowers paying on schedule helps rule out some factors like unexpected jumps in cash or other life events, allowing for more causal conclusions. The broader group can provide only correlational, but more representative, findings.

3.1 Final payments up to five years early

When a borrower pays off a student loan, her required student loan payments drop, freeing up room in her monthly budget to pay down other debts, take on new debts like mortgages, or increase consumption or savings. However, when borrowers pay off a student loan early, as most do, it could be a result of a change in wealth or income for that borrower, factors which may themselves directly affect the payoff or take-up of other debts. To study these possibilities,

this analysis examines how borrowers' other debt holdings change relative to the month they first pay off a student loan.

Figure 2 above shows the average payments made on individual loans preceding their final payoff. In many cases borrowers hold multiple student loans, and Figure 4 shows the average payments made by borrowers on (a) all of their student loans, and (b) their remaining student loans that are *not* paid off at the same time. Compared to Figure 2, average payments on all student loans follow a very similar pattern, though with a much higher spike at the month of payoff, and continued payments on remaining student loans in the months that follow.

FIGURE 4: AVERAGE PAYMENTS ON BORROWERS' STUDENT LOANS AROUND FIRST STUDENT LOAN PAYOFF (WITHIN 5 YEARS OF SCHEDULED PAYOFF)

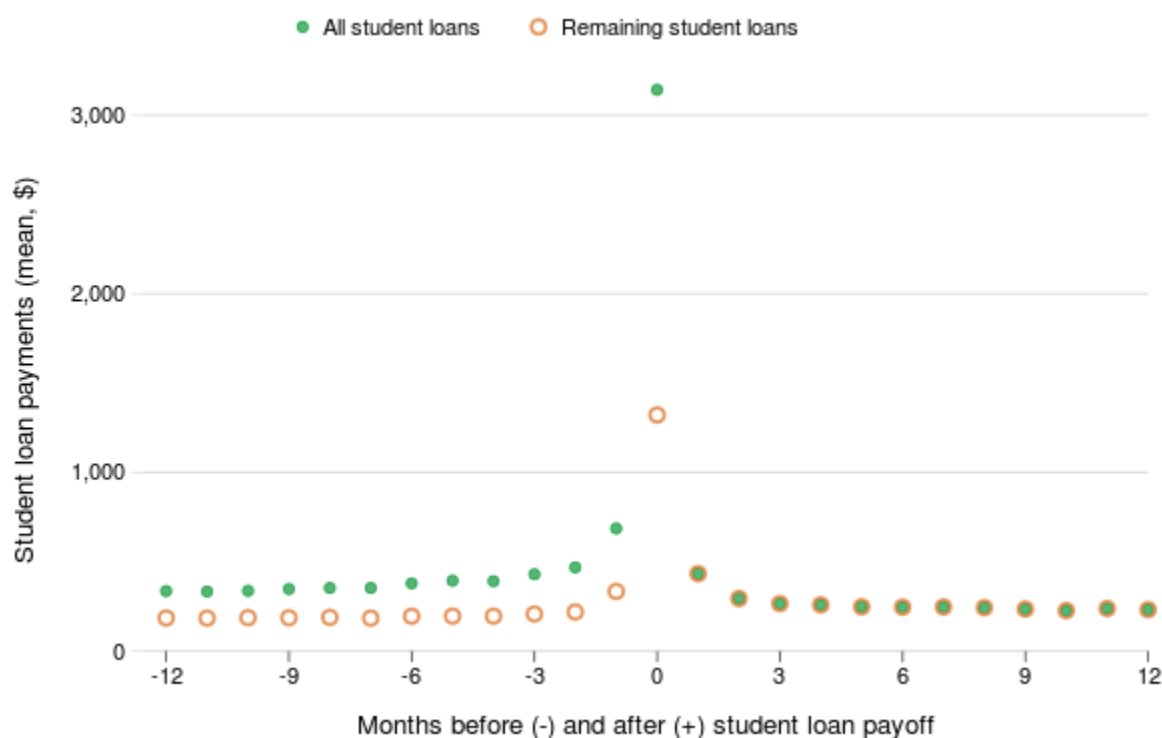
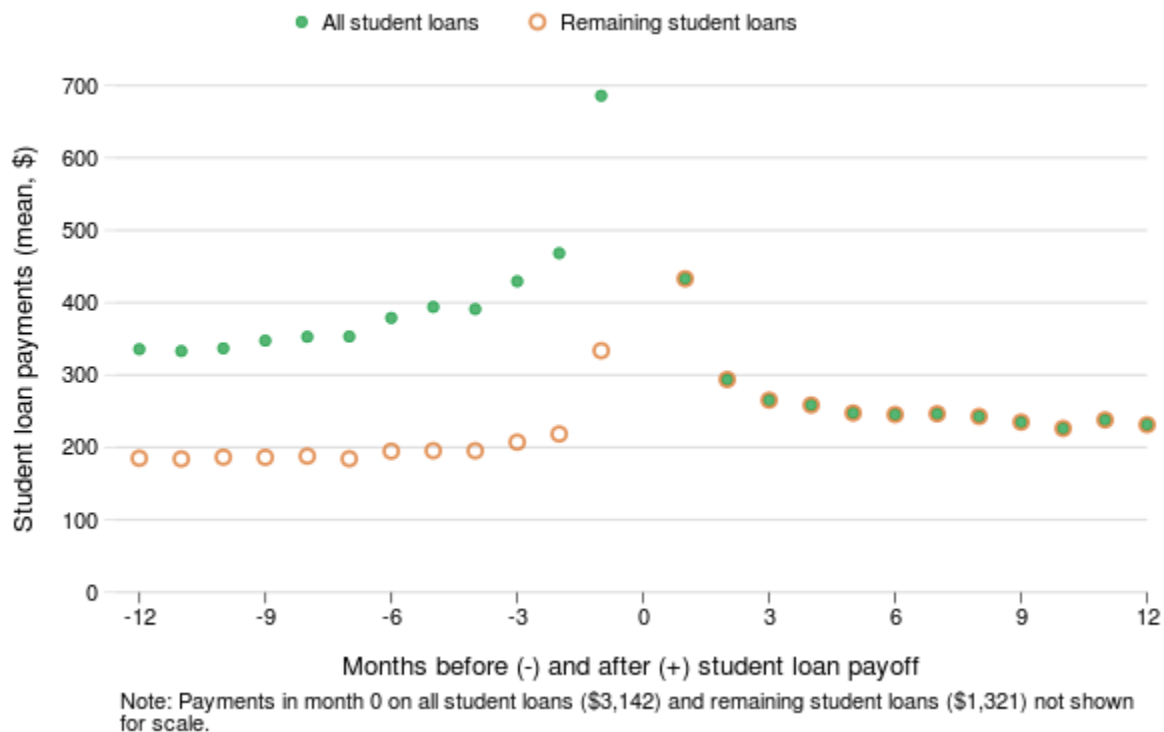


Figure 4 also shows that borrowers make large payments on their remaining student loans simultaneously (or in adjacent months) with their large final payments on the paid off loans. In addition, average payments on these remaining loans are 25 percent higher six months after payoff than they were six months before payoff (\$243 versus \$195). Figure 5 shows this more clearly by excluding the large payments in month zero for scale.

FIGURE 5: AVERAGE PAYMENTS ON BORROWERS' STUDENT LOANS AROUND FIRST STUDENT LOAN PAYOFF (WITHIN 5 YEARS OF SCHEDULED PAYOFF), EXCLUDING MONTH ZERO

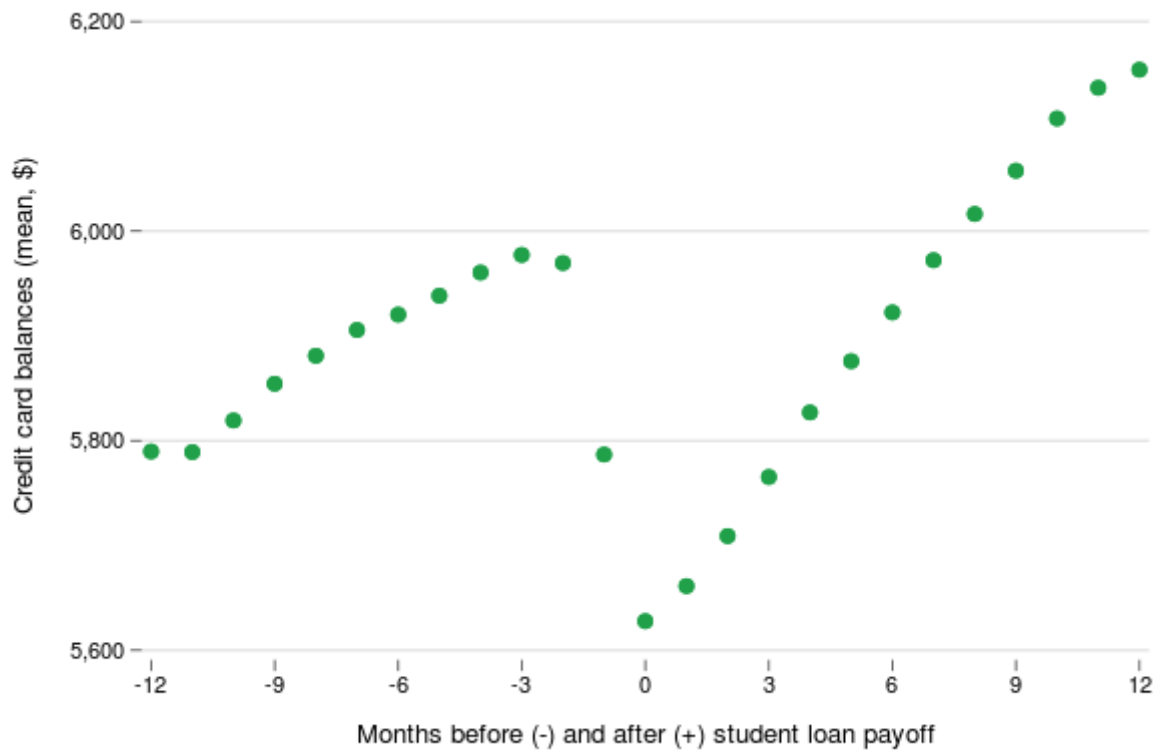


These results suggest that when borrowers first pay off a student loan, many also have the ability (and desire) to make increased payments on their remaining student loans as well. The next subsection looks at whether similar patterns hold for borrowers' use of other credit products, to further explore the timing and effects of these large student loan payments.

3.1.1 Changes in other credit use

If paying off a student loan early frees up income or assets to pay down other debts, a decline in higher interest debt, like credit cards, might be expected following the student loan payoff. On the other hand, if borrowers have new increased resources (or motivation) to pay off debts, the debt held on credit cards might decline prior to or simultaneously with the student loan payoff. Figure 6 shows the evolution of average credit card balances in the 12 months prior to and following borrowers' first student loan payoff. These credit card balances include both revolving debt that borrowers carry from month to month and any transaction charges during the current billing cycle.

FIGURE 6: AVERAGE CREDIT CARD BALANCES AROUND FIRST STUDENT LOAN PAYOFF FOR CONSUMERS PAYING OFF STUDENT LOAN WITHIN 5 YEARS OF SCHEDULED PAYOFF

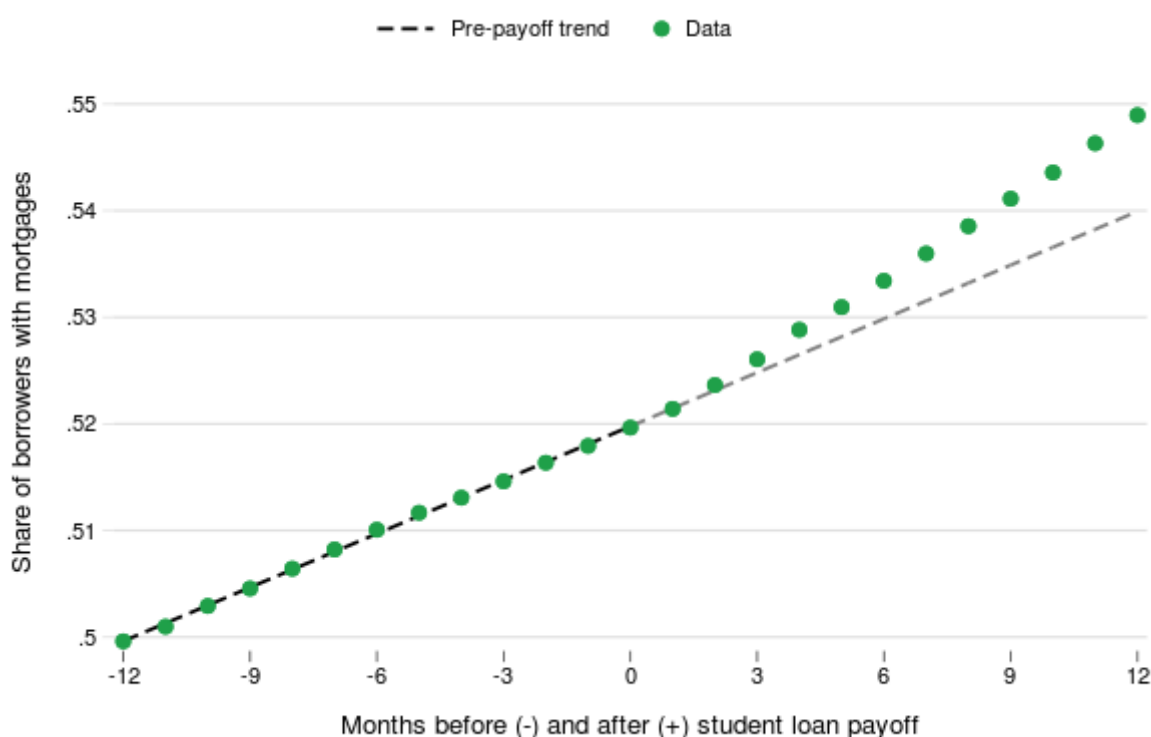


Average credit card balances fall six percent (\$5,977 to \$5,628) in the months preceding and month of borrowers' student loan payoffs, suggesting that the timing of when a borrower pays off their student loan may be influenced by either increased resources to pay down debts broadly, or a new desire to do so out of previously held savings.⁶ Average credit card debt does appear to return to its prior trend within a year of the student loan payoff.

⁶ Note that the fall in credit card debts is not driven by balance transfers or account closures, as the number of open (and total) credit card accounts is smooth over the payoff period (not shown). Additionally, while a temporary fall in purchases made on credit cards by borrowers who do not revolve (pay interest on) their balances could also lead to such a drop, balances should immediately revert to their previous level after payoff under this explanation, unlike the gradual reversion observed.

Beyond paying down existing debts, paying off student loans may coincide with taking on new debts, particularly mortgages for the purchase of homes. To test for effects on mortgages, Figure 7 examines the share of borrowers with any mortgage loan.

FIGURE 7: SHARE OF BORROWERS WITH RECORD OF ANY MORTGAGE LOAN AROUND FIRST STUDENT LOAN PAYOFF (WITHIN 5 YEARS OF SCHEDULED PAYOFF)



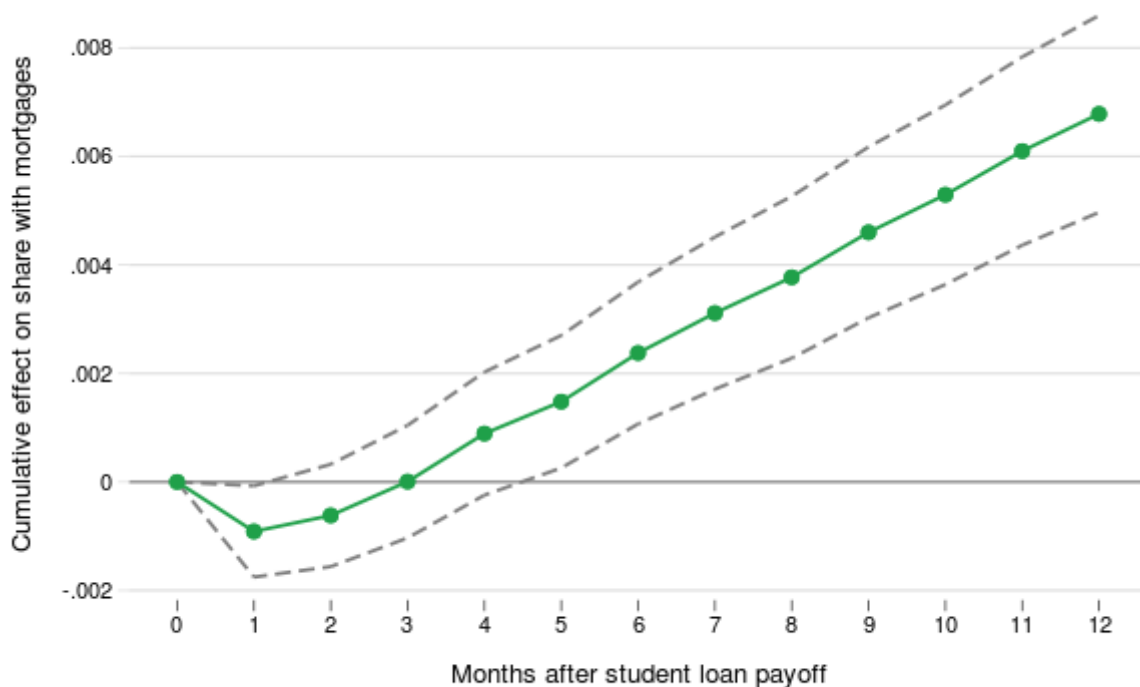
Looking at the share of borrowers with any mortgage loan on their credit record ensures that the results are picking up borrowers who are taking out a mortgage—and likely buying a home—for the first time, rather than those who may be moving or refinancing.⁷ Even absent any student loan repayment, the share of borrowers with mortgages increases over time as borrowers age,

⁷ Specifically, this is the share of borrowers with any record of open or closed mortgage loans. Note that since records of older closed loans are eventually removed due to credit reporting rules, this approach will also include borrowers taking out a new mortgage after not holding any open mortgage for over ten years, though this is expected to occur for a negligible number of borrowers in the sample.

reflected in the continuous upward trend in Figure 7. To help detect possible shifts associated with repayment, the share of borrowers with mortgages in the data are plotted relative to a linear trend based on the months prior to student loan payoff. The increased share of borrowers with mortgages relative to the trend after payoff suggests home purchases may have increased after the student loan payoff. To more precisely assess whether there is a change in the slope of this trend, Figure 8 depicts the change in the likelihood that a borrower has a mortgage in the months following student loan payoff, relative to the trend before the payoff and accounting for seasonal and national trends.⁸ The dashed lines reflect 95 percent confidence intervals.

⁸ These estimates (and the others in this report) come from event study regression models that include a linear pre-trend, individual fixed effects, and month fixed effects, the last of which control for national and seasonal trends. The reported estimates reflect the coefficients on indicator variables for the number of months a borrower is post-payoff. Standard errors are clustered at the borrower level. For additional details, see Appendix B.

FIGURE 8: CUMULATIVE CHANGE IN LIKELIHOOD BORROWER HAS MORTGAGE FOLLOWING FIRST STUDENT LOAN PAYOFF (WITHIN 5 YEARS OF SCHEDULED PAYOFF), RELATIVE TO LINEAR PRE-TREND



Note: Effects estimated from event-study regression model (see Appendix B for details). Dashed lines represent 95 percent confidence intervals.

The results suggest that these borrowers are 0.68 percentage points more likely to have a first mortgage 12 months after paying off a student loan, relative to the trend for all borrowers in the sample.⁹ For context, the estimated linear trend for all borrowers in the sample indicates a 2.20 percentage point increase in having a first mortgage over any 12 month period. Thus, student loan payoff is associated with a 31 percent increase in the likelihood of taking out a first mortgage in the following year.

Taken together, the evidence suggests that borrowers paying off their student loans early simultaneously pay down other existing debts, and take out new debts associated with home

⁹ The 0.68 percentage point higher likelihood is reflected in the 0.0068 cumulative effect 12 months after payoff shown in Figure 8, since 100 percent of borrowers having mortgages would translate to a share of 1.

purchases (mortgages) in the months that follow. However, the direction and source of the causality is unclear. On the one hand, because credit card debt falls prior to the student loan payoff, jumps in wealth or income or life events like household formation (which are not observable in the data) are consistent with all of the changes.

On the other hand, borrowers could be using their savings to pay down debts in anticipation of purchasing a home. They could pay off debts early because of their concerns over underwriting requirements, such as limits on monthly payment-to-income ratios, or their aversion to holding multiple large debts. However, a few elements of the findings suggest this may not be the primary cause of the results. First, although credit card balances fall sharply at the time of student loan payoff, they quickly return to prior levels while the cumulative effects on mortgage take-up steadily increase, suggesting the balance reduction is not sharply tied to the timing of a mortgage origination. Further, if borrowers had substantial prior savings, either more gradual increases in student loan payments above the scheduled payment or the allocation of these funds towards a larger mortgage downpayment might be expected instead.

3.2 Final payments made on schedule

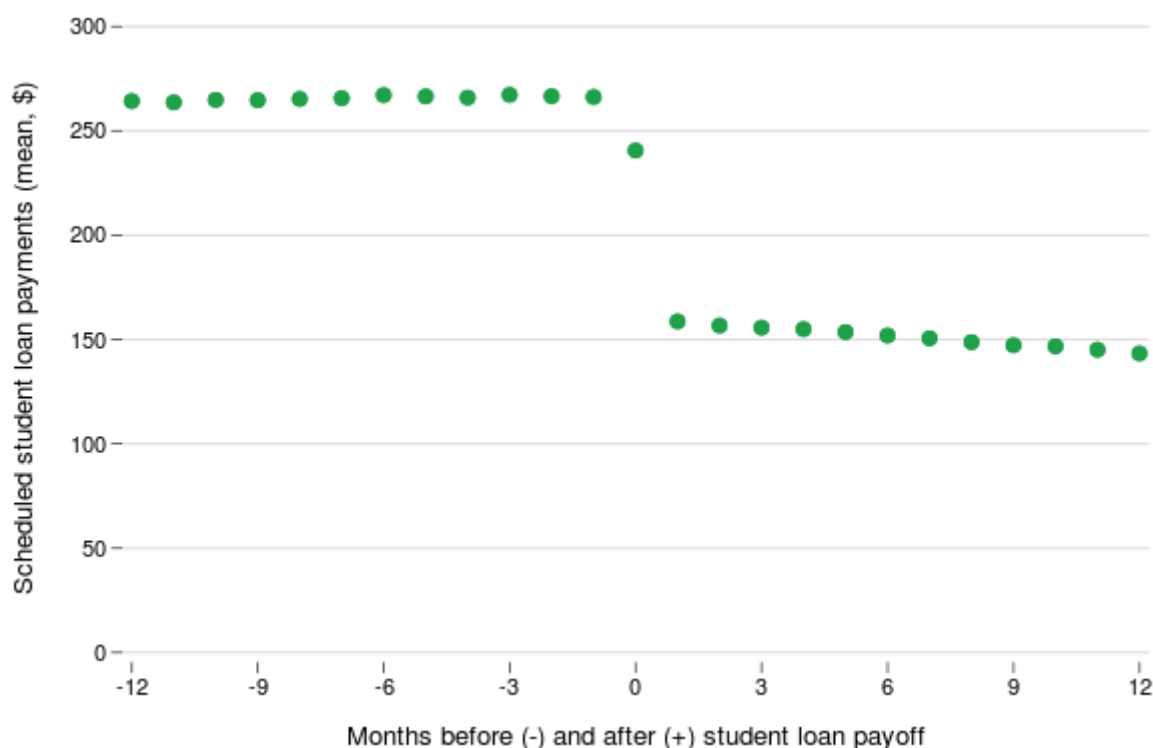
This section looks at a narrower subsample of borrowers whose final few payments essentially equal their scheduled monthly payments. Relative to those paying off early, these borrowers' smooth pattern of payments allows for a cleaner look at what happens when their student loan payment is removed from their monthly budget obligations. Note that while on average these borrowers have similar credit scores and live in areas with similar income levels compared to borrowers paying off with a large final payment, they are slightly older (38 versus 35) and their finances may differ on other dimensions.¹⁰

When these borrowers approach their final scheduled monthly payment, they have a smooth decrease in student loan balances ending in a predictable drop in their monthly payments.

¹⁰ The median borrower paying off on schedule is 38 years of age, has a credit score of 729, and lives in a census tract with a median income of \$68,247. For comparison, the median borrower paying off a loan any time up to five years early is 35 years of age, has a credit score of 736, and lives in a census tract with a median income of \$67,609. Appendix C shows the distributions of borrowers' ages at payoff for both groups.

Figure 9 shows the scheduled monthly payments on all student loans for those borrowers first observed paying off a student loan on schedule.

FIGURE 9: AVERAGE OF ALL SCHEDULED STUDENT LOAN PAYMENTS AROUND FIRST PAYOFF, AMONG BORROWERS REPAYING ON SCHEDULE

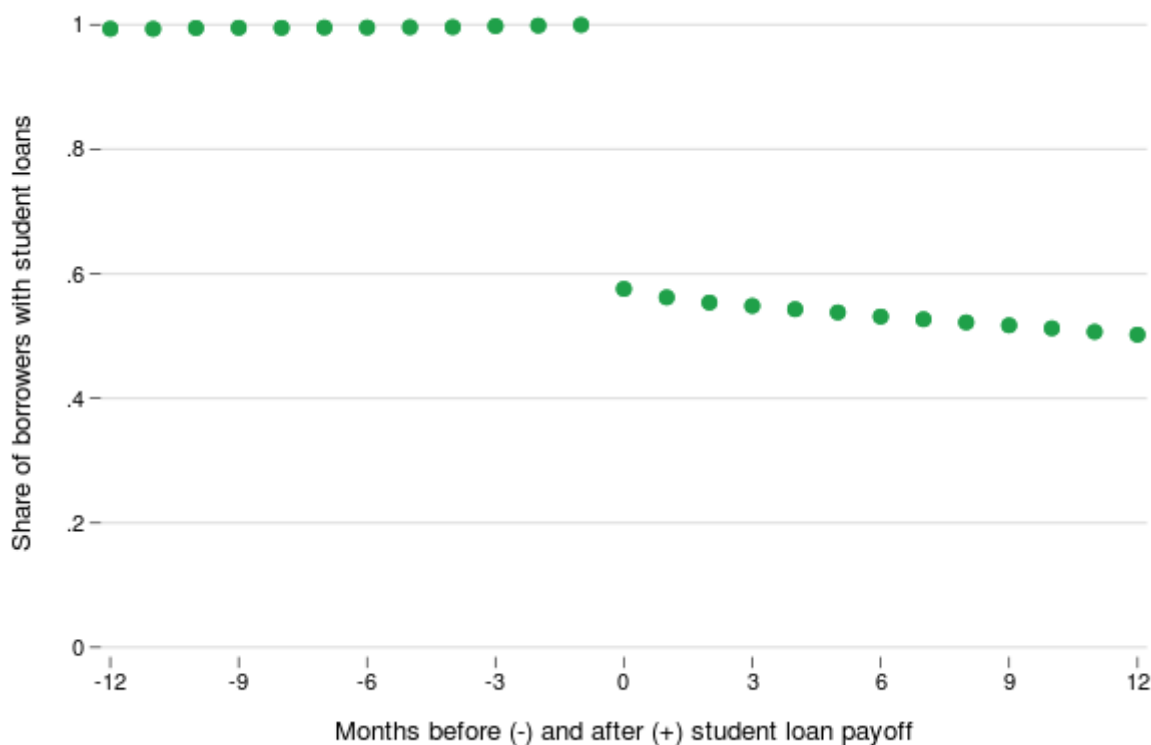


When these borrowers are first observed paying off a student loan, their required scheduled monthly payments drop by \$108, on average.¹¹ How do borrowers use this newly freed portion of their monthly budget? Since the analysis looks at the first loan borrowers pay off, many of these borrowers still have additional student loans as evidenced by the fact that the average

¹¹ A student loan's last scheduled payment is often a smaller "remainder" than the normal scheduled monthly payment, as late payments, periods of forbearance, interest rate adjustments, and other events over the preceding years of repayment can lead to slight deviations from the loan's initial exact repayment schedule. As a result, the drop in scheduled payments is calculated from the month before payoff to the month after payoff (omitting the month the loan is fully repaid).

borrower has a student loan payment of \$159 in the month after the first observed payoff of a student loan in Figure 9. Figure 10 shows the portion of borrowers with an open student loan, before and after this first payoff occurs.

FIGURE 10: SHARE OF BORROWERS WITH ANY OPEN STUDENT LOAN AROUND FIRST PAYOFF, AMONG BORROWERS REPAYING ON SCHEDULE



When the first payoff occurs, 58 percent of borrowers have other open student loans, and this share declines as they pay off their other loans in the months that follow.

The next set of figures shows how actual payments toward these other loans increase after the first payoff. Figures 11 and 12 show the scheduled and actual payments each month relative to the first payoff date, with borrowers split between those with and without additional remaining student loans. The latter figure shows the actual payments made in comparison to the scheduled payments.

FIGURE 11: SCHEDULED PAYMENTS ON ALL STUDENT LOANS AROUND FIRST ON SCHEDULE PAYOFF, FOR BORROWERS WITH AND WITHOUT OTHER STUDENT LOANS

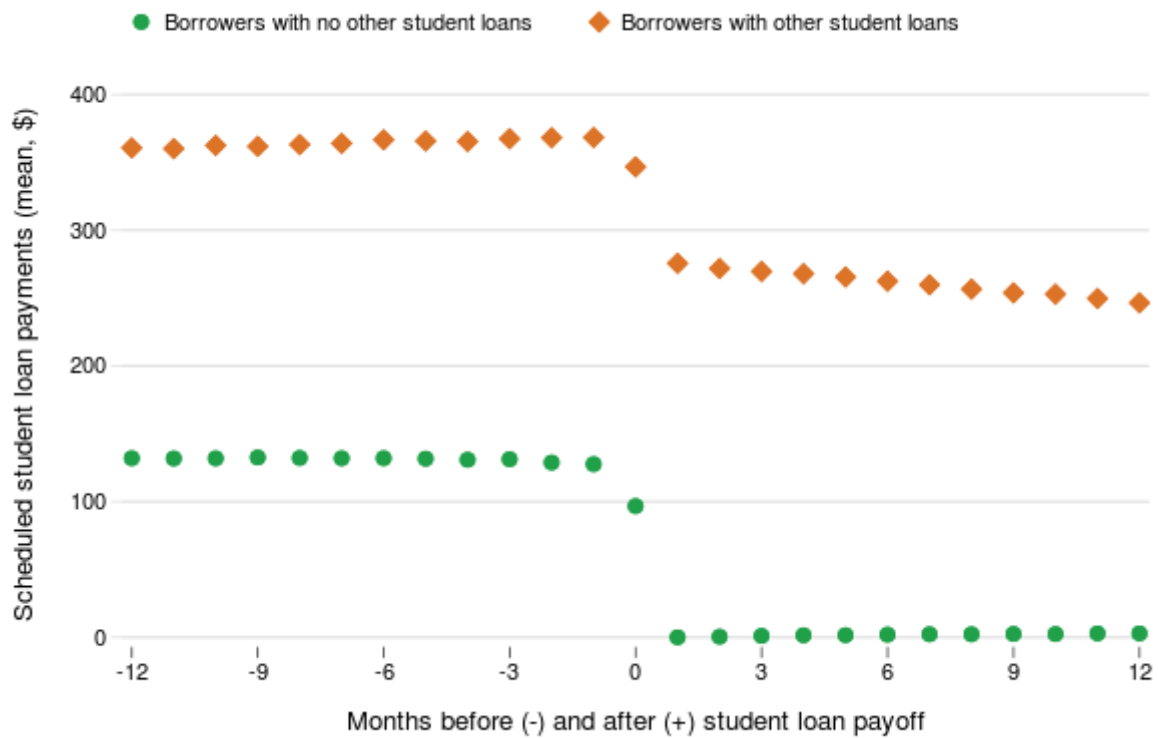
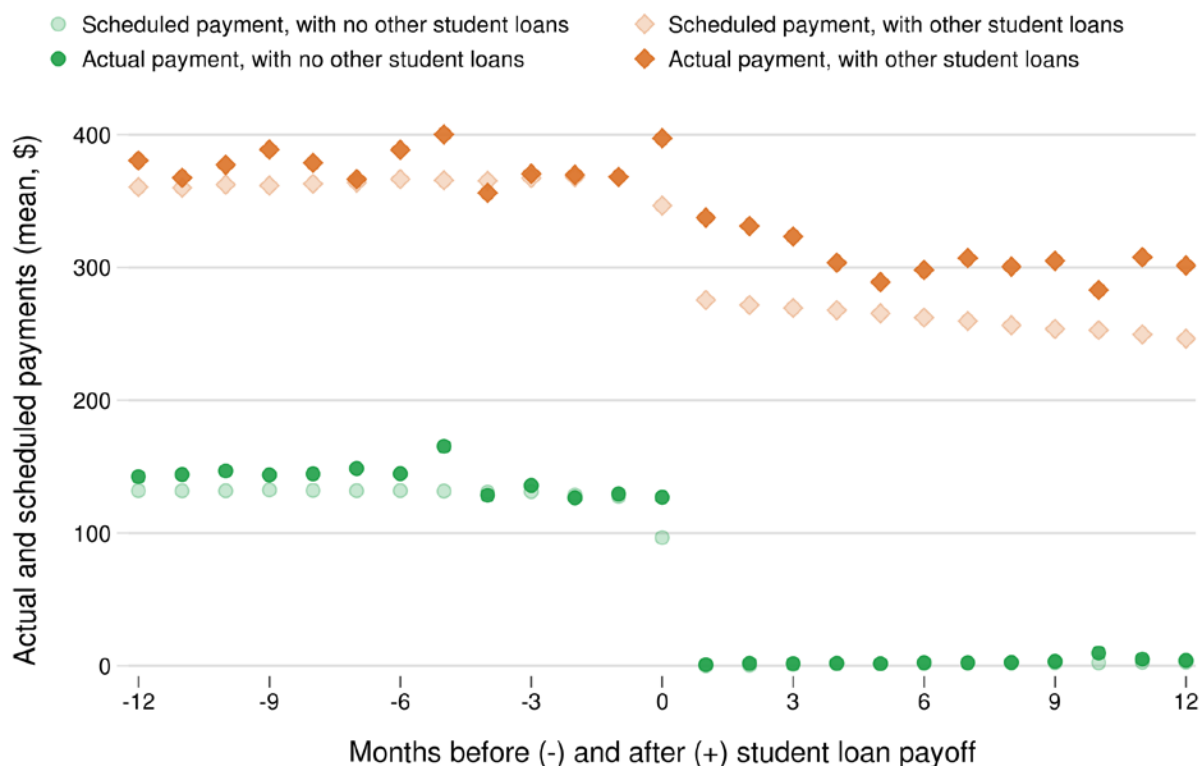


FIGURE 12: PAYMENTS ON ALL STUDENT LOANS AROUND FIRST ON SCHEDULE PAYOFF, FOR BORROWERS WITH AND WITHOUT OTHER STUDENT LOANS



For borrowers with remaining open student loans, required monthly payments drop by an average of \$123 per month or a total of \$1,478 in the year following the student loan payoff, relative to the year prior. However, total actual student loan payments, which include overpayments, drop by only \$1,120 in the year following the first student loan payoff. The difference between the two suggests that on average, borrowers put \$358, or 24 percent of their newly available funds toward paying down their remaining student loans faster.

3.2.1 Changes in other credit use

In addition to (or as an alternative to) repaying other student loans faster after the first observed repayment, borrowers who pay off their student loans on schedule (like those who pay them off early) could also use the extra room in their budget to pay down other types of debt, take on new debt, or increase consumption or savings.

Figure 13 shows credit card balances around the time of payoff for these borrowers paying off their loans on schedule, plotted relative to a linear trend based on the pre-payoff data. In contrast to those borrowers paying off early (Figure 6), no clear change is seen for balances prior to or simultaneous with the student loan payoff, consistent with the timing of payoff being pre-determined by the scheduled loan term. Figure 14 shows the difference in cumulative credit card balances for these borrowers in the months following the student loan payoff, estimated relative to the trend before payoff, controlling for seasonal patterns.¹² Credit card balances are \$234 lower, suggesting that borrowers put approximately 16 percent of their \$1,498 savings on student loan payments toward reducing credit card balances.

¹² See Leonel Drukker and Scott Nelson, “Quarterly Consumer Credit Trends: End-of-Year Credit Card Borrowing” (June 2018), available at https://www.consumerfinance.gov/documents/6574/bcfp_consumer-credit-trends_eoy-credit-card-borrowing_062018.pdf.

FIGURE 13: AVERAGE CREDIT CARD BALANCES AROUND FIRST STUDENT LOAN PAYOFF, AMONG BORROWERS REPAYING ON SCHEDULE

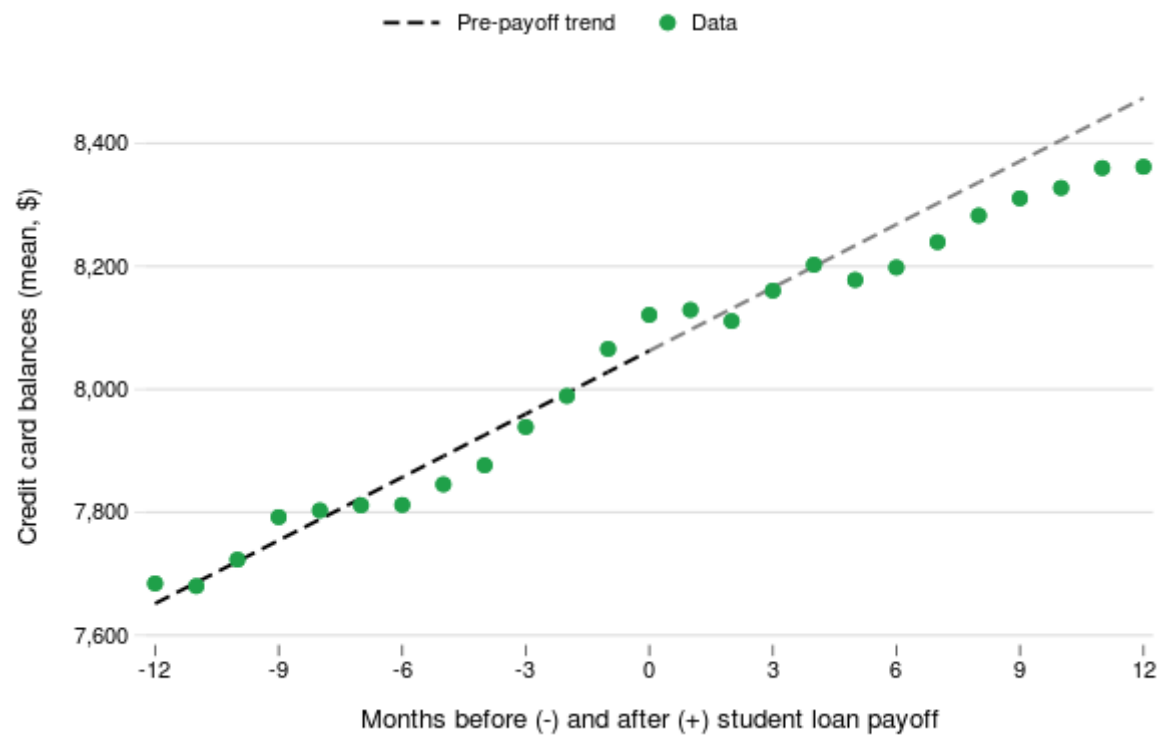
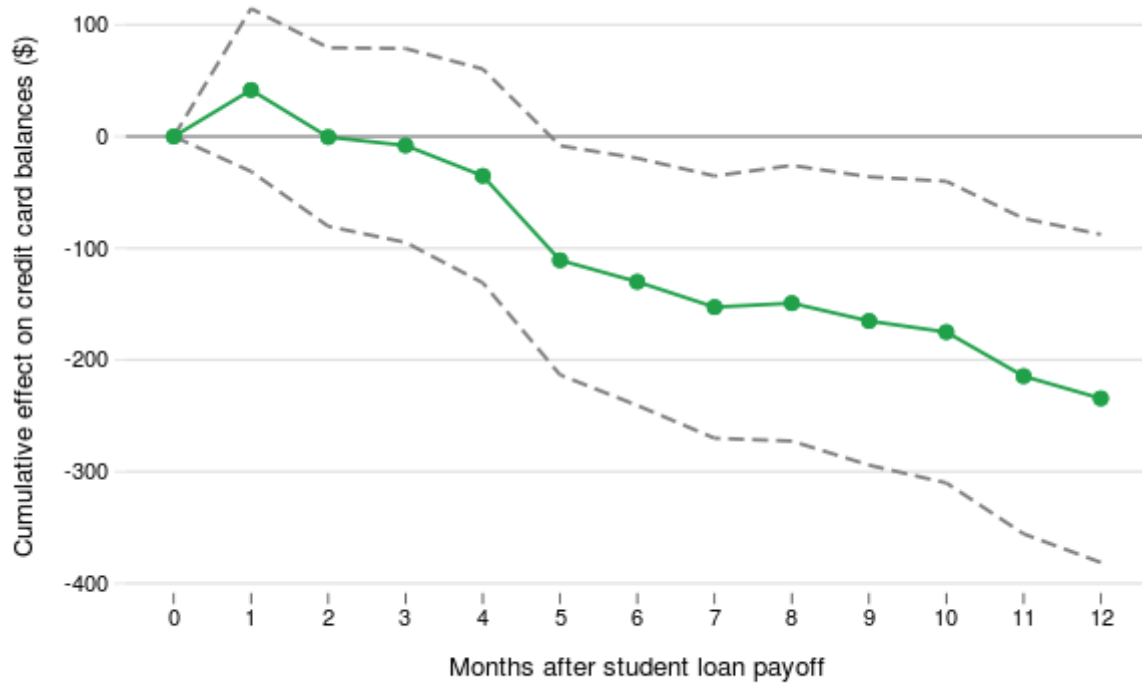
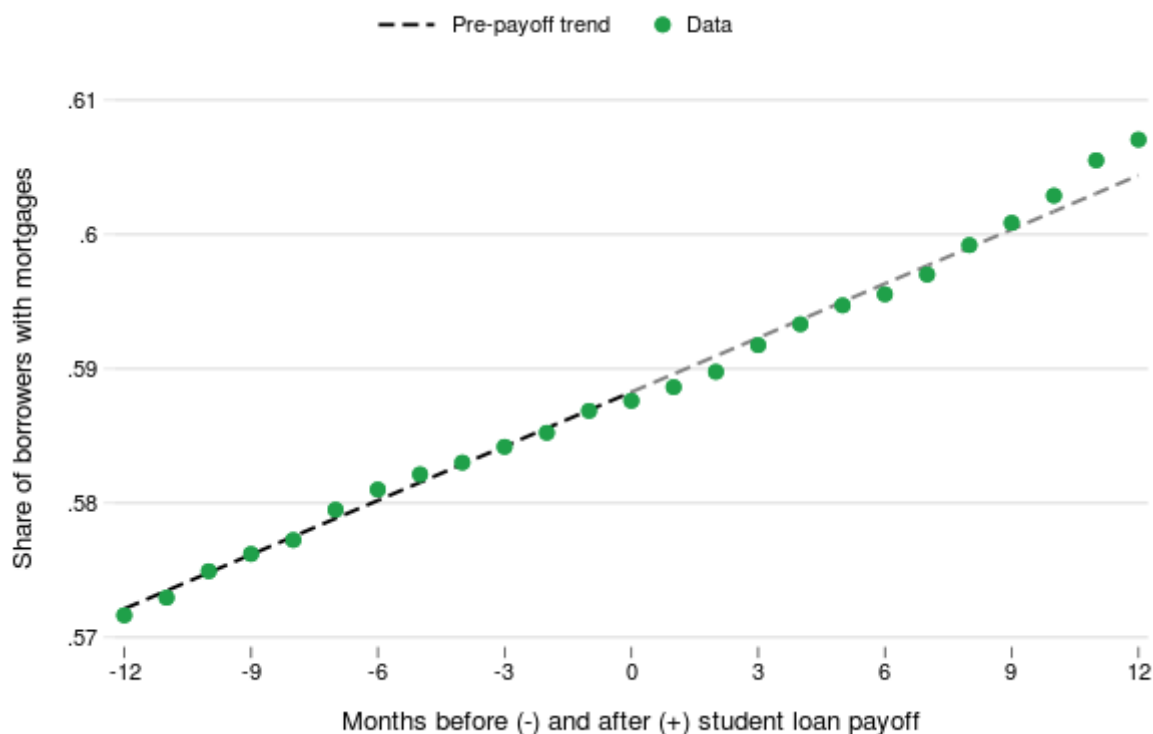


FIGURE 14: CUMULATIVE CHANGE IN CREDIT CARD BALANCES FOLLOWING FIRST STUDENT LOAN PAYOFF, COMPARED TO LINEAR PRE-TREND (ON SCHEDULE PAYOFF)



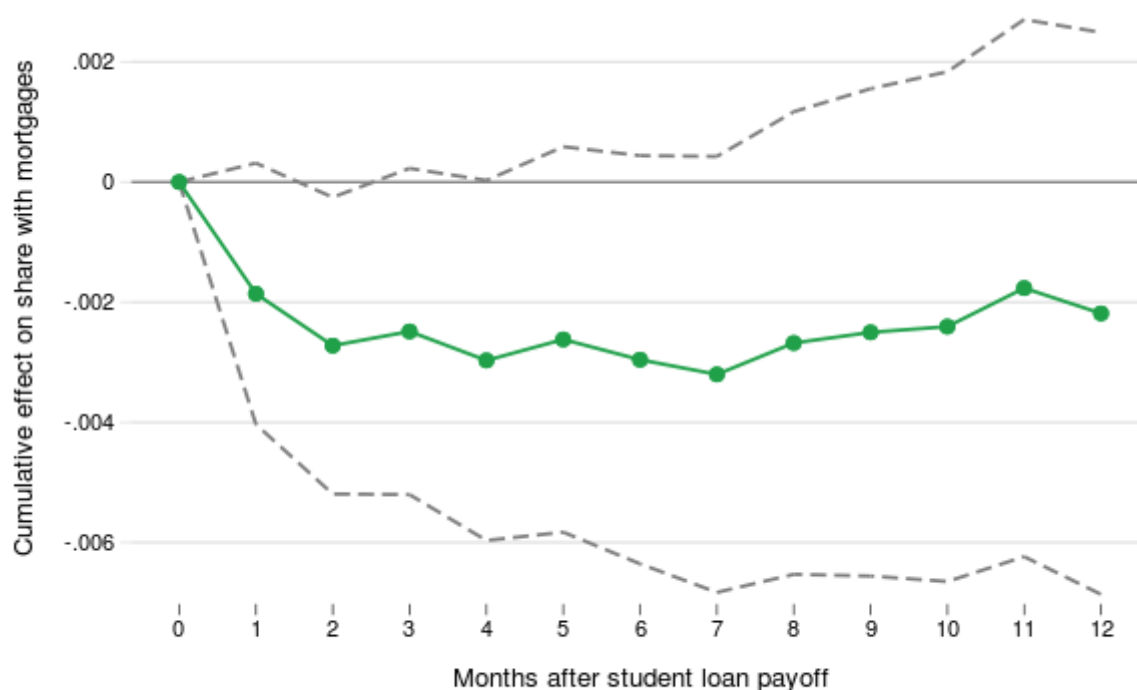
To examine whether borrowers who pay off student loans on schedule take out new loans for homes, Figure 15 shows the share of borrowers with mortgage loans before and after the first student loan payoff date.

FIGURE 15: SHARE OF BORROWERS WITH ANY MORTGAGE ACCOUNT AROUND FIRST STUDENT LOAN PAYOFF, AMONG BORROWERS REPAYING ON SCHEDULE



The figure does not reveal clear evidence of an uptick (or downtick) in the trend of borrowers with mortgage loans. In contrast to the increases for early payoff borrowers shown in Figure 8, Figure 16 shows a lack of statistically significant changes in mortgage take-up for these borrowers, as the 95 percent confidence intervals do not exclude a zero effect. These patterns are consistent even when splitting the sample into populations based on factors (such as by age, community housing prices, credit scores, whether a borrower has any remaining student loans, and total level of student borrowing (not shown)) for which effects might be more or less likely.

FIGURE 16: CUMULATIVE CHANGE IN LIKELIHOOD BORROWER HAS MORTGAGE FOLLOWING FIRST STUDENT LOAN PAYOFF, AMONG BORROWERS REPAYING ON SCHEDULE



Note: Effects estimated from event-study regression model (see Appendix B for details). Dashed lines represent 95 percent confidence intervals.

There are a few possible reasons why the effects on mortgages seen for borrowers paying off early may not be found for this group. First, for borrowers paying off early the results suggest that their timing of student loan payoff could be influenced by unobserved factors like increased wealth or income, or even be an anticipatory action in preparation for buying a home. For borrowers paying off on schedule, the timing of payoff primarily depends on the scheduled loan term and should be largely independent of these other factors or anticipatory behavior. As a result the initial reduction in required monthly payments of \$108, absent wealth or income changes, may be insufficient to significantly affect home purchases in the year following payoff. In addition, because so many borrowers pay off their loans early, those who do not may be the borrowers with the least savings or available income. As such, they may primarily pay down other debts or save in the year following payoff, rather than purchase homes. This could include some borrowers who already purchased homes (and thus have larger existing debt commitments) prior to paying off their student loans.

4. Discussion and conclusion

Using monthly data from the Bureau's CCP, this analysis studies the full stream of payments and balance changes across borrowers' different credit products in the months leading up to and following a student loan payoff. The results provide new facts about the size and timing of borrowers' final student loan payments. The majority of payoffs occur early, and coincide with large payments and balance reductions on other student loans and revolving credit products. Following these large payments—and potentially also being driven by changes in income or wealth—borrowers increasingly take out new mortgages to purchase homes. For those borrowers paying off according to their scheduled payments, they do not take out mortgages at higher rates but do pay down other debts in the months that follow.

Other studies have also found links between student debt levels and housing markets, suggesting that higher debt levels may decrease or delay homeownership.¹³ Relative to these studies, this analysis focuses only on borrowers who have successfully reached the end of a long repayment schedule. This certainly does not reflect the experience of all borrowers, as rising student loan balances over the past 15 years have coincided with an increased share of borrowers either defaulting or making payments too small to reduce their balances.¹⁴

¹³ See Zachary Bleemer, Meta Brown, Donghoon Lee, Katherine Strair, and Wilbert van der Klaauw, "Echoes of Rising Tuition in Students' Borrowing, Educational Attainment, and Homeownership in Post-Recession America" (July 2017), available at https://www.newyorkfed.org/research/staff_reports/sr820.html; Alvaro Mezza, Daniel Ringo, Shane Sherlund, and Kamila Sommer, "Student Loans and Homeownership" (June 2017), available at <https://doi.org/10.17016/FEDS.2016.010r1>.

¹⁴ See Christa Gibbs, "CFPB Data Point: Student Loan Repayment" (August 2017), available at https://www.consumerfinance.gov/documents/5148/201708_cfpb_data-point_student-loan-repayment.pdf.

This Data Point shows that early student loan payoffs coincide with increased home purchases, though the timing of both events may be driven by changes in wealth or income, or other life events like household formation. For borrowers paying off on schedule, the results suggest that reduced required monthly payments do not increase take-up of new debts, but rather lead to reductions in other existing debts. One possible mechanism to explain these varied results is that while the timing of student loan payoffs and home purchases may both be determined by when a borrower reaches a certain level of accumulated wealth or income, it may take longer to reach this level now than in the past due to increased student borrowing in recent years.

Overall, these results highlight the interlinked nature of borrowers' balance sheets, as repayment of one type of debt directly affects payments and borrowing on other types of debt. Consequently, policies or products that change repayment terms or balances for one credit product are likely to have spillover effects on others, either enhancing the intended effects (e.g. payment relief, increased credit access) or leading to compensating shifts (e.g. reallocated payments or borrowing). Analyzing borrowers' behavior across the full set of liabilities—and ideally assets—can improve our understanding of the underlying mechanisms guiding behavior, and lead to more accurate predictions of the impacts new policies or products will have on consumers and the market at large.

Finally, while this analysis focuses on student loan borrowers who are successfully paying off their loans, similar approaches could be applied to the large population of student borrowers struggling with rising balances, delinquency, or default.¹⁵ The results could shed light on how borrowers use other credit products to cope with their student debt, how their access to other credit may be inhibited, and how available repayment plans and other programs change these outcomes.

¹⁵ See “Annual Report of the CFPB Student Loan Ombudsman: Strategies for Consumer-Driven Reform” (October 2017), available at https://www.consumerfinance.gov/documents/5702/cfpb_annual-report_student-loan-ombudsman_2017.pdf; “Update from the CFPB Student Loan Ombudsman: Transitioning from Default to an Income-Driven Repayment Plan” (May, 2017), available at https://www.consumerfinance.gov/documents/4774/201705_cfpb_Update-from-Student-Loan-Ombudsman-on-Redefaults.pdf.

APPENDIX A:

Robustness to refinances and consolidations

This appendix assesses whether borrowers who appear to pay off their loans within 60 months of their scheduled repayment are actually refinancing or consolidating their debts into new student loans. Since loans that have been paid off or refinanced remain as closed tradelines on a borrower's credit record for a number of years, when a borrower refinances or consolidates their total number of student loan tradelines—including open and closed loans—should jump by one at the time of payoff.

Figure 17 shows the average count of all student loan tradelines for borrowers in the year prior to and following their student loan payoff. The downward trend in the number of tradelines, which is due to older closed or transferred student loan records eventually being removed from borrowers' credit records, shows little change at the time of payoff and indicates that refinancing activity does not significantly affect the overall trends observed in this paper.

FIGURE 17: AVERAGE NUMBER OF STUDENT LOAN TRADELINES—OPEN OR CLOSED—AROUND FIRST STUDENT LOAN PAYOFF (WITHIN 5 YEARS OF SCHEDULED PAYOFF)

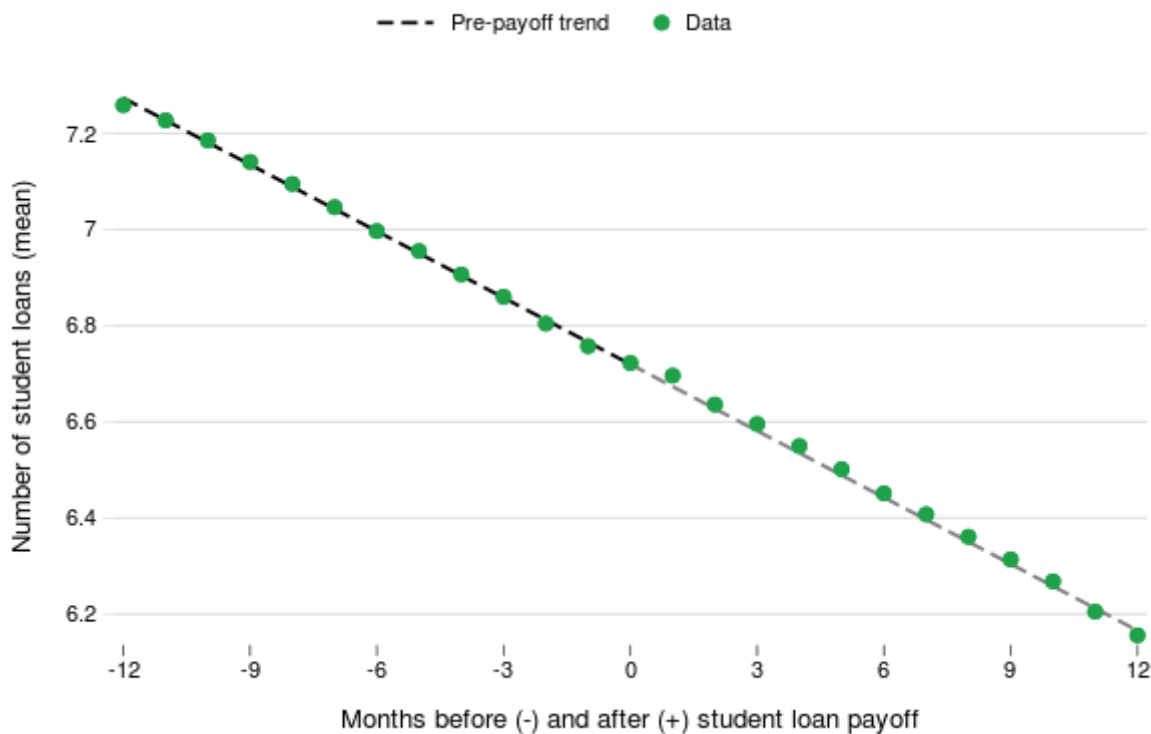
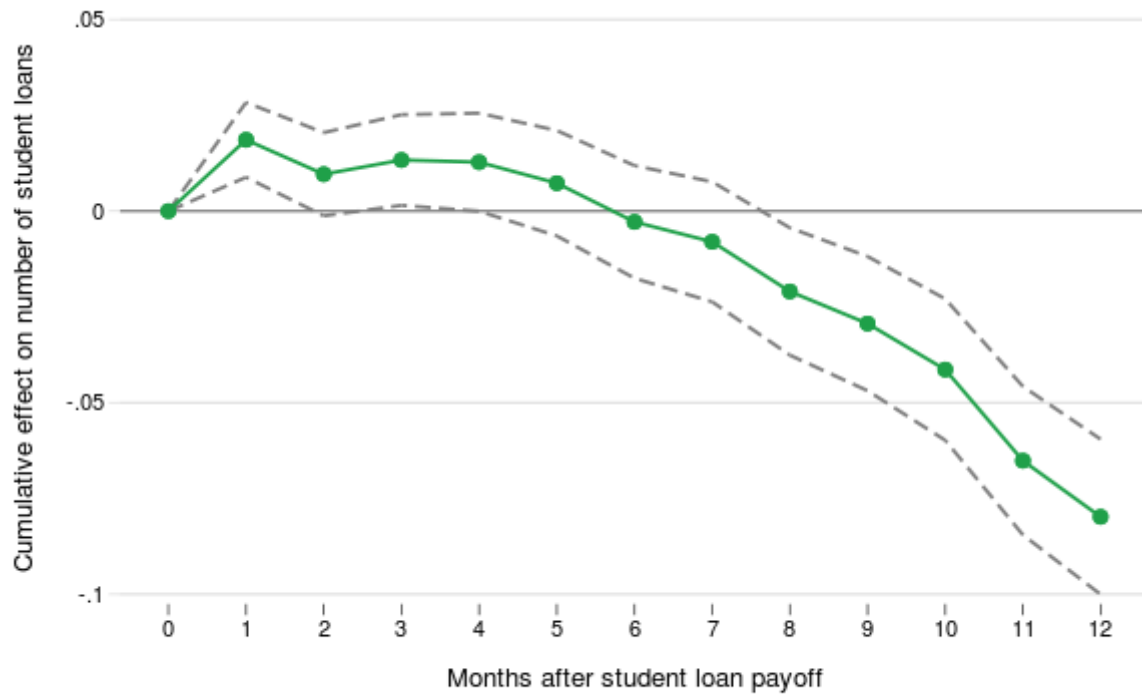


Figure 18 uses an event study regression approach (described in Appendix B), to put an upper bound on the increase in number of student loan tradelines borrowers have in the months following payoff. The upper 95 percent confidence interval excludes an increase of greater than 0.03, or three percent of payoffs, being potentially caused by refinances or consolidations.

FIGURE 18: CUMULATIVE CHANGE IN AVERAGE NUMBER OF STUDENT LOAN TRADELINES FOLLOWING FIRST STUDENT LOAN PAYOFF, COMPARED TO LINEAR PRE-TREND (WITHIN 5 YEARS OF SCHEDULED PAYOFF)



Note: Effects estimated from event-study regression model (see Appendix B for details). Dashed lines represent 95 percent confidence intervals.

APPENDIX B:

Regression model details

To measure how borrowers use credit in the months after they pay off a student loan, this Data Point uses event study regressions which compare borrowers' outcomes a given number of months after payoff to the outcomes of borrowers who have paid or will pay off a student loan in a different month.

Following Borusyak and Jaravel (2016), Dobkin, Finkelstein, Kluender, and Notowidigdo (2018), and Gross, Notowidigdo, and Wang (2016), for each outcome of interest, estimates are calculated for both a non-parametric specification with all lead and lagged indicators, as well as a parametric specification with only lagged indicators plus a linear time trend.¹⁶ The non-parametric specification takes the form:

$$Y_{it} = \gamma_t + \gamma_i + \sum_{\tau \in T} \delta_{\tau} \cdot I\{r_{it} = \tau\} + \varepsilon_{it}$$

Y_{it} is the outcome of interest for borrower i in month t and the model includes borrower and month fixed effects, as well as a full set of indicator variables for the number of months since (or prior to) payoff, r_{it} .¹⁷ The estimates of δ_{τ} capture differences in outcomes τ months since payoff.

Since all borrowers in the sample eventually pay off a student loan—and hence are “treated”—the non-parametric model cannot separately identify the full set of lead and lagged indicators

¹⁶ Kirill Borusyak and Xavier Jaravel, “Revisiting Event Study Designs” (August 2016), available at SSRN: <https://ssrn.com/abstract=2826228>; Carlos Dobkin, Amy Finkelstein, Ray Kluender, and Matthew J. Notowidigdo, “The Economic Consequences of Hospital Admissions” (2018), *American Economic Review*, 108(2): 308-352; and Tal Gross, Matthew J. Notowidigdo, and Jialan Wang, “The Marginal Propensity to Consume Over the Business Cycle” (August 2016), NBER Working Paper No. 22518 available at <http://www.nber.org/papers/w22518>.

¹⁷ Any two indicator variables for months since (or prior) to payoff must be omitted for identification, such as those for 12 and zero months prior in the example Figure 19 below.

from the included month fixed effects. In particular, without a “control” group, models of this type can only identify changes relative to a linear trend in the data. The regression results reported in this Data Point come from the parametric specification:

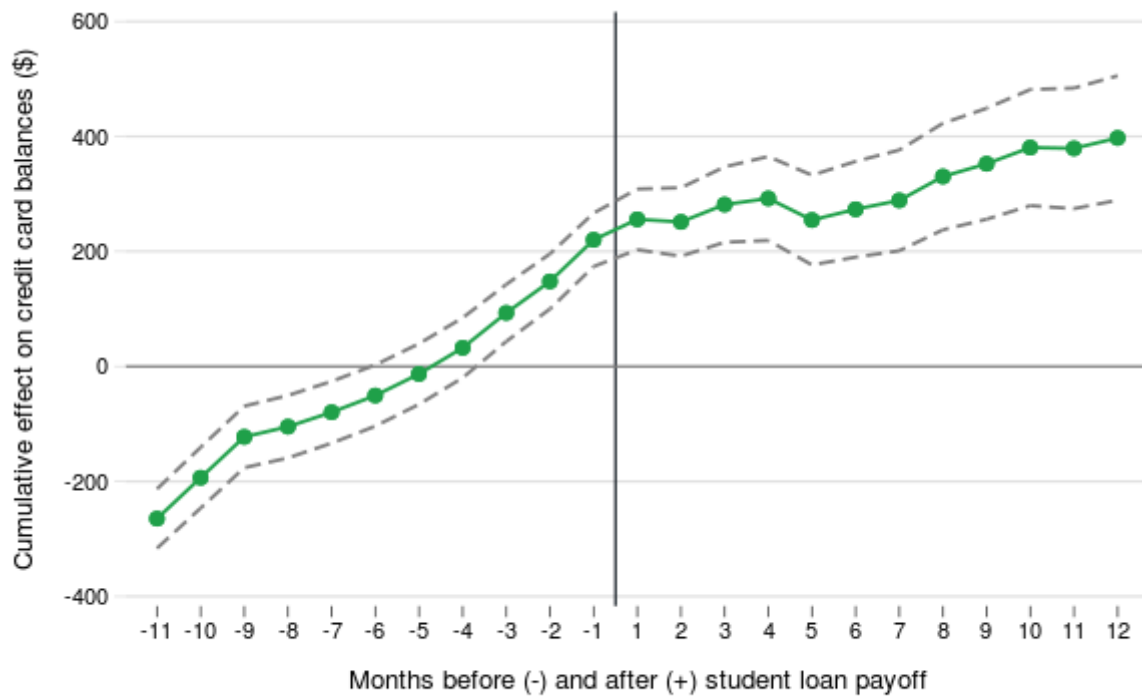
$$Y_{it} = \gamma_t + \gamma_i + \alpha r_{it} + \sum_{\tau \geq 0} \delta_\tau \cdot I\{r_{it} = \tau\} + \varepsilon_{it}$$

This specification assumes a linear time trend αr_{it} in place of the lead indicators, and then measures all estimated effects δ_τ as deviations from this trend. In combination with the borrower fixed effects, αr_{it} serves as a local linear approximation of the relationship between a borrower’s age in months, and the outcome variable.¹⁸ The non-parametric specification is used to assess whether the trend prior to payoff is indeed approximately linear, and hence whether the assumed linear trend of the parametric model is valid.

As an example, Figure 19 below provides the coefficients from the non-parametric specification estimated on credit card balances of borrowers with smooth payoffs. The estimates in this figure are used to confirm that the pre-payoff trend in coefficients is roughly linear, and thus can reasonably be approximated by a linear pre-trend in the parametric specification. Figure 14 in the main text provides the corresponding parametric estimates for the period after payoff, relative to the estimated linear pre-trend.

¹⁸ For robustness, additional specifications including lead indicators and flexible polynomials in borrower age instead of the linear trends and borrower fixed effects were estimated, which yielded similar results (not shown).

FIGURE 19: CUMULATIVE EFFECT ON CREDIT CARD BALANCES FOLLOWING FIRST STUDENT LOAN PAYOFF, NON-PARAMETRIC SPECIFICATION (ON SCHEDULE PAYOFFS)



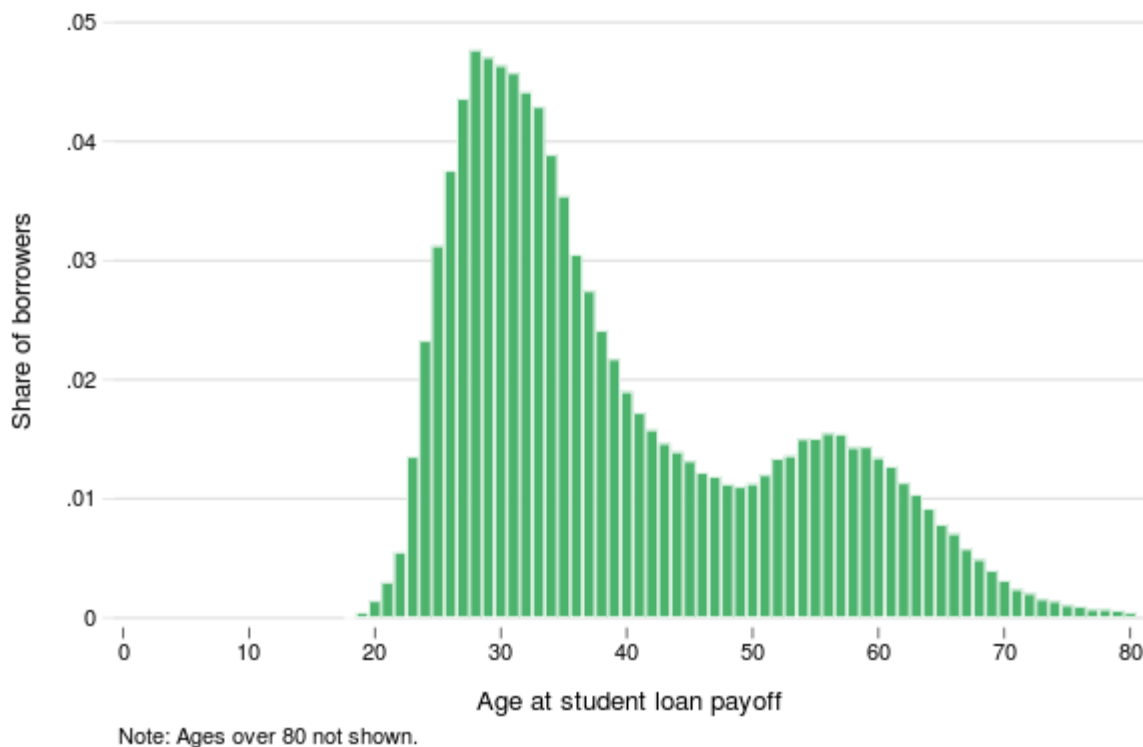
Note: Effects estimated from event-study regression model (see Appendix B for details). Dashed lines represent 95 percent confidence intervals.

APPENDIX C:

Borrower age distributions at payoff

This appendix provides two additional figures, showing borrowers' ages when they first paid off a student loan during our sample. Figure 20 provides the age distribution for those paying off up to five years early (the sample studied in Section 3.1), and Figure 21 shows the distribution for the subsample of borrowers paying off on schedule (those studied in Section 3.2).

FIGURE 20: BORROWERS' AGES AT FIRST STUDENT LOAN PAYOFF (WITHIN 5 YEARS OF SCHEDULED PAYOFF)



For both groups, the largest share of borrowers are paying off their loans in their late 20s or 30s, but there are also sizeable shares paying off in their 50s and 60s, likely reflecting parent borrowers or borrowers who returned to school later in life.

FIGURE 21: BORROWERS' AGES AT FIRST STUDENT LOAN PAYOFF (ON SCHEDULE PAYOFFS)

