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Not Cashing In on Cashing Out: An Analysis of Low Cash-Out Refinance Rates

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Abstract

Lowering a borrower's interest rate is one of the most effective ways to reduce a borrower's debt burden. Mortgage refinancing offers a chance to shift debt balances from high-interest loans into a low-interest mortgage through "cashing out" some of the home's equity. Borrowers could reduce their monthly payments by up to 13 percent by folding a student loan with a 6 percent interest rate into a mortgage with a 3 percent interest rate. Using anonymized data on mortgage refinancing behavior, we find that over half of borrowers with high-interest loans and available home equity do not take advantage of their cash-out opportunities. Strikingly, this pattern is seen among borrowers who have already chosen to refinance their mortgage, thereby overcoming inertia, information frictions, and large fixed costs associated with the decision to refinance. Furthermore, even when the last remaining fixed cost (cash-out surcharge) is eliminated for student-loan borrowers by a policy change at Fannie Mae, we find that the presence of a student loan does not significantly affect borrowers' propensity to cash out after these surcharges are eliminated.

Keywords: mortgage refinancing, cash-out refinancing, student loans, cash-out surcharge, household finance

JEL Codes: D14, G51, G40, G53

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1 Introduction

Lowering a borrower's interest rate is one of the most effective ways to reduce a borrower's debt burden. The market for lowering interest rates is huge, with $1.6 trillion in mortgage refinancing in the first half of 2021 (Freddie Mac, 2021). Despite the opportunities to secure lower interest rates on debt, many borrowers do not convert high-interest debt to low-interest debt, due to many reasons, such as inertia, fixed costs, or information frictions (Agarwal et al., 2017).

Our paper studies whether borrowers are more likely to reduce their debt burden when inertia and fixed costs are eliminated. We find that even when these frictions are removed, over half of borrowers with high-interest loans do not shift their debt balances to available lower-interest loans. Specifically, we examine mortgage refinancing, which gives borrowers the opportunity to use their home equity to pay down other higher-interest debt. Because refinancing is associated with large fixed costs, inertia, and information frictions, we focus on borrowers that have *already* chosen to refinance their mortgage, thereby eliminating these hurdles. Still, less than half of borrowers with available home equity and higher-interest non-mortgage loans choose to use the cash-out option when refinancing their mortgage, thus forgoing an opportunity to lower their debt burden.

A possible barrier to rebalancing loan portfolio is the surcharge that borrowers typically have to pay when cashing out. Starting in 2016, Fannie Mae eliminated this cash-out surcharge for borrowers who used their home equity to pay down their student loans. Strikingly, we find that even after this policy change, the presence of a student loan does not significantly affect borrowers' propensity to cash out after these surcharges are eliminated.

Our paper contributes to three strands of the literature. First, we contribute to the household finance literature by showing that borrowers do not reduce their total debt burden by converting high-interest debt into low-interest debt. In particular, we show this in a setting where borrowers are already deciding to lower their interest rate on one part of their debt portfolio, but they do not extend that decision to the rest of their portfolio, namely, when borrowers have already made a mortgage refinancing decision. Previous research has extensively documented a variety of reasons why borrowers do not act optimally to reduce their total debt burden (See Agarwal et al. (2017), Amromin et al. (2020) for reviews of the literature). Commonly cited reasons for this suboptimal behavior include inertia, inattention, information frictions, and fixed costs (Agarwal et al., 2016, 2017, Keys et al., 2016, Andersen et al., 2020, Agarwal et al., 2021, Amromin et al.,

2020).[1] We show that even in a situation where all of these frictions are removed (barring some small information frictions), many borrowers still do not convert high-interest debt into low-interest debt.

Second, we contribute to the literature on mortgage refinancing by examining the cash-out decision *conditional* on the borrower already choosing to refinance their mortgage. By focusing on borrowers that are already refinancing, we do not need to model the decision of *when* or *whether* to refinance. Furthermore, we leverage the fact that frictions and costs associated with the cash-out conditional on refinancing are dramatically smaller than those associated with the refinancing decision itself. Previous research has primarily focused on the decision of *when* to refinance given its frictions and costs (see Gerardi et al. (2021), Lambie-Hanson and Reid (2018), Agarwal et al. (2013) for analysis of the refinancing decision its costs). Little work has focused on borrowers' decisions after they have already chosen to refinance.[2]

Finally, we contribute to the literature on student debt by examining the decision of student loan borrowers to pay off their loans through mortgage refinancing. Recent work on student loans has primarily focused on how income-based repayment plans affect loan outcomes or the effects of student loan forgiveness (Bachas, 2018, Lochner and Monge-Naranjo, 2016, Lochner et al., 2021, Mueller and Yannelis, 2022, Catherine and Yannelis, 2020, Herbst, 2023).

We find that almost 60 percent of borrowers who refinance with available tappable equity and other higher-interest debt do not extract equity from their home.[3] Student loan borrowers are slightly more likely to cash out some equity, but 53 percent are not cashing out even though it would likely reduce their cost of borrowing (See Table 1). As an example, a borrower could reduce their monthly payment by up to 13 percent (about $300 annually for the median refinancer with student loans) if they converted a student loan with a 6 percent rate into a mortgage with a 3 percent rate.[4]

[1] Using Finnish data, Vihriälä (2022) points to intra-household frictions and anchoring as possible sources of the closely-related credit card (co-holding) puzzle.

[2] Pennington-Cross and Chomsisengphet (2007), LaCour-Little et al. (2010) primarily focus on the correlation between interest rates, macroeconomic variables, and borrower demographics and the decision to cash out.

[3] We define tappable equity as mortgages with a loan-to-value ratio of less than 75 percent. Following the Great Financial Crisis of 2008-2009, lenders are very reluctant to allow a cash-out for refis that will make the LTV exceed 80 percent.

[4] The median borrower that refinances and has student loans has a student loan balance of $16,500. Under the standard ten-year repayment plan, they would owe $183 per month given a 6 percent interest rate. Refinancing to 3 percent would lower their monthly payment to $159.

Table 1: Cash-out share of all mortgage refinances

Loan type in debt portfolio	Share of cash-out refis, percent
Overall	41.50
Student loan	46.82
Auto	45.57
Other*	47.52
Credit card	41.37

Notes: Table reports the share of mortgage refis that are cash-out, conditional on whether or not a borrower has other types of debt in their debt portfolio. The sample is composed of all cash-out refis and of rate-and-term refis with an LTV of 75% or less. Sources: Authors' calculations based on Equifax Credit Risk Insight Servicing, Black Knight McDash Data, and Home Mortgage Disclosure Act (HMDA). * Other loans includes retail, consumer finance, and "other" loans as coded by Equifax.

A range of frictions may prevent borrowers from cashing out and lowering their overall debt burden. Our paper examines the cash-out decision *conditional* on refinancing one's mortgage. For borrowers that have already decided to refinance their mortgage and pay the fixed costs to do so, the costs of extracting equity from their home is relatively small. These borrowers have already overcome the inertia of not refinancing, the information frictions of learning about refinancing, and the fixed costs of initiating the refinancing process. Even after overcoming each of these frictions, borrowers still face an additional fixed cost if they choose to do a cash-out refinance instead of the "standard" rate-and-term refinance.

To test whether the fixed costs of a cash-out refinance prevent borrowers from rebalancing their debt portfolio and lowering their overall debt burden, we leverage a policy change introduced by Fannie Mae, one of the biggest mortgage securitizers. In late 2016, Fannie Mae created a new program where borrowers who refinanced their mortgage could also pay off their student loans without incurring additional fees. Using a differences-in-differences and triple-differences approach, we estimate that removing the additional refinancing costs typically incurred to pay down additional debt did not significantly increase borrowers' propensity to convert high-interest debt to low-interest debt.

Our paper is structured as follows. Section 2 provides background information on the refinancing process. Section 3 describes the data used in our analysis. Section 4 provides descriptive analysis of the cash-out decision. Section 5 presents the results of our difference-in-differences and triple-diff estimation that leverages Fannie Mae's policy change. Finally, Section 6 concludes.

2 Background

Homeowners can reduce their total cost of borrowing by refinancing their mortgage at a lower interest rate when interest rates decline. In the United States, most mortgages are fixed-rate mortgages, which means that the interest rate is fixed for the life of the loan (typically 30 years). Therefore, when mortgage interest rates fall below a borrower's current rate, they can refinance and lock in the new, lower rate for the duration of their mortgage. However, refinancing incurs substantial up-front costs because a borrower is basically taking out a new mortgage to pay off their old mortgage. Therefore, many of the same "closing costs" still must be paid. These closing costs discourage borrowers from refinancing every time that interest rates fall.

If a borrower decides to refinance, they have two options. First, the borrower could choose a "rate and term" refinance in which they may change the rate and term (duration) of the new mortgage. For example, if a borrower refinances a 30-year mortgage that they have had for 5 years, they could choose to extend it by taking out a 30-year mortgage to pay off the remaining balance, keeping the current term, or shortening the mortgage term. Borrowers cannot choose the interest rate they pay, but by refinancing, they can lock in a lower rate than the rate on their old mortgage. Alternatively, a borrower could do a cash-out refinance which has the same options as a rate and term refinance plus the option to extract equity from one's home. If a borrower chooses a cash-out refinance, the amount they can cash out is typically capped such that the new mortgage plus cash-out does not exceed 80 percent of the home's value.[5]

The refinancing decision can be summarized in the following manner. Given the prevailing interest rate and estimated closing costs, a borrower chooses whether or not to refinance. Conditional on refinancing, the borrower then chooses the term and equity extraction of their new mortgage. A rate and term refinance is one where the borrower chooses no equity extraction and a cash-out refinance is one where the borrower chooses a positive amount of equity to extract from their home. In reality, due to Loan Level Price Adjustments, the interest rate on a cash-out refinance is about 0.125-0.625 percentage points higher than a rate and term refinance, depending on a borrower's credit score and loan-to-value ratio of the mortgage.[6] The slightly higher rate is almost surely less than the interest rate the

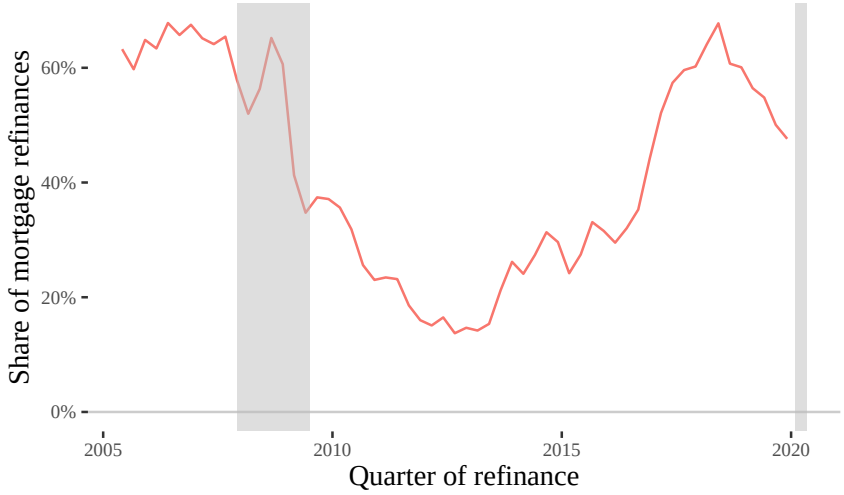
[5] Appendix Figure A.2 shows that only about 16 percent of cash-out refis are for amounts greater than 80 percent LTV.

[6] See Fannie Mae's Loan-Level Price Adjustment Matrix for an example. Available at https://singlefamily.fanniemae.com/media/9391/display. See Appendix Figure A.3 for a scatterplot of

borrower is paying on their other debt such as student loans or credit cards.

Trends in cash-out refinancing reflect changes in interest rates. When interest rates are high, there is less incentive to refinance and so only borrowers that need cash do a cash-out refi. Figure 1 shows that when interest rates are low, there are large gains to refinancing and so a large share of refinances are rate-and-term refinances. This pattern is supported by evidence from the National Survey of Mortgage Originations. Table B.1 shows stark increases in the share of borrowers refinancing to take out cash (23 percent to 39 percent) or to consolidate and pay down debt (30 percent to 51 percent) between 2016 and 2018 when interest rates were rising.

Figure 1: Cash-out share of all refinances



Note: "Tappable equity" refers to refinanced mortgages with a cash-out or with a loan-to-value ratio (LTV) of no more than 75%. Sources: Authors' calculations based on Equifax Credit Risk Insight Servicing, Black Knight McDash Data, and HMDA.

In contrast to a large portion of the literature on refinancing, our paper focuses on the borrower's second stage decision of whether or not to do a cash-out refinance after they have already decided to refinance. By focusing the second-stage decision, we obviate the need to assess the discouraging effect of closing costs, information frictions, inertia, or behavioral biases that may prevent borrowers who could benefit from refinancing from choosing to do so. Conditional on already going through the refinancing process, the costs

differences between cash-out and non-cash-out rates separated by credit score.

of choosing cash-out over rate and term refinancing are almost nonexistent. However, we find strong evidence that a substantial portion of borrowers that have chosen to refinance do not choose to cash out even though they could reduce their total cost of borrowing. Table B.2 provides evidence that a substantial portion of borrowers who do a refi are thinking about debt consolidation.

3 Data

We use Equifax Credit Risk Insight Servicing data and Black Knight McDash data (McDash) known as CRISM along with additional McDash data and mortgage application data available through the Home Mortgage Disclosure Act (HMDA). We use the Federal Reserve Bank of Philadelphia's (FRBP) merge of these anonymized data, hereafter referred to as HMDA-McDash-CRISM. The McDash data contain monthly mortgage servicing information from the largest residential mortgage servicers in the United States. The data contain multiple types of mortgage products, most saliently for this project, rate-term and cash-out refinances. The data also contain various borrower, property, and loan characteristics. The HMDA data contain records on loan originations and purchases by depository institutions and and some for-profit non-depository institutions (see Avery et al. (2007) for more details). The HMDA data provide demographic characteristics of borrowers and co-borrowers; these include race and gender.

The HMDA-McDash merge is performed by FRBP and we use the fourth generation of the matching algorithm. These merged data are then merged with Equifax credit bureau data (a nationally representative anonymous random sample from Equifax credit files, see Lee and Van der Klaauw (2010) for more information on the Equifax data). The data span from the second quarter of 2005 to the second quarter of 2021. The data contain only loans that are uniquely matched. That is, a loan is included if the McDash record only has one match in the HMDA and the HMDA loan has only one match in the McDash data. While match rates vary over time, in 2019, 70 percent of McDash loans were uniquely matched in HMDA. The match rate falls to about 55 percent when matched with Equifax data. This is a good match rate and FRBP continues to evolve its matching algorithm. The HMDA-McDash-CRISM data contain 67 million mortgages from 2005 to 2021. To speed computation, we use a 10 percent subsample of CRISM borrowers. We also limit our analysis to CRISM loans with a level of match confidence greater than .8234 (the standard confidence threshold). We further restrict to all borrowers that either did a cash-

out refinance or a rate-and-term refinance with an LTV of 75 percent or less. We drop borrowers with more than two outstanding mortgages and a small number of borrowers who refinanced multiple times within a quarter. Finally, we drop borrowers for whom demographic information is missing or inconsistent. These restrictions give us a sample of 776,981 refinanced mortgages, with about 42 percent of those being cash-out refinances.

Table 2: Loan characteristics for cash-out and no cash-out refinances

	All refinances mean/sd	Cash-Out mean/sd	No cash-out mean/sd	All refinances median	Cash-out median	No cash-out median
FICO score at origination	738.99	719.14	753.24	755.00	728.00	770.00
	(61.70)	(65.50)	(54.54)			
30-year rate at origination	4.79	5.15	4.54	4.45	5.06	4.36
	(1.03)	(1.06)	(0.93)			
Age (years)	51.23	50.46	51.76	51.00	50.00	51.00
	(12.34)	(12.40)	(12.27)			
Income (thousands)	114.09	101.03	123.41	85.00	78.00	90.00
	(190.14)	(222.12)	(162.91)			
LTV	59.74	66.60	55.06	62.93	70.00	58.82
	(23.83)	(30.77)	(16.01)			
Student loan balance	3383.46	3719.10	3152.13	0.00	0.00	0.00
	(16135.99)	(16599.20)	(15804.69)			
Has a student loan	0.11	0.13	0.10			
	(0.32)	(0.34)	(0.31)			
Share with coborrower	0.52	0.49	0.53			
	(0.50)	(0.50)	(0.50)			
Share Asian	0.05	0.03	0.06			
	(0.21)	(0.17)	(0.23)			
Share Black	0.04	0.05	0.03			
	(0.20)	(0.23)	(0.18)			
Share White	0.78	0.77	0.79			
	(0.41)	(0.42)	(0.41)			
Share Hispanic/Latino	0.08	0.09	0.07			
	(0.27)	(0.29)	(0.26)			
Share male	0.63	0.62	0.64			
	(0.48)	(0.49)	(0.48)			

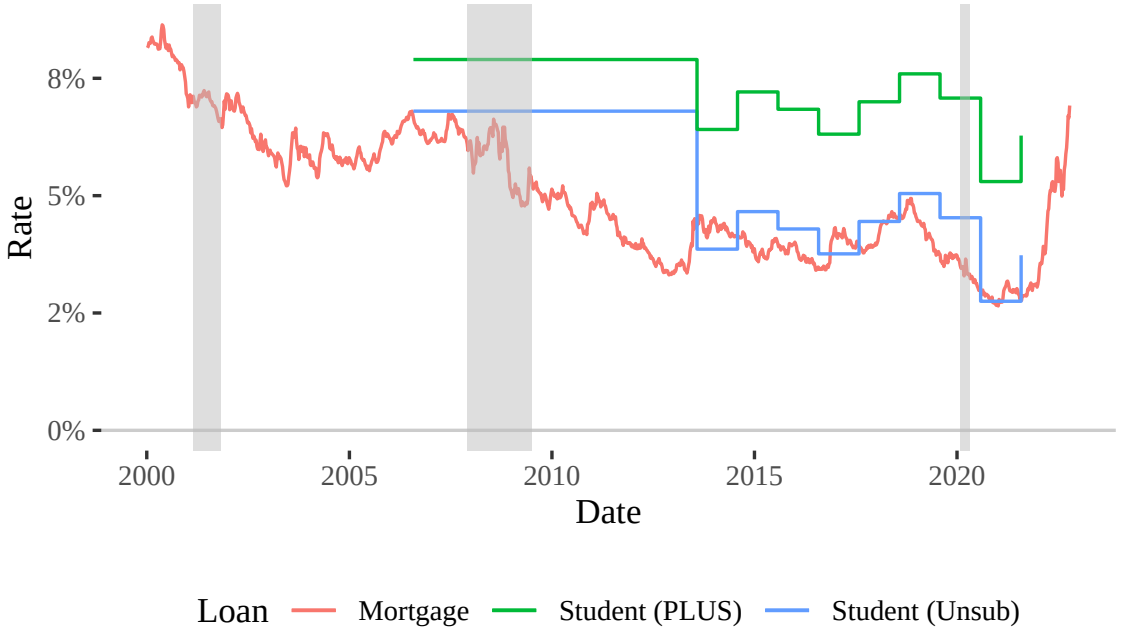
Note: Race, ethnicity, and gender data are from HMDA. Sources: Equifax Credit Risk Insight Servicing, Black Knight McDash Data, and Home Mortgage Disclosure Act (HMDA).

Table 2 reports the summary statistics for our sample. Note that borrowers who do not cash-out refinance have FICO scores that are on average about 34 points higher (about one half of a standard deviation) relative to borrowers who cash out.[7] This is consistent with the findings of Gerardi et al. (2021).

We restrict our analysis to all borrowers that refinanced their mortgage. We are focused

[7] All references to FICO and credit score herein refer to the credit score at origination from McDash.

Figure 2: Average 30-year fixed mortgage rate and federal student loan rates



Shading denotes recessions. Student loan rate series are fixed rates and start in 2006, as these rates were variable prior to 2006. Sources: Freddie Mac, 30-Year Fixed Rate Mortgage Average in the United States [MORTGAGE30US], retrieved from FRED, Federal Reserve Bank of St. Louis, July 11, 2022; https://fred.stlouisfed.org/series/MORTGAGE30US; SavingForCollege.com; US Department of Education.

on understanding why borrowers may choose to not cash out *conditional on refinancing*. Since we are not analyzing the refinancing decision, we do not include borrowers that do not refinance their mortgage.

Our policy analysis focuses on borrowers with both student loans and mortgages. First, Figure 2 shows that interest rates on federal student loans are almost always higher than the prevailing 30-year mortgage rate.[8] Furthermore, borrowers are likely to take out mortgages only after they finish school, so borrowers that originated mortgages in the 2010s likely had student loans back in the 2000s. For those borrowers, the 6 percent (or higher) interest rate on student loans is almost twice as large as the average mortgage rate.

[8]Federal student loans make up the overwhelming majority (over 92 percent) of outstanding student loans, so we do not consider how private student loans may differ (Amir et al., 2021).

Student loans are particularly well-suited for our analysis. First, interest rates are set annually by Congress and are the same for all borrowers (i.e., no differences by credit score). Furthermore, student loan debt is difficult to discharge in bankruptcy, so borrowers have little incentive to keep student loans since they will be responsible for paying down the debt even if they declare bankruptcy (i.e., no strategic default motive). Student loans are thus arguably a better setting than other high-interest loans, such as credit card loans. Credit card loans are dischargeable in bankruptcy and not all credit card balances are actual debt (i.e., the borrower pays off their statement each month). Furthermore, there are a range of promotional and balance transfer programs through which borrowers can obtain 0 percent APR on their credit cards (and auto loans), which is a better rate than they could obtain on their mortgage.

Admittedly, there are several possible (rational) reasons for not using mortgage refinancing to repay student loans. One example is the recent decision by the Biden administration to forgive up to $20,000 of student loans. While we concede that this is a valuable perk of student loans, Figure A.1 shows that this policy proposal only gained serious clout during the 2020 primary season, which is outside of our analysis period.[9] We believe that the expectations of outright student loan forgiveness were very low in the years that our analysis focuses on. A somewhat related reason for not shifting from student loans to mortgages is the flexibility of repayment afforded by student loans via various income-based repayment schemes (some of these schemes permit some debt forgiveness at the end, but that outcome is exceedingly infrequent, as documented in National Consumer Law Center (2021)). Based on the eligibility guidelines for income-based repayment programs, given the median student debt balance and a two-person household, only borrowers making less than about $49,000 would benefit from keeping their federal loans.[10] In our data, about 10 percent of

[9] There was a spike in search interest around June 2014, but this was likely related to President Obama's announcement of a cap on loan payments at ten percent of income and any remaining balance would be forgiven after 20 years of payments. In our view, that kind of forgiveness is substantially different than the broad forgiveness that has been discussed since 2020.

[10] We calculate this using a conservative framework. The only borrowers that would benefit from keeping the income-based repayment are those that would have a lower monthly payment based on their income than if they reduced their interest rate from 6 percent to 3 percent. The median student loan of a borrower that refinances their mortgage is $16,500, which implies a monthly payment of $183 per month or $2,196 per year. The most generous repayment plans cap monthly payments at 10 percent of "discretionary income" (any income above 150 percent of the federal poverty line. For a two-person household, they would only benefit if their income was less than $49,425. The 10th percentile of joint mortgage applicants who refinance is $49,000, so the benefit of income-based repayment does not apply to the vast majority of our sample (i.e., those with both a mortgage and student loans).

mortgage borrowers that refinanced have income low enough to benefit. Unfortunately, we lack data that would enable us to evaluate the importance of this potential explanation. Lastly, there may be a tax benefit to student loans (relative to mortgages) for a subset of borrowers — those who do not itemize deductions and thus do not benefit from mortgage interest tax deductability (claiming interest on student loans does not require itemizing).[11]

4 Analysis

We examine cash-out propensity across different types of borrowers using the following descriptive regression. We restrict our sample to only borrowers with tappable equity in their home, so a cash-out refinance is a feasible choice:

$$Cashout_{it} = \alpha + \beta_1 LoanPortfolio_{i,t-1} + \beta_2 X_{it} + \lambda_t + \epsilon_{it}, \tag{1}$$

where $Cashout$ indicates whether borrower i, who refinanced in quarter t, chose to cash out. $LoanPortfolio$ is a vector of indicators of the loan types held by borrower i in the previous quarter $t-1$. X is a vector of other covariates including race, ethnicity, gender, credit score, income, age, age squared, and an indicator for whether the mortgage is jointly held. Table 3 shows that borrowers that hold student loans, auto loans, or other consumer finance loans are 1 to 6 percentage points more likely to do a cash-out refinance compared to borrowers without these additional loans. This is compared to a mean of 42 percent so this is a statistically and economically significant increase in a borrower's cash-out propensity. Furthermore, we find that Asian and female borrowers are significantly less likely to cash out than white, male borrowers. The likelihood of cashing out falls with credit score, age, and income. Overall, borrowers that hold other higher-interest debt are more likely to cash out than borrowers without other high-interest debt, but a large portion of them are still not cashing out though it would potentially be financially advantageous to do so.

[11] One way to see if this consideration is quantitatively important is to compare cash-out rates across states. Our hypothesis is that NY and CA borrowers with student loans should be more likely to cash out during a refinancing than their counterparts in Texas, because borrowers in high-tax states are more likely to itemize when filing taxes due to much larger SALT deductions.

Table 3: Determinants of cash-out behavior (conditional on tappable equity)

	(1) cash-out	(2) cash-out	(3) cash-out
Lag student loan	0.0327***	0.0269***	0.0188***
	(0.0016)	(0.0016)	(0.0017)
Lag auto		0.0323***	0.0447***
		(0.0011)	(0.0011)
Lag other loan		0.0438***	0.0536***
		(0.0011)	(0.0011)
Lag credit card		0.0153***	0.0124***
		(0.0014)	(0.0015)
American Indian/Alaska Native	-0.0202***	-0.0209***	0.0024
	(0.0070)	(0.0070)	(0.0075)
Asian	-0.0856***	-0.0782***	-0.0871***
	(0.0021)	(0.0021)	(0.0023)
Black	0.0004	0.0012	0.0237***
	(0.0025)	(0.0025)	(0.0027)
Hawaiian/Pacific Islander	0.0342***	0.0358***	0.0661***
	(0.0081)	(0.0080)	(0.0087)
Two or more races	-0.0205***	-0.0170***	-0.0032
	(0.0044)	(0.0044)	(0.0047)
Female	-0.0122***	-0.0135***	-0.0125***
	(0.0011)	(0.0012)	(0.0013)
Hispanic or Latino ethnicity	-0.0109***	-0.0116***	0.0184***
	(0.0019)	(0.0019)	(0.0021)
Credit score	-0.0011***	-0.0011***	-0.0019***
	(0.0000)	(0.0000)	(0.0000)
Joint application		0.0066***	-0.0142***
		(0.0011)	(0.0012)
Log income	-0.0343***	-0.0383***	-0.0391***
	(0.0008)	(0.0008)	(0.0008)
Year-quarter FEs	Yes	Yes	No
Quarter FEs	No	No	Yes
Observations	776981	776981	776981
R^2	0.183	0.187	0.084
Dependent variable mean	0.42	0.42	0.42
Dependent variable SD	0.49	0.49	0.49

All variables are binary. Standard errors are heteroskedasticity robust. The base level for race is white. The base level for sex is male. The base level for ethnicity is not Hispanic nor Latino. Race, ethnicity, and gender data are from HMDA. Source: Authors' calculations based on Equifax Credit Risk Insight Servicing, Black Knight McDash Data, and HMDA. * $p < .10$, ** $p < .05$, *** $p < .01$.

5 The Effect of Eliminating the Cash-Out Surcharge

On November 2, 2016, Fannie Mae entered into a pilot program with SoFi to roll out their new "Student Loan Payoff ReFi" product which allowed borrowers who refinanced their mortgage to also extract equity ("cash out") and pay off their student loans. Typically, a cash-out refi generates additional fees, but Fannie Mae waived those fees if the cash-out was used to pay down student loans.[12] This program was then made available to all mortgage lenders that securitize with Fannie Mae on April 25, 2017 with the goal of providing borrowers a "cost-effective alternative to use existing home equity to pay off student loan debt..., potentially reducing their monthly debt payments."[13] Based on our review of all announcements, letters, and notices published by Fannie Mae and Freddie Mac between 2016-2018, there were no other significant programs that directly affected refinancing. We use a difference-in-difference specification to assess whether eliminating the cash-out surcharge increased the likelihood that borrowers would cash out.

$$\begin{aligned} Cashout_{it} = \alpha &+ \beta_1 PostFannie_{it} + \beta_2 StudentLoan_{i,t-1} + \\ &\beta_3 PostFannie_{it} * StudentLoan_{i,t-1} + \\ &\beta_4 LoanPortfolio_{i,t-1} + \beta_5 X_{it} + \lambda_{q(t)} + \epsilon_{it}, \end{aligned} \tag{2}$$

where $PostFannie$ indicates a time period after the introduction of Fannie's student loan cash-out refi program (after Nov. 2, 2016).[14] $StudentLoan$ indicates whether borrower i had a student loan in the previous quarter $t-1$. $LoanPortfolio$ is a vector of indicators for whether borrower i held other kinds of debt in the previous quarter. X is a vector of other covariates including race, ethnicity, gender, credit score, income, age, age squared, and an indicator for whether the mortgage is jointly held. $\lambda_{q(t)}$ is a calendar-quarter fixed effect to control for seasonality. We focus on a four year time window around the policy change, so our data spans 2015Q1 to 2018:Q4. The coefficient of interest is β_3. If the program encouraged cash-outs, then we expect β_3 to be positive.

[12] See "SoFi and Fannie Mae give homeowners a smart way to reduce student debt" press release available at https://www.sofi.com/press/sofi-fannie-mae-give-homeowners-smart-way-reduce-student-debt/

[13] See Announcement SEL-2017-04 from Fannie Mae available at https://singlefamily.fanniemae.com/media/20191/display. The messaging associated with this new program was added to Fannie Mae's Desktop Underwriter software on July 29, 2017. See SEL-2017-06 from Fannie Mae available at https://singlefamily.fanniemae.com/media/4741/display.

[14] Results are robust to using April 2017 as the policy date.

Table 4: Difference-in-difference regression of cash-out indicator on post-Fannie Mae program rollout and student loan indicators

	(1) cash-out	(2) cash-out	(3) cash-out	(4) cond fannie
Post Fannie program	0.3325***	0.2715***	0.2702***	0.3151***
	(0.0044)	(0.0091)	(0.0091)	(0.0119)
Lag student loan	0.0293***	0.0285***	0.0248***	0.0208**
	(0.0075)	(0.0075)	(0.0075)	(0.0096)
Post Fannie program × Lag student loan	0.0090	0.0094	0.0095	0.0130
	(0.0117)	(0.0117)	(0.0117)	(0.0150)
Credit score	-0.0005***	-0.0005***	-0.0004***	-0.0005***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Log income	0.0138***	0.0136***	0.0105***	0.0081**
	(0.0031)	(0.0031)	(0.0031)	(0.0041)
Linear time		0.0073***	0.0073***	0.0092***
		(0.0009)	(0.0009)	(0.0012)
Lag auto			0.0152***	0.0161***
			(0.0041)	(0.0053)
Lag other loan			0.0418***	0.0367***
			(0.0041)	(0.0054)
Lag credit card			0.0174***	0.0132*
			(0.0054)	(0.0071)
Quarter FEs	Yes	Yes	Yes	Yes
Observations	51342	51342	51342	27893
R^2	0.130	0.131	0.133	0.188
Dependent variable mean	0.36	0.36	0.36	0.35
Dependent variable SD	0.48	0.48	0.48	0.48

Standard errors are clustered at the borrower level. Race, ethnicity, and gender are used as controls. Race, ethnicity, and gender data are from HMDA. Inclusion in the sample is conditional on having tappable equity. Source: Authors' calculations based on Equifax Credit Risk Insight Servicing, Black Knight McDash Data, and HMDA. * $p < .10$, ** $p < .05$, *** $p < .01$.

Columns 1-3 of Table 4 show that the cash-out propensity for borrowers with student loans does not significantly change relative to borrowers without student loans after the Fannie Mae policy reform is implemented. However, this coefficient may be biased towards zero because it assumes that all borrowers were eligible for or had access to the surcharge-free cashout following the Fannie Mae refi program reform. Column 4 restricts the analysis to only refis that were done with Fannie Mae and the results are virtually unchanged. Additionally, because this program only applied to refis done through Fannie Mae, we have an additional control group of Freddie Mac mortgages that we can use to further control for additional changes in the loan environment. Therefore, to better identify the possible effect of the Fannie Mae refi program, we construct a triple-difference specification that also controls for whether or not the refinanced mortgage was actually securitized by Fannie Mae. Equation (3) shows the triple-difference specification.

$$\begin{aligned} Cashout_{it} = \alpha + & \beta_1 PostFannie_{it} + \beta_2 StudentLoan_{i,t-1} + \beta_3 Fannie_{i,t} + \\ & \beta_4 PostFannie_{it} * StudentLoan_{i,t-1} + \\ & \beta_5 PostFannie_{it} * Fannie_{i,t-1} + \\ & \beta_6 Fannie_{it} * StudentLoan_{i,t-1} + \\ & \beta_7 PostFannie_{it} * StudentLoan_{i,t-1} * Fannie_{i,t} + \\ & \beta_8 LoanPortfolio_{i,t-1} + \beta_9 X_{it} + \lambda_{q(t)} + \epsilon_{it}, \end{aligned} \tag{3}$$

where $Fannie$ indicates whether the refinanced mortgage is securitized by Fannie Mae. All other covariates are the same as in Equation (2). β_7 is our coefficient of interest and estimates the effect of the reform on its target group (i.e, borrowers with student loans and who refinance into a mortgage securitized by Fannie Mae). Table 5 shows that even after controlling for the mortgage securitizer, there is no significant effect of the Fannie Mae policy on the cash-out propensity of its target group. On the other hand, there appears to be a significant increase in cash-out propensity (by 12 percentage points) of mortgages securitized by Fannie Mae, regardless of whether the mortgage holder had a student loan.

6 Conclusion

We find that many borrowers fail to convert high-interest debt into low-interest debt even when inertia, most information frictions, and fixed costs are eliminated. We focus on

Table 5: Triple-difference regression of cash-out indicator on post-Fannie Mae program rollout, Fannie Mae securitization, and student loan indicators

	(1) cash-out
Post Fannie program	0.2075***
	(0.0104)
Lag student loan	0.0296***
	(0.0114)
Post Fannie program × Lag student loan	0.0038
	(0.0183)
Fannie flag	-0.1064***
	(0.0050)
Post Fannie program × Fannie flag	0.1242***
	(0.0089)
Lag student loan × Fannie flag	-0.0077
	(0.0148)
Post Fannie program × Lag student loan × Fannie flag	0.0086
	(0.0236)
Credit score	-0.0004***
	(0.0000)
Linear time	0.0072***
	(0.0009)
Lag auto	0.0148***
	(0.0041)
Lag other	0.0413***
	(0.0041)
Lag credit card	0.0169***
	(0.0054)
Log income	0.0108***
	(0.0031)
Quarter FEs	Yes
Observations	51342
R^2	0.140
Dependent variable mean	0.36
Dependent variable SD	0.48

Standard errors are clustered at the borrower level. Race, ethnicity, and gender are used as controls. Inclusion in the sample is conditional on having tappable equity. Race, ethnicity, and gender data are from HMDA. Source: Authors' calculations based on Equifax Credit Risk Insight Servicing, Black Knight McDash Data, and HMDA. * $p < .10$, ** $p < .05$, *** $p < .01$.

borrowers that have already overcome the inertia and information frictions by considering mortgage borrowers that have already chosen to refinance. Furthermore, we show that lowering (or eliminating) the cost of cashing out does not significantly increase the cash-out propensity of borrowers who would benefit from converting high-interest debts into lower-interest mortgages. On the other hand, our findings suggest that a "nudge" encouraging borrowers to take advantage of a cash-out opportunity may be quite effective.

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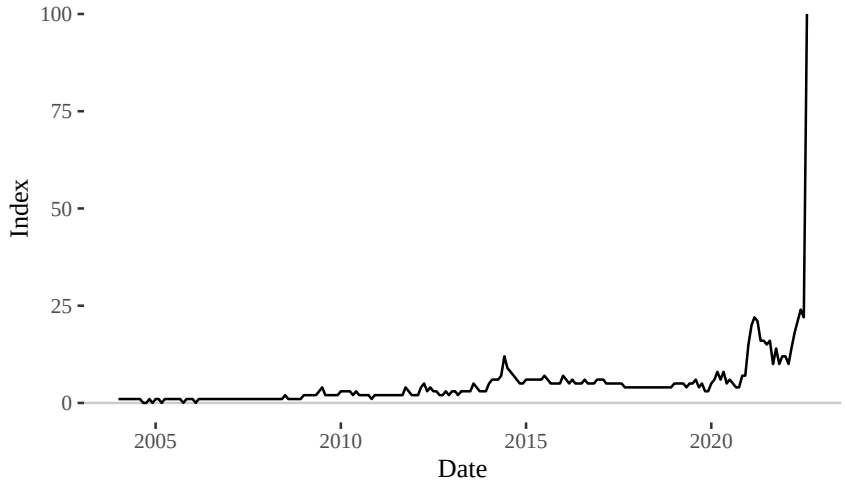
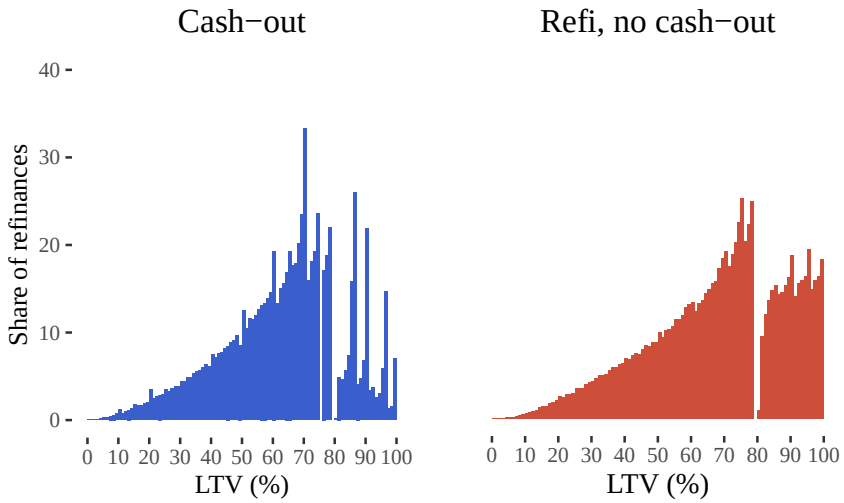
A Appendix Figures

Figure A.1: Google Searches for "Student Loan Forgiveness"



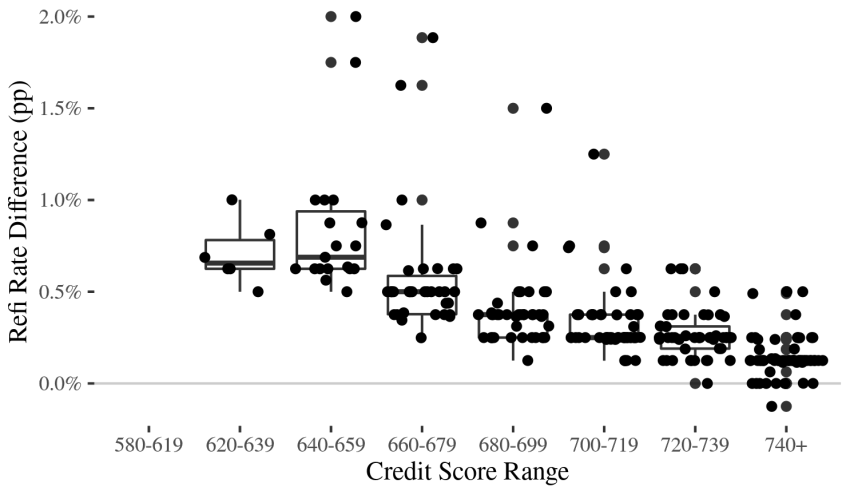
Source: Google Trends. Accessed August 29, 2022.

Figure A.2: Distribution of Loan-to-Value Ratios by Type of Refinance



Sources: Authors' calculations based on Equifax Credit Risk Insight Servicing, Black Knight McDash Data, and HMDA.

Figure A.3: Distribution of Differences Between Cash-out and Non-Cash-out Rates



Source: Data collected by the authors from publicly available quote tools available from Bankrate.com.

B Appendix Tables

Table B.1: How important were the following in your decision to refinance, modify, or obtain a new mortgage?

Reason	2015	2016	2017	2018	2019
Change to a fixed-rate loan	48%	47%	46%	54%	40%
Get a lower interest rate	91%	91%	80%	74%	86%
Get a lower monthly payment	74%	71%	66%	63%	66%
Consolidate or pay down other debt	32%	30%	41%	51%	41%
Repay the loan more quickly	43%	42%	37%	40%	34%
Take out cash	22%	23%	34%	39%	32%
Remove private mortgage	NA	NA	NA	NA	76%

Source: National Survey of Mortgage Originations Public Use File.

Table B.2: Did you use the money you got from this new mortgage for any of the following?

Use	2013	2014	2015	2016	2017	2018	2019
College expenses	6%	5%	7%	7%	8%	6%	4%
Auto or other major purchase	6%	9%	8%	11%	13%	10%	6%
Buy out co-borrower	NA	NA	NA	3%	3%	4%	2%
Pay off other bills or debts	29%	38%	43%	44%	54%	45%	36%
Home repairs or new construction	21%	27%	36%	39%	45%	37%	27%
Savings	10%	13%	15%	16%	17%	14%	13%
Closing costs of new mortgage	48%	33%	32%	35%	28%	23%	20%
Business or investment	5%	7%	6%	6%	5%	4%	4%
Did not get money from refinancing	NA	NA	NA	NA	NA	24%	39%

Source: National Survey of Mortgage Originations Public Use File.