

What's the Catch? Suspicion of Bank Motives and Sluggish Refinancing

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Failing to refinance a mortgage can cost a borrower thousands of dollars. Based on administrative data from a large financial institution, we show that around 50% of borrowers leave thousands of dollars on the table by not refinancing. Survey data indicate that, among all the behavioral factors examined, only suspicion of banks' motives is consistently related to the probability of accepting a refinancing offer. Finally, we report the results of three field experiments showing that enticing offers made by banks fail to increase participation and may even deepen suspicion. Our findings highlight the important role of trust in financial decisions. (*JEL* G02, G21, C93)

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People are very sluggish in reacting to refinance opportunities (see, e.g., Agarwal et al. 2015, Agarwal, Rosen, and Yao 2016, Campbell 2006, Stanton 1995). This paper investigates sluggish refinancing using three sources of information: administrative data from refinance offers sent to about 550,000 borrowers from a large financial institution (*FI*), survey results matched to the administrative data, and three large-scale field experiments. The data help address two main questions. First, what is the effect of various psychological

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factors on refinance rates? In particular, we investigate whether trust on the part of the households that the offers are really what they promise is important. Suspicion that the offers are “too good to be true” and will come with costly caveats or “fine print” might hamper take-up. Second, might carefully designed interventions overcome sluggish refinancing?

We take advantage of the Home Affordable Refinance Program (HARP).¹ All the refinancing offers we analyze have no upfront monetary costs. Any prepayment penalties, fees and appraisal costs are waived. This makes refinancing a much simpler decision compared to most other offers that have upfront costs. For both the borrower and the researchers it is simple to observe that these offers dominate the current mortgage in monetary terms. Thus, HARP provides us with a relatively unique setting in which many empirical problems are minimized. Unlike most papers on refinancing that compare the interest rate on the mortgage with the market interest rate to calculate refinancing benefits, we know that borrowers received an offer allowing them to refinance and the exact potential savings resulting from refinancing. We therefore do not have to worry about search costs or about whether borrowers qualify for refinancing (similar to the context in Denmark studied by Andersen et al., 2014).

The results show that only 20% of the borrowers applied to the first refinance offer sent by the *FI*. Eventually, an additional 29% paid off their loan by July 2013 (which was on average around 12 months after receiving the first offer from the *FI*). That means that 51% did not refinance within our relatively long time window. These numbers are consistent with those in previous papers on sluggish refinancing (e.g., Andersen et al. 2014, Agarwal et al. 2015). The proportion of borrowers who choose not to refinance is stunningly high given the fact that there are no monetary costs and that the preapproved offers are attractive: on average, the interest rate drops by 1.83 percentage points (median: 1.75). Such a rate decrease would lead to a savings of \$110 on average (median: \$92) for each month of the mortgage. While this amount may seem modest, especially to a customer with high income, the total cumulative amount left on the table is typically too large to ignore: on average nonapplicants in our data leave about \$8,719 (median \$7,399) on the table by not applying to the offer sent to them.²

The main part of the paper investigates potential reasons for not refinancing, with a focus on behavioral factors: The consumers’ financial literacy and numerical ability may affect their evaluation of the offer (e.g., Bajo and Barbi 2015). The consumer’s degree of conscientiousness and inattention may also play a role; for example, a consumer might have the intention to respond to the offer but misplace the offer or just never get around to responding

¹ For details about the HARP program, see www.harp.gov.

² Savings are calculated following Agarwal, Driscoll, and Laibson (2013): we use a discount rate of 5%, assume a 10% probability each year of paying off the mortgage, and calculate the tax benefits of holding debt (assuming a 28% tax bracket).

(e.g., Andersen et al. 2014). The consumer's time and risk preferences also influence how they weigh the long-term versus short-term benefits of the offer (e.g., Atlas, Johnson, and Payne 2017). Suspicion could also affect the perceived transaction cost because suspicious borrowers might not believe the costs communicated by the financial institution. Indeed, suspicion or lack of trust has been shown to affect take-up for other financial products, for example, investing in stocks (Guiso, Sapienza, and Zingales 2004, 2008) or buying insurance (Cole et al. 2013, Dercon, Gunning, and Zeitlin 2016).

At least two aspects make suspicion a particularly plausible behavioral factor in our context as well. First, mortgage contracts are notoriously complex and difficult to understand, because they describe multiple multidimensional outcomes. Not surprisingly, many borrowers are confused (see, e.g., Stango and Zinman 2009, Agarwal, Rosen, and Yao 2016) and are reluctant to shop around, presumably because it is difficult to compare different products (Woodward 2003, Woodward and Hall 2010). Borrowers are generally also confused about the difference between the lender and the servicer (or even their own mortgage terms) (e.g., Bucks and Pence 2008). Borrowers might therefore not understand that lenders and servicers have different incentives for encouraging refinancing. Given this complexity, and the potential for information asymmetry or shrouded attributes (Gabaix and Laibson 2006), suspicion of consumers about the motives of firms should be an important factor in their decision to refinance.

Additionally, the past behavior of financial institutions might have decreased trust and increased suspicion of borrowers. For example, Gurun, Matvos, and Seru (2016) present rigorous evidence for deceptive advertising in which reset rates were not saliently presented. They further show that interest rates were higher in areas with more advertising that mainly targeted less informed borrowers (mainly minority, less educated, and poorer households). Additionally, Agarwal and Evanoff (2013) show that brokers and real estate professionals were steering borrowers into subprime loans that were too expensive given their risk profile. Piskorski, Seru, and Witkin (2015) uncover substantial misrepresentation of borrower's housing equity. Even larger magnitude of misreporting has been documented in Griffin and Maturana (2016). For misreporting of income, see also Jiang, Nelson, and Vytlačil (2014) and Mian and Sufi (2017).

It is not difficult to imagine that those fraudulent practices increase suspicion. Suggestive of the effect of fraud on trust in financial institutions is the evidence by Andersen, Hanspal, and Nielsen (2014) and Gurun, Stoffman, and Yonker (2018) that show the negative effect of fraudulent behavior by financial institutions on investing: "People lost trust in the system" (Gurun, Stoffman, and Yonker 2018, p. 2). How past behavior of financial institutions affects suspicion about motives of banks for HARP refinance offers is nicely illustrated in this online forum discussion (<http://www.fatwallet.com/forums/finance/1165177/>): Person 1: "Received a UPS letter package yesterday regarding refi'ing through HARP 2.0 with my current mortgage. (...) The ad specifically states 'no cost

to you', and the fine print doesn't hint at any other fees. So, my question is, what's the catch? (...)" Person 2: "There's no catch, why would you think there is?" (...)" Person 1: "My past dealings with the large banks have skewed me. But no doc stamps, title insurance, I just fail to see why they'd be so generous to the little guy. (...)" While there are no hidden costs involved for borrowers in the offers we analyze, lenders are indeed exploiting the program by not passing-through all subsidies to the consumers (Agarwal et al. 2015).³

Our survey is able to measure proxies for these behavioral factors and test their association with refinancing. We also include subjective assessment of moving probabilities and are able to capture many sociodemographic variables.

We find a significant relation between being suspicious of the motives of financial institutions and the decision to refinance.⁴ Suspicion may be thought of as changing the borrower's beliefs on the refinancing cost and increasing the expected value of this cost. Refinance offers under the HARP program seem too good to be true for many borrowers. Households expect there to be hidden fees and cumbersome processes that are not compensated for by the offer's attractiveness.

We do not claim that suspicion is the main or only reason that many customers did not accept the offer, but we find that the correlation between suspicion and refinancing is robust and significant. A 1-standard-deviation change in our suspicion measure is associated with a 3.8-percentage-point change in application rates (as a comparison, a one standard deviate change in interest rates is associated with a 8.5-percentage-point change in application rates). Our data suggest that other factors that have been shown to be important in the refinance literature, for example numerical ability, conscientiousness, or time and risk preferences, seem less important in determining refinance decisions and are not statistically significantly associated with the refinancing decision. Our survey also establishes that most borrowers remember receiving the mailing which was sent express using DHL. Nevertheless, remembering to have received an offer is strongly associated with refinance rates. Limited attention can therefore still be an important aspect of sluggish refinancing. While the association between suspicion and application rates can ultimately not be interpreted as causal, it is robust to adding many control variables and different specifications, including using the suspicion measure to predict future take-up and an instrumental variable approach. Importantly, suspicion—along with many other factors—is robustly associated with sluggish refinancing and received limited attention in the literature.

³ The importance of intermediaries in program implementation also can be seen in the Home Affordable Modification Program (HAMP) (Agarwal et al. 2017).

⁴ We elicited consumer's suspicions about the motives of *FI* from four questions. The four questions are as follows: (1) "My financial institution will only offer me an option to refinance my mortgage if it is in my best interest to do so"; (2) "There has to be 'a catch' if my financial institution would offer me a lower interest rate"; (3) "Refinancing a mortgage (if the rate is lower than current interest rate) has hidden costs"; and (4) "A significant amount of paperwork is involved in refinancing a mortgage with my financial institution."

Our subsequent three field experiments demonstrate that barriers to refinancing are very difficult to overcome. In one field experiment, the *FI* relied on a third-party (in our case, Fannie Mae and Freddy Mac) to increase the credibility of the program. In a second field experiment the *FI* committed to paying \$500 to the borrower if the process took more than 30 days. In a third field experiment the *FI* offered an immediate benefit for applying, that is, gift cards of up to \$100, to mitigate procrastination. However, when borrowers are suspicious, they are likely to discount such interventions. If anything, these interventions might backfire, and borrowers become even more suspicious. Evidence from these large-scale field experiments (with more than 100,000 borrowers per experiment) indicates that these interventions have no effect on application rates. Offering gift cards, for example, has—if anything—a slight negative effect on application rates. In other words, interventions that try to tackle psychological barriers may be ineffective when customers are suspicious.

1. Relevant Literatures

Overall, our unique contribution is twofold. First, we empirically study the relation between refinancing and several behavioral factors, which we are able to measure directly at the individual level using a survey. Second, we explore, using field experiments, whether carefully designed interventions might overcome sluggish refinancing. More precisely, this paper makes contributions to several related literatures.

First, our paper contributes to the debate about whether people only make financial mistakes when the financial consequences are negligible (e.g., Agarwal et al. 2015).⁵ On the one hand, we find that it is indeed true that when benefits increase, people are more likely to refinance. On the other hand, a large number of borrowers make decisions that seem suboptimal and the failure to refinance is substantial in terms of foregone savings. Agarwal et al. (2015) find that in their 4-year sample period, only about 25% of eligible loans refinance under HARP. Andersen et al. (2014) show that in their context (Denmark), 24% refinance and even for households with high benefits of refinancing, the rate is only around 50%. Of course, the dollar amount that we can put on the suboptimal decision for those who do not refinance in our setting is specific to our sample and the particular decision. However, given that there are no upfront costs in refinancing in our setting, normative models of refinancing like the one by Agarwal, Driscoll, and Laibson (2013) would imply that all households in our sample should refinance.⁶ Additionally, the median foregone discounted

⁵ A larger debate centers on whether behavioral mistakes disappear when stakes are high enough (see literature in Pope and Schweitzer 2011).

⁶ With monetary closing costs, Agarwal, Driscoll, and Laibson (2013) argue that it is beneficial to refinance if the interest rate reduction would be 100 to 200 basis points. Even if we restrict the sample to people who receive an offer with more than 200 basis point rate reduction, 50% still do not refinance.

saving of the nonapplicants in our sample is around \$8,000, which is quite consistent with Keys, Pope, and Pope (2014), who estimate based on loan-level data that the median present-discounted cost of failing to refinance is about \$11,500.

Mistakes in financial decisions appear to persist even when large sums are at stake and substantial effort is made by the *FI* to remedy the mistakes. These results complement those of Andersen et al. (2014) and Bajo and Barbi (2015), who also find that many borrowers fail to refinance optimally in other contexts where barriers to refinancing are minimal or inexistent (Denmark and Italy, respectively).

Second, we contribute to the understanding of what determines refinancing decisions. With the availability of loan-level data, researchers have investigated heterogeneity in refinancing (see, e.g., Archer, Ling, and McGill 1996, Peristiani et al. 1997, LaCour-Little 1999, Deng, Quigley, and Order 2000). Still, a large unobserved borrower heterogeneity remains and Deng, Quigley, and Order (2000, p. 277) summarizes: “Either transaction costs vary a great deal across borrowers, or else some people are simply much worse at exercising options.” Andersen et al. (2014) show that their results are consistent with inattention and inertia being key factors affecting refinancing decisions, but are not able to measure these constructs at the individual level. Bajo and Barbi (2015) argue a causal relationship between inattention and refinancing decisions, where inattention is proxied at the aggregate level using the number of web searches for relevant keywords. In this paper, we complement administrative data with survey data, which allow us to measure behavioral factors at the individual level, rather than treat these factors as latent or measure them using aggregate proxies. We include various behavioral factors in our analysis, including inattention (like in Andersen et al. 2014, Bajo and Barbi 2015) and financial literacy (like in Bajo and Barbi 2015), and also numerical ability, conscientiousness, risk and time preferences, and suspicion.

Third, the results in this paper contribute to the discussion of the benefit of loyalty and trust between consumers and firms. Past research showed the importance of trust in household finance. Gurun, Stoffman, and Yonker (2018) find that trust plays an important role in the financial intermediation industry. Guiso, Sapienza, and Zingales (2004, 2008) show that a general lack of trust is related to lower participation in the stock market. Giannetti and Wang (2016) show that trust in the stock market specifically is related to household stock market participation.

Our paper argues that a particular form of mistrust, that is, being suspicious of the motives of financial institutions, substantially affects the interactions between the *FI* and its borrowers, leaving both worse off. It suggests that once consumers are suspicious about the motives of a firm, it will be very difficult for firms to reestablish trust.

Fourth, the results shed light on the question of whether exploiting consumers’ decision-making biases is sustainable. If the suspicion of our

borrowers was really shaped by the past behavior of the financial industry, then the resultant loss of trust has delayed costs in that it restricts the *FI*'s ability to sell its products. Exploiting behavioral bias in the short run may have long-term costs of increased suspicion. Indeed, the importance of trust (and its absence) in guiding customer behavior is well documented in marketing (Berry 1996, Tax, Brown, and Chandrashekar 1998, Garbarino and Johnson 1999, Sirdeshmukh, Singh, and Sabol 2002, Harris and Goode 2004), but trust and suspicion have received less attention in household finance.⁷ Exceptions are the papers mentioned above on trust and stock market participation in general and a paper by Andersen, Hanspal, and Nielsen (2014) that analyzes the effect of exposure to defaulting banks during the financial crises on investment decisions. Moreover, suspicion can have an interesting effect on pricing decisions.⁸ We argue in this paper that consumers are suspicious if firms offer them better deals. As a result, prices remain higher as consumers will not react positively to lower prices or better offers. This is related to the suggestive result in Bertrand et al. (2010) in which potential borrowers react negatively to giveaways by the lender. Overcoming mistrust is very difficult, especially if attempts at persuading consumers involve additional monetary incentives, such as gift cards, that might increase suspicion even further.

Last, but not least, our paper contributes to a larger literature on sluggish take-up of public and private subsidies and social services (for a review of take-up, see Currie 2004). Take-up of government programs, government-sponsored debt relief, tax benefits, school scholarships, or offers after product recalls, is far from perfect. Bhargava and Manoli (2015), for example, explore psychological frictions in Earned Income Tax Credit (EITC) take-up. Hoxby and Turner (2013, 2015) show that many high-achieving low-income students do not take enough advantage of scholarships to top colleges. Our paper adds another explanation for low take-up of public and private subsidies: consumers are suspicious about whether communicated benefits will materialize or come with substantial limitations and restrictions.

2. Data and the Design of the Survey and Field Experiments

2.1 Administrative data

Our data come from a large (U.S.-based) nationwide financial institution (from now on called *FI*). The *FI* sent refinancing offers to selected, preapproved borrowers between November 2011 and March 2013. All the borrowers were clients of *FI* holding a current mortgage with *FI*. Offer letters sent to borrowers with at least 10 years left on their mortgages presented two options, a *Maintain offer* and an *Extend offer*. The *FI* sent the offers by Express Mail through

⁷ Trust has a longer tradition in other parts of economics, for example, in behavioral game theory (e.g., Camerer 2003) or in the debate about credibility of monetary policy (e.g., Blinder 2000).

⁸ This point was shaped by a discussion with Botond Koszegi.

	Current Loan	Option 1: Maintain Term	Option 2: Extend Term
Product	<XX>-Year Fixed Loan	<XX>-Year Fixed Loan	<XX>-Year Fixed Loan
Interest Rate/APR	<X.XXX%>	<X.XXX%/X.XXX%> APR(e) ⁹	<X.XXX%/X.XXX%> APR(e) ⁹
Monthly Payment	<\$X,XXX>	<\$X,XXX>	<\$X,XXX>
		Payment Savings	Payment Savings
		<\$X,XXX>	<\$X,XXX>

Figure 1
Offers sent by FI

DHL to increase the attention given to the offer by borrowers. Offers were “preapproved,” meaning the *FI* approved the loan based on their information on file. It was, however, still possible that the application might not be approved during the refinance process due to changes unknown to the *FI* when making the offer, for example, employment status. The two offers are defined as follows:

1. *Maintain offer*: This offer maintained most of the mortgage terms (particularly the amount of time remaining on the mortgage) but lowered the interest rate and therefore the monthly payment. Because this is the only difference between the current mortgage and the new one, the maintain offer dominates the current mortgage in monetary costs. This offer provides us with a lower bound of the potential savings to the customer if they accepted the offer.⁹
2. *Extend offer*: This offer extended the term of the mortgage. If, for example, the current loan had a remaining term of 23 years, this offer (if accepted) extended the term to 30 years and adjusted the interest rate and monthly payment accordingly. The monthly payment is lower than in the *Maintain offer* even with the same interest rate because the loan is repaid over a longer time period. This trade-off makes the “extend offer” more difficult to compare to the original loan. We therefore focus on the characteristics of the *Maintain offer*.

Figure 1 provides an example of how these two offers were displayed. (*FI* changed the creatives slightly between mailings over time).

We have extensive information on about 547,000 borrowers and their mortgages. All those borrowers received a *Maintain offer*, have more than 10 years remaining on their current loan, and have nonmissing values for crucial mortgage characteristics. Panel A in Table 1 shows summary statistics for both borrower and mortgage characteristics. The last column of panel A shows summary statistics from Keys, Pope, and Pope (2014). Panel B shows details of the first offer that the borrowers received from the *FI*.

⁹ Borrowers with less than 10 years remaining on their current mortgage received a “Maintain” offer that actually did not maintain the remaining term of their current offer, but rather had a 10-year term. We exclude those offers from the analysis in Sections 2.1 and 3.1, because it is questionable whether refinancing into a mortgage with an extended term is optimal.

Table 1
Summary statistics for our administrative data

Variable	N	Mean	SD	Median	Keys, Pope, and Pope (2014)
<i>A. Borrower and mortgage characteristics</i>					
Remaining term (in months)	547,331	248.51	53.29	257.00	280.8
Note rate (current mortgage interest rate)	547,331	5.96	0.60	5.88	5.52
Original loan amount (in 1,000\$)	547,331	161.93	83.85	143.60	
Current LTV	547,331	71.24	28.54	69.61	74.2
Unpaid principal balance (in 1,000\$)	547,331	139.03	77.18	120.95	205.218
Income (in 1,000\$)	547,331	76.56	33.84	65.00	
Current FICO	547,331	734.51	69.75	752.00	737
Investor dummy	547,331	0.05	0.23	0.00	
<i>B. Offer characteristics of the 1st offer (maintain)</i>					
Decrease in interest rate	547,331	1.83	0.75	1.75	
Monthly savings (in \$)	547,331	109.58	70.85	92.09	

Panel A shows characteristics of the borrower and the mortgage at the time of the first offer, and panel B shows characteristics of the 1st offer sent to borrowers. In the last column, we show summary statistics (average values) from Keys, Pope, and Pope (2014) (their table 1, column 1). Their FICO score information is at origination, whereas we provide FICO scores at the time of the offer.

The selection of homeowners due to the criteria required by HARP and any related preapproval process within *FI* suggests that our sample would not be a subset of the pool of a representative sample of mortgage holders reflected in the last column. There are other reasons for the differences. That sample was originated before November 2010 and active in December of 2010. The current mortgages of our sample were originated before 2010 and about 50% were originated before 2005 (see Appendix Table A1 for the distribution of origination years). Our sample has fewer remaining months on their mortgage and smaller unpaid balances, possibly reflecting the difference in origination years. Interest rates are somewhat higher for our sample, while FICO scores are relatively similar. Our FICO scores (median of 750) reflect that borrowers must be current on their mortgage to qualify. It is noteworthy that borrowers, on average, are not underwater; that is, their LTV is below 100. While the HARP program was designed with underwater borrowers in mind, there is no restriction that borrowers have to be underwater. Our *FI* clearly targets borrowers with LTV below 100. However, they did not share with us their selection model.

It may seem that it would have been potentially beneficial for our sample to refinance previously, but it is difficult to say since a lower interest rate is not enough to make refinancing optimal – given the associated costs. For example, in Keys, Pope, and Pope’s (2014) nationally representative sample, 91.4% have higher interest rates than the market rate, but “only” for 41.2% would it be optimal to refinance.

In sum, our selected sample does not look that different from a nationally representative sample of borrowers. The potential mortgage savings that people leave on the table are also similar to the amounts calculated by Keys, Pope, and Pope (2014).

Panel B in the table shows that the Maintain offer reduces the mortgage interest rate by an average of 1.83 percentage points (median 1.75), translating to an average monthly saving of \$110 (median \$92). The *FI* set the new mortgage interest rate based on borrower and mortgage characteristics (e.g., original note rate, current FICO, and mortgage size) and on the market rate at the time the offer was sent out (the *FI* did not share their proprietary model determining the interest rate decrease with us). While the decrease in interest rate is not an exogenous variable, we can explain more than 90% of the variance in the offered interest rate reduction with the market interest rate at the time of offer, the rate on the current loan, the FICO score of the borrower, the remaining months on the current mortgage, and an indicator variable identifying which mortgages were held on investment properties (see Appendix Table A2 for the result of an ordinary least squares (OLS) regression). However, we do not know how the *FI* decided on the timing of when to send a refinance offer to a borrower, which strongly affects the interest rate of the offer through the market interest rate on that day.

Our analysis focuses on the borrowers' response to the first offer they received from *FI*. Later mailings would reflect the influence of prior mailings and the decisions of the *FI*. Since we do not have information on how the *FI* decided who received additional mailings we do not include them in our primary analysis. However, we will use information from remailings in order to test whether information from our survey predicts take-up of future offers.

Finally, we also have information about the status of all mortgages as of July 2013, that is, on average, 361 days (more than 11 months) after the first offer was mailed. In particular, we know whether the borrower paid off their mortgage with *FI*. For a borrower who did not respond to the first offer, paying off their loan can mean a number of things: (a) the borrower applied to future offers, (b) the borrower refinanced with *FI* outside of the HARP, (c) the borrower refinanced with another provider, (d) the borrower defaulted on the loan, or (e) the borrower paid off the loan (see, e.g., Archer, Ling, and McGill 1996, LaCour-Little 1999 for a discussion of what could cause a loan to be paid off).¹⁰ We therefore need to be careful in interpreting "paid off" as refinancing. However, we are certain that if the loan was not paid off, then the borrower did not refinance, even though they could have.

2.2 Survey data

We were able to survey a subset of the borrowers in our administrative data set and to match their survey responses to their administrative data. Around 170,000 borrowers who had an email address on file were invited to take our online survey. The survey was not conducted by the *FI*, but by Columbia University in July/September 2012. Appendix D1 shows the introductory email

¹⁰ To be preapproved by the *FI* and in line with HARP rules, borrowers cannot be delinquent on their loan. Therefore, modifications are unlikely to be an option for our borrowers.

Table 2
Selection into survey?

Variable	Full sample	Mean NR	Mean R	Mean NR-R	<i>p</i> -value two-tailed
Decrease in interest rate (Maintain)	1.83	1.56	1.58	-0.02	.04
Note rate	5.96	5.70	5.67	0.03	.01
Original amount (in 1,000\$)	161.93	172.88	177.03	-4.15	.00
Current LTV	71.24	66.56	61.92	4.64	.00
Unpaid principal balance (in 1,000\$)	139.03	136.96	136.77	0.19	.88
Income (in 1,000\$)	76.56	82.44	84.26	-1.82	.00
Current FICO	734.51	740.13	747.83	-7.70	.00
Applied to 1st offer (=1)	0.20	0.16	0.20	-0.04	.00
Paid off in July 2013 (=1)	0.49	0.46	0.54	-0.08	.00
N	547,331	165,882	3,978		

Observable characteristics of NR=Nonrespondents and R=Respondents and *p*-values from two-sided *t*-tests. The number of observations slightly differs between different variables. *N* in the table indicates the maximum number of observations.

text. Our response rate was 2.3%, leading to 3,978 respondents. This is in the historical range of market research conducted by the *FI*, but lower than when using a preselected online panel. Of people who responded to the survey, 1,900 completed the entire survey (48% completion rate).

Before we explain the questions in the survey, it is natural to ask whether respondents were substantially different than nonrespondents. While it is impossible to know selection effects on unobservable characteristics, we can use the extensive administrative data to see whether respondents differed from nonrespondents on observable borrower and mortgage characteristics. Table 2 shows a set of summary statistics for nonrespondents (NR) and respondents (R) to the survey as well as the results of *t*-tests comparing the differences. The differences in mortgage characteristics are rather small but, given the very large sample size, often statistically significant. For example, respondents have a FICO score that is about 8 points higher. Given a standard deviation of 66, this is a rather small difference. However, one important difference is whether R and NR actually took up the refinance offer. About 16% of NR applied for a refinance offer, while 20% did among the R. While the differences across all the variables do not seem to be large in absolute terms, we have to keep the differences in mind when trying to generalize from this self-selected sample.

We now turn to the survey questions. For the main analysis, the questions about the motives of financial institutions will be particularly important (see Appendix D2 for the full survey and Table 4 for summary statistics of the variables used in this paper):

Suspicious of the motives of FI. We asked individuals how much they agreed or disagreed with four statements on a 5-point scale from “strongly agree” to “strongly disagree.”¹¹

¹¹ The questions were introduced as follows: “Below are four statements about the motives of financial institutions to offer refinance opportunities and the costs of refinancing. As a reference point, please think about the financial institution from which you have your mortgage.”

Table 3
Distribution of “Suspicious of the motives of FI”

Value	Freq.	%	Cum.
0	223	8.95	8.95
1	429	17.22	26.16
2	573	22.99	49.16
3	729	29.25	78.41
4	538	21.59	100.00
Total	2,492	100.00	

“Suspicious of the Motives of FI” is the sum of four dummies that equal 1 if the respondents “agree” or “strongly agree” (reversed for statement 1) with the four statements about the motives of FI.

- “My financial institution will only offer me an option to refinance my mortgage if it is in my best interest to do so.”
- “There has to be ‘a catch’ if my financial institution would offer me a lower interest rate.”
- “Refinancing a mortgage (if the rate is lower than current interest rate) has hidden costs.”
- “A significant amount of paperwork is involved in refinancing a mortgage with my financial institution.”

To create a single item based on the answers to those four statements, we created four dummies that take on the value 1 if respondents “agree” or “strongly agree” (reversed for statement 1). We then add up the four dummies to create a 5-point scale that we call “Suspicious of the Motives of FI.” There are, of course, other ways to aggregate the answers to the four subitems, and we show the robustness of our results to those alternative ways in Table A3 in the appendix. Table 3 shows the distribution of our suspicion measure. While only about 9% disagree with all the statements, around 50% agree or strongly agree with either 3 or 4 of the statements.

We also use answers to a question that would capture the effect of prior experience on our suspicion measure: “How often did you feel that your financial institution (mortgage lender, if you have a mortgage) has offered you or tried to offer you terms or services that were unfavorable to you but favorable to them?” Participants answer on a 5-point scale from “Never” to “Always” (with the middle option labeled as “Sometimes”). The variable may reflect historic experience with FI that precede increased levels of suspicion. As seen in Table 4, the average respondent feels that they got offered unfavorable terms “Sometimes” (Average of 2.8); 26% of respondents reported that their financial institutions offered them unfavorable terms more than “Sometimes.” The correlation of this variable with our suspicion measure is 0.28 ($p < .01$). In some of our additional tests we will use this variable as an instrument for suspicion (discussed in more detail below).

In addition to the suspicion measure, the survey questions were designed to measure many aspects of an individual’s financial decision-making process (see

Table 4
Summary statistics for survey answers

Variable	N	Mean	SD	Median	Min	Max
Suspicious of the motives of <i>FI</i>	2,492	2.37	1.24	3	0	4
Unfavorable terms in past	2,492	2.80	1.19	3	1	5
Trusts others	2,492	0.28	0.45	0	0	1
Trusts banks	2,492	0.27	0.45	0	0	1
Present bias β	2,445	0.98	0.16	1.01	0.06	1.35
Discount rate δ	2,445	0.00	0.00	0.00	0.00	0.01
Probability weighing α	1,964	0.60	0.16	0.59	0.16	0.93
Risk aversion σ	1,964	0.48	0.08	0.48	0.30	0.69
Loss aversion λ	1,964	1.30	0.42	1.34	0.21	2.13
Conscientiousness	2,471	6.01	1.51	7	0	7
Financial literacy scale	2,474	6.19	1.08	6	0	8
Numeracy scale	2,392	4.88	2.04	5	0	8
Probability of moving	2,492	0.19	0.26	0.01	0	1
Believe that eligible: Yes	2,480	0.33	0.47	0	0	1
Remember offer: Yes (=1)	2,492	0.71	0.46	1	0	1
Age	2,492	51.04	10.33	51	17	112
Ethnicity: White (=1)	2,492	0.77	0.42	1	0	1
College degree of higher (=1)	2,492	0.74	0.44	1	0	1
Female (=1)	2,492	0.42	0.49	0	0	1
Sociodemographics NA (=1)	2,492	0.08	0.27	0	0	1

Summary statistics were restricted to people who also answered the question for “Suspicious of the motives of *FI*.”

Appendix D2 for the full list of the questions and their respective wordings). We will use the following in the analysis below:

- *Remember offer?* Borrowers were asked “Have you gotten an offer to refinance your mortgage from your financial institution in the last 12 months?”

- *Believe that eligible.* In the survey, we explained the HARP program and asked respondents whether they thought that they would be eligible. The dummy variable is 1 if they think they are eligible and 0 otherwise.

- *Trust.* We asked about trust in others, bankers, banks, and large organizations on a 5-point scale from “do not trust at all” to “trust completely” (developed by Sapienza and Zingales 2012). We transformed the answers into dummies that take the value 1 if the respondent selected one of the two top answers. In the main analysis we use “Trusts others” and “Trusts banks.” The suspicion measure only correlates with “Trusts banks” (correlation coefficient = -0.138).

- *Financial literacy* was measured using eight questions standard in this literature (for a review, see Lusardi and Mitchell 2014). We assigned one point for each correct answer and summed up the points.

- *Numerical ability* was measured using questions from Fernandes, Lynch, and Netemeyer (2014) and a version of the cognitive reflection test (Frederick 2005). We assigned one point for correct answers to each of the eight numerical ability questions and summed up the points.

- *Conscientiousness* was measured using an 8-item instrument (Saucier 1994). For each item we created a dummy that is 1 if the respondent answered that the attribute, for example, whether they are organized, is at least slightly accurate, 0 if neutral or inaccurate. For the negative attributes, for example,

sloppy, it is 1 if inaccurate. We summed the eight dummies to create our measure.

- *Time Preferences.* We measured individual time preferences using the “dynamic experiments for estimating preferences” (DEEP) methodology developed by Toubia et al. (2013). The method uses a quasi-hyperbolic discounting model (Strotz 1956, Laibson 1997) and generates for each respondent to the survey two parameters: β that captures present bias ($\beta < 1$ corresponds to present bias, $\beta = 1$ corresponds to no present bias, $\beta > 1$ corresponds to future bias) and δ that captures the daily discount rate.

- *Risk Preferences* were measured using the risk version of the DEEP methodology developed by Toubia et al. (2013). The underlying model is cumulative prospect theory (Tversky and Kahneman 1992), and risk preferences are captured by three parameters: a probability weighing parameter α (smaller values mean more distortion of probabilities whereby low likelihood events are over weighted and high likelihood events under weighted, $\alpha = 1$ corresponds to no distortion), a risk aversion parameter σ (smaller values mean more risk aversion, $\sigma = 1$ implies risk neutrality), and a loss aversion parameter λ (higher values mean more loss aversion).

- *Sociodemographics:* We elicited a number of sociodemographic variables, for example, education and ethnicity. For people with missing sociodemographic variables, we imputed their value at the mean value and created a dummy for missing information (“NA”).

- *Moving Probability:* We elicited beliefs about “*What is the probability that you will move in the next 12 months*” from 0% to 100%.

2.3 Field experiments

The *FI* implemented three field experiments in the spring of 2013. In each field experiment a new offer letter was created to address a specific barrier to refinancing, and tested with a control and a treatment group. Tables B1, B2, and B3 in the appendix show that randomization worked when comparing mortgage and borrower characteristics across conditions. The experiments were conducted at different times during the spring of 2013, with different samples, and with incomplete overlap with the main data set. Accordingly, we see some differences across experiments in the overall application rates that could reflect differences in economic conditions, offers made, or who was contacted. However, because the *FI* successfully randomized borrowers to conditions, these variations are not relevant to our question concerning differences between groups within an experiment. The sample of the experiments consisted of borrowers who had not refinanced up to that point. As such, those might be particularly reluctant to refinance.

The three experiments were as follows:

1. *Gift card* experiment. In this experiment around 103,000 borrowers were randomly assigned into four groups and received a new offer. Three

treatment groups received \$25, \$50, or \$100 immediately if they applied to the refinancing offer. A control group received the offer but no gift cards for applying.

2. *Credibility* experiment. In this experiment, about 110,000 borrowers were randomly assigned to a control and a treatment group. The treatment group received the same offer letter as the control group but an extra flier was included, on which Fannie Mae and Freddie Mac informed the borrower about the HARP program and its benefits (see Figure A3 in the appendix for the text of the insert).
3. *Express guarantee* experiment. In this experiment, around 80,000 borrowers received either a normal offer letter (control group) or an offer in which the *FI* promised to close in 30 days. If not, the borrower would receive \$500.

3. Results

We present the results in three steps. First, we analyze savings that borrowers could have had if they were not sluggish in refinancing, using administrative data. We also study how they reacted to the attractiveness of the offer, measured as the interest rate decrease. Second, focusing on the survey responses matched to the administrative data, we analyze the relation between suspicion and take-up behavior and present results on whether and how other psychological factors are associated with application rates. Third, we present results from the three large-scale field experiments.

3.1 Leaving money on the table? Application rates and potential savings

How do borrowers react to the offer sent by *FI*? Table 5 shows how many borrowers applied to the first HARP offer (i.e., either the *Maintain* or the *Extend* offer) they received and how many paid off the loan by July 2013 (which, on average, was 361 days after the borrower received their first offer). Panel A shows rates for all borrowers in our sample. In panel B, we restrict the sample to borrowers who received the first offer at least 270 days (≈ 9 months) before July 2013. This allowed the borrower enough time to look for another offer beside the one by *FI*. For this subset, the first offer was received, on average, 404 days (more than 13 months) before July 2013.

Table 5 shows that only about 20% applied to the first HARP offer they received from *FI*. An additional 29% paid off their loan later (by July 2013). This number increases to 33% for borrowers who received their first offer at least 9 months before the end of our time window. Therefore, more than 47% did not refinance their loan even though we know that they received at least one preapproved offer from *FI* that dominated their current mortgage. That means, many borrowers do not refinance even if an attractive offer is presented to them, that is, when there is no need for them to be aware that interest rates

Table 5
Application and refinance rates

	Frequency	%	Cumulative
<i>A. All borrowers</i>			
Not refinanced	277,167	50.64	50.64
Applied to 1st offer	110,581	20.20	70.84
Paid off later	159,583	29.16	100.00
<i>B. 1st offer > 270 days ago</i>			
Not refinanced	212,711	47.44	47.44
Applied to 1st offer	88,812	19.81	67.24
Paid off later	146,898	32.76	100.00

Panel A shows the application and the refinance rates for all borrowers in our sample as of July 2013. Panel B shows the application and the refinance rates as of July 2013 for borrowers who received their first offer more than 270 days before July 2013.

have changed or to search for a refinancing offer and when the offer has no associated monetary cost.

To calculate how much money nonapplicants leave on the table, we focus on the “maintain” offer to ensure that we use only dominating offers, as everything except the interest rate is the same between the original mortgage and the offer foregone by the borrower. Table 6 presents the offer details relative to the current mortgage for both applicants and nonapplicants. “Applicants” are defined as borrowers who applied to their first offer or paid off the loan before July 2013, and “Nonapplicants” are defined as borrowers who did not respond to the first offer *and* did not pay off their loan as of July 2013 (which was, on average, 361 days after receiving their first offer). Column 1 shows that nonapplicants could have saved a substantial amount of money by applying to the first offer. On average, their interest rate would have been almost 1.9 percentage points lower, resulting in an average monthly saving of \$105. Savings are extremely skewed, but even median savings would have been \$88 per month. Multiplying the monthly savings with the number of remaining months on the mortgage gives an unadjusted total savings over the full lengths of the mortgage. On average, nonapplicants could save \$26,589 (median=\$21,312). This is, of course, too high since we need to discount future benefits, and adjust for the probability of moving/paying off/refinancing in the future, and the tax incentives associated with paying interest. To calculate the foregone *adjusted* savings, we follow the conservative approach by Agarwal, Driscoll, and Laibson (2013) and assume a 5% real discount rate, a 10% chance of moving per year, and a 28% tax bracket. We then calculate the net present value (NPV) of the savings in two ways: Option 1 assumes that borrowers pay the reduced monthly payment and consume the saved money. Option 2 assumes that borrowers use the saved money per months to repay the mortgage faster. Based on the more conservative Option 1, nonapplicants leave, on average, \$8,719 on the table (median: \$7,399). The mean NPV of the potential savings represent about 12% of the nonapplicants’ reported annual income. Figure A1 in the appendix shows the distribution of savings for applicants and nonapplicants.

Table 6
Savings of applicants and nonapplicants

	(1) Nonapplicants	(2) Applicants	(3) NA-A	(4) t-value
Interest rate decrease (Maintain)	1.941 [1.875]	1.722 [1.625]	0.219	109.109
Monthly savings (Maintain) (in \$)	105.095 [88.414]	114.177 [96.014]	-9.082	-47.508
Unadjusted savings (in \$)	26,589 [21,312]	30,068 [24,170]	-3,478	-60.681
NPV of savings (in \$) (option 1)	8,719.22 [7,399.3]	9,473.78 [8,067.45]	-754.56	-51.119
NPV of savings (in \$) (option 2)	10,131.11 [8,553.8]	11,118.79 [9,419.75]	-987.68	-56.18
N	277,167	270,164		

Median values are in brackets. “Nonapplicants” are borrowers who neither applied to the first offer sent by *FI* nor have repaid their loan by July 2013. “Applicants” either applied to the first offer or paid the loan off before July 2013. The table shows the savings benefits for the “Maintain” offers, which strictly dominate the current mortgage.

Interestingly, Table 6 seems to indicate that interest rate reduction is lower for applicants than it is for nonapplicants, potentially indicating that nonapplicants react differently to interest rate reduction. However, this is driven by outliers in interest rate reduction (Figure A2 in the appendix shows a binscatter plot with 17 bins) and does not reflect actual monthly savings. Applicants experience higher savings than nonapplicants would. Figure 2 shows that borrowers do react to savings on monthly payment as expected: the higher the savings, the higher the probability that borrowers accept the offer.

Of course, both the interest rate reduction and the monthly savings are correlated with other mortgage characteristics such as the note rate or the unpaid principal balance (UPB). Table 7 presents the outcome of a series of binomial logistic regressions that use as a dependent variable whether or not the borrower applied to their first HARP offer. Columns 3 and 4 control for the relevant mortgage characteristics and still confirm that borrowers react to the interest rate decrease benefit and the monthly payment reduction in the expected way. Based on the size of the effect in Column 4, for example, an increase in the monthly savings of 1 standard deviation (\$71) is associated with an increase in the application rate of around 3 percentage points.

In sum, the results so far show that borrowers leave substantial amounts of money on the table by not applying to the offer sent by the *FI*. While borrowers seem to react to the attractiveness of the offer in the expected direction, that is, more attractive offers tend to increase the application probability, there are still about 50% of the borrowers who neither applied to the first offer they received nor paid off their loan (potentially by refinancing after receiving a later offer or through a competitor of *FI*).

3.2 Barriers to refinancing

The previous section suggested that around half of the borrowers in our sample leave money on the table by not refinancing their mortgages, even though

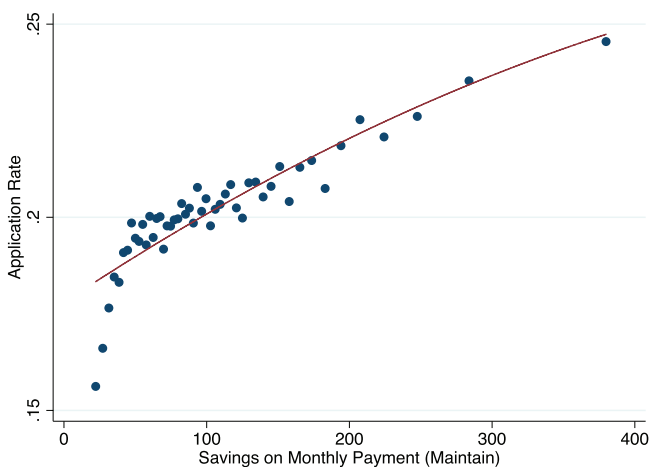


Figure 2
Monthly savings and application rates
 The graph is produced using binscatter for Stata by Chetty, Friedman, and Rockoff (2014).

Table 7
Effect of rate and savings benefit on applications

	(1)	(2)	(3)	(4)
Decrease in interest rate (Maintain)	0.538*** (0.160)		0.551*** (0.211)	
Decrease in interest rate (Maintain) ²	-0.103*** (0.027)		-0.066*** (0.021)	
Monthly savings (Maintain)		0.001*** (0.000)		0.003*** (0.001)
Original note rate			-0.173 (0.179)	-0.117 (0.079)
Original amount (in 1,000\$)			0.000 (0.001)	0.000 (0.001)
Current LTV			0.011*** (0.001)	0.011*** (0.001)
Unpaid principal balance (in 1,000\$)			-0.002 (0.002)	-0.004** (0.002)
Blended income at origination (in 1,000\$)			0.000 (0.000)	0.000 (0.001)
Current FICO			0.001*** (0.000)	0.001*** (0.000)
Investment indicator (=1)			-0.019 (0.114)	-0.030 (0.077)
Remaining months on current loan			-0.001 (0.001)	-0.002*** (0.001)
Constant	-1.959*** (0.256)	-1.499*** (0.072)	-2.617*** (0.632)	-1.840*** (0.604)
Dummies for loan origination period	No	No	Yes	Yes
Number of observations	547,331	547,331	547,331	547,331

Dependent variable: Borrower applied to first offer (=1) or did not (=0). Logit regression. Standard errors are in parentheses. Regressions include dummies for origination period, that is, year dummies for origination year after 2003 and one for mortgages that were originated before 2003. Standard errors are clustered at the month that the offer was sent. *Level of significance*: * $p < .1$, ** $p < .05$, and *** $p < .01$.

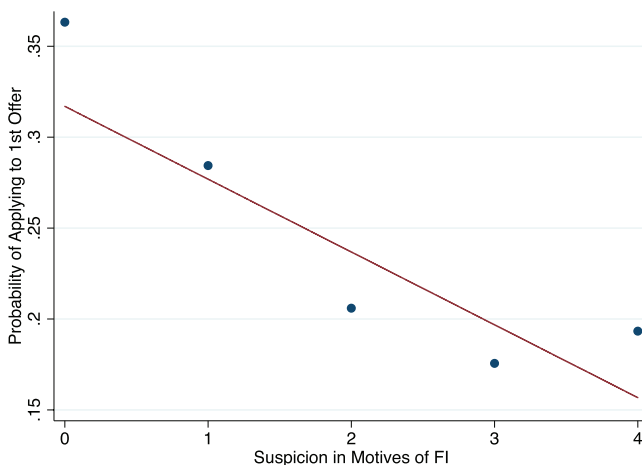


Figure 3
Suspicious of the motives of FI and applications
 The graph is produced using binscatter for Stata by Chetty, Friedman, and Rockoff (2014).

we know that they received an offer to refinance that dominated their current mortgage. This section uses answers from our survey matched to administrative data to investigate potential explanations, that is, barriers to refinancing. In presenting the results, we will mainly focus on whether consumers are suspicious of the motives of banks and whether this suspicion acts as a barrier to refinance. However, the section also discusses a number of other potential barriers to refinance: personality traits (e.g., conscientiousness and/or forgetting about the offer), cognitive skills (e.g., numerical ability), expectations about the future and time and risk preferences. Those factors can be thought of as influencing the probability that a borrower forgets about the offer or loses it (conscientiousness), affecting how well the borrower understands the offer (financial literacy and numerical ability), or how the borrower thinks about the trade-off between the current effort of refinancing and the future benefits and their associated uncertainties. Importantly, the results cannot be interpreted as causal, as both omitted variables and potential reverse causality cannot be ruled out. However, the evidence can nevertheless provide indicators about the potential importance of certain psychological barriers and be informative for interventions.

Figure 3 shows the association between our measure of suspicion and application to the first offer sent by FI. The figure shows a strong negative relationship between suspicion and application rates. The application rate for people who are in the two lowest suspicion groups is 31%. For people in the two highest suspicion groups, it is only 18%.

Table 8 explores the association between suspicion and application further. The dependent variable is 1 if the household applied to the first offer received

Table 8
Suspicious of the motives of FI

	(1)	(2)	(3)	(4)	(5)
				DV: Applied after	IV probit
Suspicious of the motives of FI	-0.229*** (0.039)	-0.192*** (0.053)	-0.200*** (0.045)	-0.094* (0.050)	-0.181* (0.098)
Decrease in interest rate (Maintain)		0.984*** (0.379)	1.010*** (0.336)		0.539*** (0.202)
Decrease in interest rate (Maintain) ²		-0.061 (0.064)	-0.041 (0.060)		-0.020 (0.036)
Trusts others		0.223 (0.145)			
Trusts banks		-0.302** (0.153)	-0.223* (0.131)	-0.032 (0.135)	-0.162* (0.083)
Present bias β		-1.338 (0.920)			
Discount rate δ		-96.032 (129.555)			
Prob. weighing α		-2.602 (2.897)			
Risk aversion σ		-1.787 (1.571)			
Loss aversion λ		0.710 (1.038)			
Conscientiousness		0.073 (0.044)			
Fin. literacy		-0.115 (0.071)			
Numeracy		0.061 (0.040)			
Believe that eligible: Yes		1.291*** (0.134)	1.237*** (0.117)	0.384*** (0.136)	0.709*** (0.071)
Probability of moving (next 12 months)		-0.476* (0.268)	-0.410* (0.233)	-0.202 (0.238)	-0.245* (0.134)
Remembers offer: No		-1.283*** (0.197)	-1.269*** (0.170)	-0.041 (0.144)	-0.690*** (0.091)
Remembers offer: Don't know		-1.165*** (0.345)	-1.197*** (0.293)	-0.402* (0.230)	-0.680*** (0.156)
Age		-0.001 (0.007)	0.001 (0.006)	0.008 (0.006)	-0.000 (0.003)
Female (=1)		-0.144 (0.144)	-0.070 (0.120)	-0.023 (0.125)	-0.042 (0.068)
College degree or higher (=1)		0.076 (0.175)	0.104 (0.149)	0.295* (0.160)	0.078 (0.087)
Ethnicity: White (=1)		-0.084 (0.189)	-0.098 (0.159)	-0.121 (0.167)	-0.067 (0.091)
Sociodemographics NA		-1.109 (1.117)	-0.323 (0.298)	-0.103 (0.300)	-0.197 (0.169)
Time between 1st offer and survey		0.007*** (0.001)	0.007*** (0.001)	0.001 (0.001)	0.004*** (0.001)
# of offers received before survey				-0.273 (0.200)	
Constant	-0.733*** (0.097)	0.406 (2.698)	-1.289 (1.671)	-2.391* (1.335)	-0.676 (0.948)
Dummies for loan origination period	No	Yes	Yes	Yes	Yes
Mortgage offer controls	Yes	Yes	Yes	Yes	Yes
Number of observations	2,492	1,674	2,181	1,472	2,181

Dependent variable: Borrower applied to first offer (=1) or did not (=0) in Columns 1–3 and 5. Dependent variable is applied to any offers households received after survey in Column 4. Logit regressions are reported in all regressions, except in Column 5, which reports results from an IV probit model, that is, a maximum likelihood estimator with instrumented suspicion measure. Standard errors are in parentheses. For coefficients on mortgage offer controls, see Table A5 in the appendix. *Level of significance:* * $p < .1$, ** $p < .05$, and *** $p < .01$.

and 0 otherwise. Column 1 presents results from a logit regression with only our suspicion measure as the independent variable plus a constant term. It shows the association between suspicion and application shown in Figure 3. Column 2 shows that the effect is robust to adding many relevant control variables (discussed further below). Column 3 keeps those control variables from the survey that are statistically significant at the 95% level in Column 2. The association between suspicion and application remains robust. The effect is also robust to other ways of constructing the suspicion measure (see Appendix Table A3).

To calculate the marginal effect, we rerun the regression in Column 3 but with only a linear term of *Decrease in interest rate*: a 1-standard-deviation (SD = 1.25) increase in our suspicion measure is associated with a decrease in the probability of applying of 3.8% points (marginal effect of *Suspicion* = -0.030). As a comparison, a 1-standard-deviation decrease in the rate benefit (SD = 0.64) is associated with an increase in the probability of applying of 8.5% (marginal effect of *Decrease in interest rate* = 0.132).

The result that suspicion is associated with refinancing probability, is related to the survey result by a report of Fannie Mae (Fannie Mae 2013). The report interviewed 2,400 HARP-eligible borrowers of the Fannie Mae book of business. All the information (including whether they actually refinanced and information about their mortgage) was self-reported. Among borrowers who had not refinanced, 22% stated that a major reason was that they do not trust the lenders that contacted them. The survey only asked borrowers who did not refinance about their trust level. Our result more directly shows that suspicion is associated with application rates. We also have the advantage that many variables (especially whether they actually refinanced and mortgage characteristics) are from administrative data. Also, we are sure that all our borrowers actually received an offer (and we know the details of that offer). Interestingly enough, it seems that being suspicious of the motives of *FI* is distinct from trust in general (“Trusts others”) or trust in financial institutions (“Trusts banks”). In our data, trust (either in others or financial institutions) is not positively related to application rates. If anything, trust in banks tends to be associated with lower application rates. Answers to the “trust” question might capture more than the expectation of being treated fairly. They might also indicate trust in the financial system leading to a more optimistic view that refinancing offers by competitors of *FI* might be available.

While the association between suspicion and application is robust to the inclusion of many factors, it is unclear whether we can interpret the relationship as causal. In particular, our survey was sent out after respondents received their first offer and therefore households’ experience with this offer could have affected their suspicion level (rather than the other way around). To shed some light on this issue, we take two approaches: (1) we predict application to offers mailed *after* the survey was conducted, and (2) we use an instrumental variable approach.

In the model in Column 4, we concentrate on households who haven't applied to an offer and/or have not repaid their mortgage by the time of the survey. In this case, the *FI* keeps sending most of them new offers.¹² The dependent variable is whether the individual applied to one of the future offers that they received. We control for the same variables as in Column 3, except that we exclude the variables for the interest rate decrease because the DV is not specific to one offer. We also include a variable that captures how many offers the household received from the *FI* before the survey started. This is a difficult test of the relationship between suspicion and refinancing, as more suspicious people remain in the sample as they have not refinanced. The number of observations also drops which substantially decreases the statistical power. Nevertheless, the results show that the suspicion measure can predict future application rates.

Column 5 takes another approach. It shows results of an IV probit regression in which we instrument the suspicion measure by the answer to the question about how often respondents got unfavorable terms when dealing with *FI* in the past. As mentioned in Section 2.2, the answers to the question about unfavorable terms in the past were elicited using a 5-point scale from "Never" to "Always" (with "Sometimes" as the middle option). Although this measure is not exogenous to the survey, receiving unfavorable terms in the past should influence current suspicion, and should not be linked to the customer's experience with the current offer. The correlation with the suspicion measure was 0.28. The results of the IV regression show that the association between our suspicion measure and take-up is robust to our instrumental approach. While this regression in itself is probably not enough to establish a causal link between suspicion and refinancing decisions, it provides convergent evidence suggestive of a causal relationship. Interestingly, it also suggests that banks may pay a cost in the present for giving unfavorable terms to their customers in the past.

Other variables that we included in the survey and included in Column 2 of Table 8 shed light on other potential (behavioral) factors that could lead to sluggish refinancing:

Do households not look at the offer or forget about it? Households are bombarded with various offers from financial institutions and might just not look at offers. Similarly, households might just misplace the offer. What makes the HARP offer we analyze less likely to be just put in the pile with other financial product letters is that it was received separately by Express Mail. We have two pieces of more direct evidence that may shed more light on this issue.

a. We find that remembering receiving an offer is strongly associated with application rates.¹³ However, including this variable into the regression does not affect the association between suspicion and application rates. The association

¹² The *FI* did not share their model of determining who will receive additional mails and who will not.

¹³ Seventy-one percent of the respondents remembered receiving an offer, whereas 22% said they did not receive an offer (while, in fact, we know that they did); 7% did not remember whether they got an offer. Importantly, however, even among nonapplicants, 66% remember that they received an offer.

between suspicion and application probability stays the same if we run the regressions only with the subsample of borrowers who remember receiving an offer (see Table A4 in the appendix).

b. Another (more indirect) way to investigate whether letters were not opened or were misplaced is to determine whether more conscientious people are more likely to apply. Conscientiousness (one factor in the Big Five personality inventory) has been shown to affect many financial and social outcomes, for example, accumulation of assets, credit scores, and health outcomes (see Letkiewicz and Fox 2014 for a review of the literature). The results in Column 2 do not show a strong relationship between conscientiousness and application rates and the inclusion of the conscientiousness measure does not affect the association between suspicion and application rates.

In sum, while it is possible that some borrowers might not have opened the offer letter, this phenomenon alone does not seem to be able to explain the association between suspicion and application rates. Nevertheless, limited attention may well still be part of the problem of sluggish refinancing.

Do households not understand the details/significance of the offer? Research shows that financial sophistication can significantly affect financial behavior (e.g., Gerardi, Goette, and Meier 2013, Lusardi and Mitchell 2014). While the HARP offers sent out by *FI* are relatively simple since they clearly calculate the monthly savings of the offer and keep everything else constant, more financially sophisticated people might still understand the implications of accepting the offer better. The results in Column 2 of Table 8, however, show that measures of financial literacy and numerical ability are not associated with application behavior.

Do borrowers believe that they are not eligible? Only 33% of respondents think that they are eligible for HARP when we describe the program. The answer to this question is also strongly associated with whether they actually applied to the offer that they received from *FI*. The association between our measure of suspicion and application rates is, however, robust to including a dummy for whether they think they are eligible.

Are nonapplicants more present-biased and/or risk averse? Calculating whether to refinance a mortgage should be theoretically influenced by both time and risk preferences. In particular, savings are realized over many years and refinancing may involve short-term effort expenditures, which makes time preferences relevant to refinancing decisions. In addition, the decision to accept an offer is influenced by beliefs on future offers that will become available which inherently involves risk, making risk preferences relevant to the decision as well. The results in Table 8, however, do not show a main effect of time or risk preferences on applying to the refinance offer sent by *FI*.

Probability of moving. The subjective assessment of the probability of moving in the next 12 months is negatively associated with application rates. As expected in a traditional refinance model (e.g., Agarwal, Driscoll, and Laibson 2013), borrowers who expect that they will move (and therefore very

likely pay off the mortgage) are less likely to refinance, as the benefit of refinancing becomes much smaller than when they can profit from the decrease in interest rate for longer. The association between our measure of suspicion and application rates is again robust to controlling for this effect.

In sum, the results from the survey indicate that many potential hurdles, like numerical ability or present-biased preferences, are less predictive of sluggish refinancing. However, suspicion is robustly associated with the probability of applying to a refinance offer. More suspicious borrowers may find the offer “too good to be true” and expect hidden costs, resulting in a lower probability of applying. However, other factors like limited attention or subjective evaluation of eligibility can still be a major factor in sluggish refinancing. Even though the extensive survey matched to administrative data allows controlling for a large number of variables, in the end, the results from this section cannot eliminate the problem that potentially omitted variables or reverse causality could generate the association between the variables. Our instrumental variable approach and the result that the suspicion measure can predict future application rates give us more confidence that suspicion causally affects refinancing. Given the importance of suspicion about banks’ motives in the low application rates, it is expected to be very difficult to reestablish trust. The next section therefore analyzes whether interventions from the bank can overcome psychological barriers to refinancing and increase application rates.

3.3 Field experiments

The *FI* implemented the three field experiments described in Section 2.3 in order to increase application rates.

Table 9 shows the main effects of the experiments. For each of the three experiments, the table shows application rates for the control and the treatment group(s). Standard errors for the differences between treatment and control come from OLS regressions with treatment dummies.¹⁴

Results show that none of the interventions had a positive effect on application rates. Even more striking is the result that if anything, offering gift cards had a negative effect on application rates. Combining all the three gift cards conditions together (not shown in the table) suggests that the gift card intervention on average *decreased* the application rate by 0.4 percentage points ($p < .07$). Comparisons across the three different amounts seem to suggest that offering an intermediate amount had the most detrimental effect on application rates (however, the difference between the treatments is not statistically significant). While the negative effect of offering a gift card is very small in size, the fact that there is no positive effect is remarkable and important in itself. The result is consistent with the notion that small financial incentives can backfire in settings in which consumers are suspicious to begin with (related to the result on giveaways in Bertrand et al. 2010).

¹⁴ Regressions that also include mortgage and borrower characteristics yield very similar results.

Table 9
Experimental interventions

Treatments	N	Application rates & diff. to control	SE	t-value
Gift card experiment				
0. Control group	25,834	0.124		
1. Gift card: \$25	25,823	-0.0031	0.003	-1.12
2. Gift card: \$50	25,866	-0.006	0.003	-2.16
3. Gift card: \$100	25,836	-0.003	0.003	-1.16
Credibility experiment				
0. Control group	55,285	0.159		
1. Agency flier	55,267	0.002	0.002	0.96
Express guarantee				
0. Control group	39,504	0.107		
1. Express guarantee	39,501	0.001	0.002	0.29

Standard errors come from OLS regressions that regress whether a household applied to the offer on treatment dummies.

The table also shows that third-party testimony (credibility experiment) and guarantees of fast processing had no significant effect on application rates. We note that the null effect in the credibility experiment could be driven by borrowers not being willing to reduce their suspicion despite the endorsement of a credible third party, or by borrowers being suspicious of Fannie Mae and Freddy Mac themselves. While our data do not allow disentangling these two possible mechanisms, both underscore the difficulty in reestablishing trust, that is, even traditionally reputable institutions are not able to lower borrowers' suspicion of financial institutions.

In sum, the results from the three large-scale experiments indicate that it is extremely difficult to increase application rates, that is, to nudge borrowers into doing something that is in their best interest. The failure of the attempts by the *FI* to increase application rates have to be seen in light of the results from our survey that being suspicious of the motives of financial institutions is high and strongly associated with application rates.

4. Conclusions

This paper investigates homeowners' decisions to refinance their mortgage. We examine administrative data from a large US bank when a government program allowed the *FI* to send borrowers preapproved refinance offers that had no monetary and no search costs involved and that always dominated their current mortgage, offering an often-substantial decrease in payments.

We observe that around 50% of borrowers are sluggish in refinancing. This is despite the fact that the holder of the mortgages was motivated to refinance by government intervention. In particular, the steps taken by the *FI* in this case (express mail notification, refinancing requiring only a phone call, etc.), may provide an optimistic estimate of the rate of refinancing. Using a relatively

conservative set of assumptions we estimate that those who do not apply leave, on average, \$8,719 on the table (median: \$7,399). The mean NPV of the potential savings represent about 12% of the nonapplicants' reported annual income. While one might suspect that many of the financial offers that arrive in the mail could be safely ignored, ignoring this one would be costly. This failure to refinance is costly for society as well, since lower payments reduce defaults. It is also likely to be quite costly to the *FI*, but we lack data to provide an estimate.

Next, we explored why refinancing seems so sluggish using a survey of some of the *FI*'s customers. We show a linkage between levels of suspicion and refinancing. We do not argue that suspicion is the only or the main reason that many customers did not accept the refinancing offer. And while the different behavioral factors are not mutually exclusive, most factors, like financial literacy or time and risk preferences are insignificant in our regressions. In the end, we can also only show an association, which does not establish causality. But the correlation is significant and robust to adding many control variables, to instrumenting the suspicion measure with perceived past behavior of the bank, and using the suspicion measure to predict future refinance behavior. Moreover, while we included several behavioral factors in our analysis, additional factors may be studied in future research, such as peer effects (e.g., Maturana and Nickerson 2016).

Finally, we report the results of three large field experiments with sample sizes over 100,000, conducted by the *FI* to reduce the effects of suspicion and to increase refinancing. We find that it is very difficult to overcome suspicion, and offers that seem "too good to be true" result in no increase in refinancing, despite the attractive terms. It is not surprising that trust towards the financial sector dropped dramatically in 2008 (Guiso 2010), given the fraudulent behavior of certain actors in the financial sector. Our work demonstrates that suspicion of a particular bank's motives is associated with reduced refinancing. While we cannot establish a causal link, the association is robust and fairly strong. A 1-standard-deviation increase in suspicion decreases the application rate by 3.8% (in comparison a 1-standard-deviation decrease in interest rate increases the refinance rate by 8.5%). One interpretation of our result is that past behavior of financial institutions that consumers perceived as unfavorable, is costing banks some business, that is, past behavior has long-term costs. Moreover, the failures of our large field experiments are consistent with the idea that there is an asymmetry in trust (Slovic 1993, Schweitzer, Hershey, and Bradlow 2006): it is easier to lose than regain. Future research would be very helpful in understanding how to overcome suspicion both in the domain of mortgage financing and elsewhere.

Another fruitful area for future research would be to study the role of suspicion in other domains. For example, suspicion might explain sub-optimal shopping behavior for better mortgage terms in general (Woodward and Hall 2012) or credit card terms (Calem and Mester 1995). More generally, the effect

of suspicion is not restricted to financial products, but can lower take-up of a whole array of public and private subsidies or social services, such as product recalls, generous government programs, and government-sponsored debt relief.

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