

## Changing willingness to repay: a mortgage modification field experiment

### **Question/Motivation**

What are the impacts of mortgage loan modification on borrower behavior? I use a field experiment with delinquent mortgage borrowers in the US to examine the effects of reducing the amount of mortgage debt a borrower owes on their subsequent repayment behavior.

I find that a lender increases their expected recoveries by offering to reduce a borrower's contractual obligation. Do borrowers themselves also benefit from the modification offers – for example by improving their credit scores and future access to credit markets<sup>1</sup>, or by avoiding foreclosure? In order to test this, I require the purchase of additional credit reporting data.

The results of this experiment contribute to an ongoing debate of “what is optimal policy response during a financial crisis?”. Specifically, whether government response should target homeowner relief more directly (a position advocated by Mian and Sufi<sup>2</sup>) rather than its focus on aiding financial intermediaries. The fact we did not see similar modifications implemented en-masse by loan servicers on their own initiative elevates the potential role of institutional factors – such as agency problems with servicer incentives or securitization trusts' requirement for passivity – in exacerbating negative impacts of a housing-led financial crisis.

This project also contributes evidence to addressing what *type* of relief is most appropriate for which homeowners. For the less financially sophisticated ‘subprime’ borrowers treated in this experiment, affordability of the monthly payment seems to be of primary importance, rather than changes in LTV<sup>3</sup>.

### **Project Needs – Request for Funds**

A key advantage of this experiment is it provides an exogenous source of modification along with complete payment histories on the particular loans in question. A significant drawback is that we do not have current information on borrowers' other debts, or on their household incomes or consumption.

One dimension of data which would improve the analysis of this field experiment would be data which expands our view to the rest of the household balance sheet. One source of this data is credit bureau data. Archival reports are available from a bureau to provide data such as borrower utilization of revolving credit; foreclosure and bankruptcy activity; and credit scores.

I am requesting funds to purchase credit reporting data on the borrowers in the experiment at three points of time: just before, one year after, and three years after the experiment began in order to identify the short- and long-run treatment effects on borrowing and distress. I believe the first lien amounts

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<sup>1</sup> Limited credit scoring evidence available in the dataset suggests this to be the case.

<sup>2</sup> Summarized in a recent interview: [http://www.nytimes.com/2014/05/18/business/the-case-against-the-bernanke-obama-financial-rescue.html?hpw&rref=business&\\_r=1](http://www.nytimes.com/2014/05/18/business/the-case-against-the-bernanke-obama-financial-rescue.html?hpw&rref=business&_r=1)

<sup>3</sup> Campbell & Cocco 2014 and others before them such as Deng, Quigley & Van Order 2000 take an option-exercise approach as a foundation to examining default. Many policy recommendations from an academic finance perspective are to lower LTV and increase the equity position of borrowers as the most direct means to lower default rates (Geanakoplos 2010).

from this credit reporting could also be used to update estimates of Loan-To-Value more accurately than I can at the moment.

### **Field Experiment Design**

The treatments administered in the experiment were modification offers which were sent by mail. The subjects were second lien mortgage borrowers. Treatments were randomly assigned to the pool of defaulted loans belonging to a single investor and serviced by a single large loan servicer. The loans were originally classified as subprime and distributed nationwide across the US. Eligibility criteria were as follows: out of an initial pool of 4,489 defaulted second liens with no payment in the last twelve months, 1,673 loans were applicable for treatment after filtering out: bankruptcy, changes in address (e.g. returned mail), and loans no longer secured by collateral.

The letter offers were sent in early 2011. Given the net benefit expected from treatment by the owner of the loans, it was only possible to hold back 100 of the loans from treatment in a control group – this represents 6% of the total.

The modification offer was to reduce the principal balance outstanding on the debt by 50% and reduce the interest rate by 2%. Legal completion of the modification was contingent on a borrower making the equivalent of three monthly payments at 25% of the original obligation. These initial payments served as a “teaser period” and the required amounts reset higher once the first three were completed along with contractual status resetting to legally current.

The dataset consists of three deliveries from the loan servicer’s data warehouse system: at the point the experiment was begun, 8 months later and most recently three years later (two months ago). This dataset provides characteristics of the loan at origination (e.g. original balance), as well as dynamic monthly data such as monthly payments and contractual delinquency. As most of these loans were originated as subprime or lower credit quality, interest rates average relatively high at 11.1% and average balances at \$42k.

### **Illustrative and Preliminary Results**

Estimates of regressions illustrate the following key facts:

- 1) Short-term repayments increased with treatment: the likelihood of any repayment increased 10.5% in the first six months ( $p\text{-val}=0.024$ ).
- 2) But many borrowers do not complete the teaser period to earn modification – less than a third of those who made a payment in the first 6 months complete the payments required to gain modification. It appears time-inconsistency, or present-bias is most consistent with the evidence.
- 3) Estimates of long-run payment elasticity are consistent with changes in monthly payment playing a more important role than UPB reductions when both are entered into the same model with controls for observables. Elasticity of total repayment dollars to reductions in monthly obligations is 0.74 ( $p\text{-val}=0.02$ ).

## ITEMIZED BUDGET

Purchase: Archive credit statistics – batch processing

Vendor: Experian Plc.

Details: The reporting provides a limited set of the same characteristics available in a credit report (up to 20 credit attributes plus credit score) in digitized format. Results are anonymized but can be tagged with borrower characteristics such as treatment status, payment history, modification status etc.

Cost: Archival batch reports have been negotiated (from a previous field experiment) at \$4,000 each for reporting on up to 5,000 borrowers per request.

Total Cost for purchase of 3 reports = 3 x \$4,000 = \$12,000

Notes: 1) A drawback of this reporting is its ‘hit rate’ – results are not returned for 100% of the borrowers. Experian believes they usually achieve 90% accuracy on similar accounts and this seems to be the only source of data available on the rest of a borrower’s liabilities. Mortgage-only activity would be reported in lien reports on the properties themselves but that is again only one part of the credit picture. 2) Operationally, names and addresses would be transferred from the loan servicer to the credit bureau and results returned without any identifying parameters, thus counting as a ‘soft touch’ (i.e. no impact/no trace) in borrower credit profiles.

### **Future Data Availability**

I expect the ability to share results of credit reporting to be limited – it may be that some transformed version of the data (e.g. breaking score results into quantiles) may be possible. A limited and thoroughly anonymised set of loan servicing data (perhaps with indicators of payment history and modification status) would be made available to the extent legally possible, it is unclear to me whether I require additional permission for this – I would ask the loan servicer and ask University legal resources to review the relevant documents I signed with the loan servicer.

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<b>EDUCATION</b>	<b>Ph.D.</b> Financial Economics, Yale University	2016 <i>expected</i>
	<b>M.A., M.Phil.</b> Financial Economics, Yale University	2013, 2014
	<b>M.B.A.</b> Yale School of Management	2005
	<b>M.S.E.</b> Computer Science, Johns Hopkins University	2001
	<b>B.Sc(Hons)</b> Computing Science, University of Glasgow	1997
<b>INTERESTS</b>	Household Finance, Financial Distress, Behavioural Economics	
<b>RESEARCH PAPERS</b>	“Non-strategic mortgage option exercise: out of the ordinary letters improve financial action-taking”	
	“Impacts on the real economy from regulatory forbearance and low quality bank capital”	
	“Relative price $\neq$ relative value: context affects returns in sports betting markets”, with Andrew Meyer and Shane Frederick.	
	“Anchored valuations”	
<b>WORK IN PROGRESS</b>	“Teaching investors out of the disposition effect”, with James Choi, Daniel Egan, and Emily Haisley.	
	“Changing willingness to repay: a mortgage modification field experiment”	
	“Not so new nudges: promoting asset-building at the first savings banks in Scotland and Germany in the early 1800s”	
<b>SCHOLARSHIPS, AWARDS, AND GRANTS</b>	2014	Travel Award, European Economic Association
	2014	Travel Grant, Network for Integrated Behavioural Science (NIBS) Workshop
	2014	Spring School in Behavioral Economics, Choice Lab/UCSD Rady
	2013	Summer Institute Doctoral Travel Grant, NBER Household Finance
	2012	Whitebox Advisors Research Grant
	2011-2016	Yale University Graduate Fellowship
	2004	Joseph C. McNay Fellowship in Finance
	1997-1998	Postgraduate Travelling Scholarship, University of Glasgow
	1996	Erasmus Summer Research Grant, University of Amsterdam
<b>EXTERNAL PRESENTATIONS</b>	2014, European Economic Association (EEA) 29th Annual Congress, Toulouse School of Economics <i>planned</i>	
	2014, BDRM 2014 (by coauthor), London Business School	
	2014, Household Financial Decision Making and Behaviour Workshop, Network for Integrated Behavioural Science, University of Nottingham	
	2013, TIBER XII Symposium on Psychology & Economics, Tilburg University	
	2013, Boulder Conference on Consumer Financial Decision-Making (poster), UC Boulder	

2013, LBS Trans-Atlantic Doctoral Conference, London Business School

**PROFESSIONAL  
ACTIVITIES**

**Research Assistantships**

2012-present Prof. James Choi, Yale University  
2003-2005 Prof. Justine Hastings, Yale University  
1999-2000 Computer Integrated Surgery NSF ERC, Johns Hopkins University  
1998-1999 Clinical and Biomedical Computing Unit, University of Cambridge  
1997-1998 Cognitive Science Department, University of Freiburg

**Non-Academic Employment**

2007-2011 Varde Partners, Analyst Minneapolis, Minnesota  
Successfully managed distressed mortgage and consumer finance investments  
2007 Bridgewater Associates, Associate Westport, Connecticut  
Portfolio Management  
2005-2006 Obsidian Finance Group, Associate Portland, Oregon  
Distressed Investments  
2004 Barclays Capital, Summer Associate London, UK  
Capital Structure Arbitrage  
2001-2003 Lehman Brothers, Associate New York, New York  
Fixed Income Research (US Treasuries and Derivatives)

**TEACHING  
EXPERIENCE**

**Yale University**

Fall 2013, 2014 Teaching Fellow, Policy Modeling (Phd/Masters), Prof. Edward Kaplan  
Fall 2013, 2014 Teaching Fellow, Capital Markets (MBA), Prof. Gary Gorton  
Spring 2013, 2014 Guest Lecturer, Corporate Finance Research (Law School)  
Fall 2013 Tutor, Behavioural Finance (PhD)  
Fall 2012 Teaching Fellow, Real Estate (MBA), Prof. Matt Spiegel  
Spring 2012 Teaching Fellow, Advanced Business Analytics (MBA), Prof. Donald Lee  
Fall 2004 Teaching Assistant, Economics (MBA), Core - Various Professors  
Spring 2004 Teaching Assistant, Competitive Strategy (MBA), Prof. Barry Nalebuff

**Johns Hopkins University**

Fall 2000 Teaching Assistant, Computer Integrated Surgery (PhD/Undergraduate)

**University of Cambridge**

1998-1999 Supervisor (undergraduate tutor), Engineering Tripos - Computer Science, AI

**SKILLS/OTHER**

**Professional Qualifications:** CFA Charterholder; formerly Series 7, 63 licensed

**Other:** Zertifikat Deutsch als Fremdsprache - certificate of fluency in German; volunteer experience Teaching English as a Foreign Language (JHU International Society); 4 years experience mentoring Yale College and SOM students; Graduate Affiliate of Trumbull College; Guest Lecturer for Yale Graduate School "Money Mondays" series in Household Finance.

**Professional Service:** Referee - *International Journal of Industrial Organization*