Migration Responses to Moving Costs and Liquidity: Evidence from the U.S. Mortgage Market

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Abstract

I exploit variation in moving costs induced by mortgage contracts to study how a fall in moving costs effects the likelihood a household will move and how these responses vary with financial constraints. To do so, I study mortgages with prepayment penalties in their contract, a fee that is only charged in the event a borrower terminates their mortgage in a specified period of time. Leveraging the variation in the length of time these penalties are enforced, I implement a difference-in-differences research design using linked administrative loan, credit, and payroll data to establish that in the year after a prepayment penalty expires, the probability a borrower moves rises by 2 percentage points, an economically meaningful increase in migration. To understand what drives the large treatment effect, I find that this effect varies by a borrower's LTV ratio prior to moving and credit score at mortgage origination, suggesting a mixture of down payment and liquidity constraints play a role in one's decision to move. Using a sufficient statistics approach, I map these estimates into a dynamic location choice model to understand what these measures can tell us about the extent of spatial misallocation in the U.S.

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1 Project Description

Do moving costs and financial constraints affect household migration? If so, what can these measures tell us about spatial misallocation in the U.S.? When workers are perfectly mobile and face no frictions in migration, one would expect to see wages adjusted for cost of living across local labor markets to be the same (Rosen (1979); Roback (1982)). In fact, real wages across U.S. regions do vary (Moretti (2011)), implying there may exist frictions preventing labor mobility. One possible explanation for this wage dispersion is that moving is costly. In fact, a common modeling tool to generate the real wage inequality we see in the data is to incorporate moving costs (Topel (1986); Kennan and Walker (2011); Bishop (2012); Bartik (2018)).

Despite their relevance in economic theory, empirical evidence on how moving costs affect migration has proven difficult. Given the challenge of finding accurate data on moving costs, previous research has largely focused on structurally estimating dynamic life cycle models of migration decisions (Kennan and Walker (2011); Bishop (2012); Bartik (2018)). Given the potential for different modelling choices to produce different results, answers to the importance of moving costs are mixed, as well articulated in a new *Journal of Economic Literature* article summarizing the frontier research on internal migration:

> *Despite substantial advances in structural approaches, a consensus has not yet emerged about the magnitude of unobserved migration costs. The most recent approaches suggest significant heterogeneity in these costs... the answer to the question of whether migration costs are large or small may simply be "yes."*
>
> - Jia et al. (2023)

To provide more direct evidence on this question, in this proposal I describe a unique setting where I exploit with-in household level variation in the cost of moving induced by certain mortgage contracts originated in the U.S. during the housing boom of the mid-2000's to study the impact moving costs have on migration and wages. The lending boom at this time was disproportionately fueled by lenders who sold loans into the private label securitization market rather than the long standing securitization market led by U.S. government agencies.

Due to this growth in a more deregulated securitization market, many loans originated at this time had fees called mortgage prepayment penalties (MPP) that would charge borrowers for paying off their mortgage in full prior to the full amortization schedule of the mortgage. These penalties are particularly useful for studying variation in moving costs because they would only be charged when one terminates their mortgage, for example in the case of a move; they were large fees that were anywhere from 2 to 5 percent of one's unpaid balance; and they were temporary, with expiration dates varying at the contract level.

The fact that the expiration date of these penalties was a function of the age of loan allows me to use a difference-in-differences specification to see how moving rates differ between borrowers whose penalties expire early in the life of the loan versus those whose expiration date is later.

In order to run this specification and study how mobility and wages are affected by a change in moving costs, one needs detailed data on the characteristics of the mortgages

with these prepayment penalties, characteristics of the financial profile of these borrowers, and earnings data for these borrowers. In order to obtain such data, I link administrative mortgage records from Moody's Analytics that document the presence and duration of prepayment penalties on the universe of mortgages sold to the private label securitization market with borrower level data from Equifax on the monthly location of residence and other relevant financial variables. While the data I have now is sufficient to look at outcomes of migration in general, in order to additionally answer questions on the labor market implications of moving costs, I am also in the process of obtaining payroll data from Equifax, which I discuss further below.

To give a sense of my results so far, Figure 1 shows simple time series versions of the difference-in-differences design I plan to use in my project to get at migration responses to moving costs. Each panel shows the fraction of movers in the two year window around the treatment group's prepayment penalty expiring. Specifically, the left panel shows the differential response in moving by those with a 1 year prepayment penalty versus those with a penalty that lasts at least 2 years, while the right panel compares those with 2 year versus at least 3 year penalties. In both panels, a clear and immediate divergence in moving appears in the month after a penalty expires. While a more sophisticated strategy will be taken in the final draft to retrieve the migration response to a change in moving costs, I believe these simple time series plots show the power of this research design.

The unique setting of focusing on mortgage holders with variation in moving costs is particularly advantageous in that it allows one to compare how migration responses not just to moving costs, but also to financial constraints, and how comparable those responses are to each other. There is a growing literature in finance that looks at how mortgage contract features affect mobility (Ferreira et al. (2010); Gopalan et al. (2021); Bernstein and Struyven (2022); Fonseca and Liu (2023)). While this literature points to financial frictions playing a role in migration, a still left unanswered question is how comparable these frictions are to moving costs themselves (Jia et al. (2023)). Given my research setting has variation in both moving costs and financial frictions, I am be able to directly compare which one is most relevant for internal migration decisions, and what that tells us about policies aimed at inducing internal migration.

Preliminary results on how migration responses vary by financial frictions can be found in Figure 2, which shows coefficients δ_k of the following specification:

$$MoveRate_{ba} = \alpha_b + \alpha_a + \sum_k \delta_k EarlyExpiration_b \times Post_a \times 1(FinancialConstraint = k)_b + \varepsilon_{ba}$$

for borrower b and loan age a. The two measures of financial constraints shown in the figure are LTV ratios in the year prior to a prepayment penalty expiring and credit scores at loan origination. The results so far are suggestive of financial constraints having a role in migration responses: those whose home is underwater or those with low credit scores are less able to take advantage of a drop in moving costs, relative to the omitted groups with the highest levels of equity and credit score.

For next steps in the project, along with working to obtain payroll data to study how job related these moves are, I also plan to link evidence with theory to see how much these reduced form statistics can help us understand deeper economic questions in internal

migration. In preliminary work, I use a sufficient statistics approach as seen in Chetty (2008) and Indarte (Forthcoming) to show how a generalized dynamic location choice model can use the estimates of migration responses to moving costs and liquidity in my empirical work to better understand the role credit markets can play in improving migration. Intuitively, the larger liquidity plays a role in migration decisions relative to moving costs, a model can help quantify the extent to which households are not able to arbitrage differences in marginal utilities across locations due to credit market imperfections.

In conclusion, in this proposal I outline a difference-in-differences design using data on mortgage records, credit files, and payroll data to advance our understanding of how households response to a change in the cost of moving and how this response varies with financial constraints. Such estimates can improve our understanding of the exact channels that prevent households from moving, allowing policy to be better curated to more effectively boost internal migration. For example, while this project doesn't rule out the many benefits of place-based policies, my research shows there could be improvements in mobility simply by making it cheaper to move as well as addressing the financial constraints that may impede mobility.

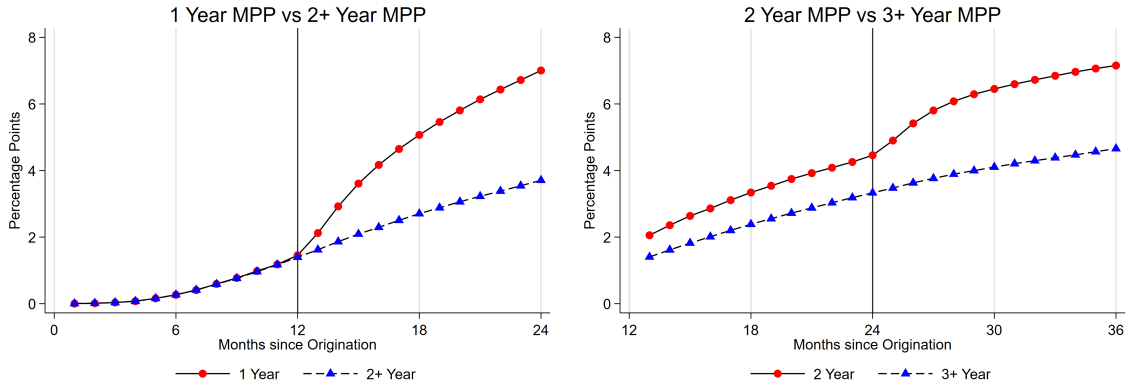


Figure 1: Cumulative Percentage of Movers around a MPP Expiration

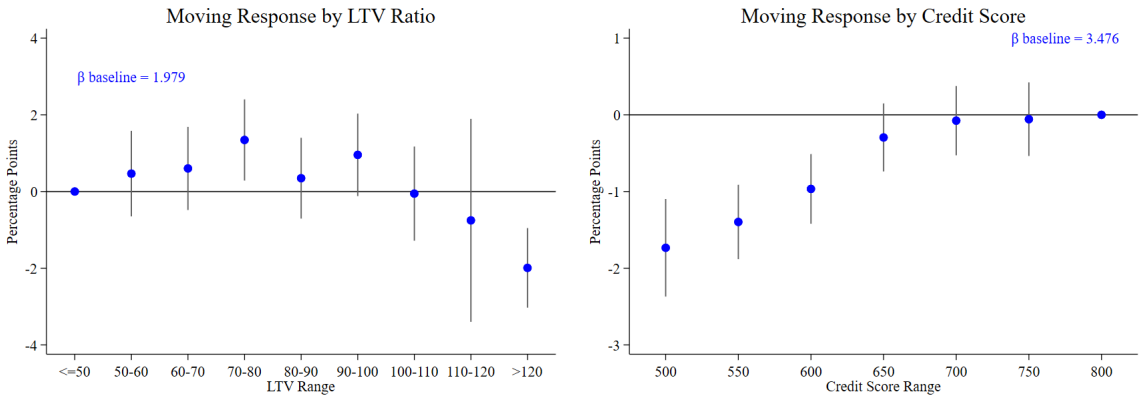


Figure 2: DiD Results by Financial Constraints

2 Itemized Budget

If given funding, I would direct it towards:

- **Travel Budget**: I plan to use the grant to pay for flights and other travel related expenses in getting to and from conferences and presentations at other universities.
- **Data Purchase**: To progress the project forward, it is important to purchase payroll data from Equifax. While the data is more expensive than the $15,000 this grant provides, the grant would go towards subsidizing this purchase. To the extent possible given data use agreements, I would gladly make whichever data I can available for public use.

Funding Purpose	**Cost**
Travel Assistance	$7,500
Equifax Payroll Data Assistance	$7,500
Total	**$15,000**

References

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Contact Information

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Education

University of Chicago
Ph.D., Joint Program in Financial Economics — 2018-Present
Committee: Amir Sufi (Chair), Michael Dinerstein, Scott Nelson, Pascal Noel, Constantine Yannelis
Masters of Arts Program in Social Sciences, Economics — 2016-2017

University of Florida, B.A., Economics & Mathematics — 2010-2014

Other Employment And Positions

Princeton University
Julis-Rabinowitz Center for Public Policy and Finance
Research Assistant to Atif Mian — 2017-2018

Federal Reserve Bank of St. Louis
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Research Assistant to David Andolfatto and Guillaume Vandenbroucke — 2014-2016

Research Interests

Corporate Finance, Household Finance, Real Estate
Banking, Applied Microeconomics

Job Market Paper

"Migration Responses to Moving Costs and Liquidity:
Evidence from the U.S. Mortgage Market"

Works in Progress

"Disintermediation versus Cost to Funding Shocks
in a Rising Interest Rate Environment:
Evidence from the Volcker-Era Savings and Loan Industry"

"Prepayment Penalties: Screening Tool or Shrouded Attribute?"

"Estimating Discount Rates: A Revealed Preference Approach"
(with Constantine Yannelis and Anthony Lee Zhang)

Awards and Grants

Financial Economics PhD Program Fellowship — 2019-Present
John and Serena Liew Fama-Miller Research Grant — 2022
Kenneth C. Griffin Department of Economics PhD Fellowship — 2018-2019
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Teaching Experience

PhD Corporate Finance II (TA for Amir Sufi) — 2021-2023

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Conferences and Seminars

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2020 G3 Finance Student Seminar, Macrofinance Student Workshop

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RE: Michael Varley

I am writing in strong support of Michael's application for a grant from the NBER for research on household finance. Michael is in the fifth year of his PhD, and I expect he will be on the market next year. I have known Michael well for six years. He was a research assistant for me before he began his Ph.D., and he was a student in my second year Ph.D. class, where he did exceptionally well. He has been my TA for three years for the same Ph.D. class. He has also been a member of my working group in which students present their own research ideas. In that setting, I have seen Michael present his research ideas several times.

Ph.D. students at Booth write a research study between their second and third year that determines whether they continue in the program. Michael wrote a very interesting study that I think has a chance of being published in a top finance journal. The study involved the collection of novel loan level data for Savings and Loans in the 1970s and 1980s, and it explored the effect of the Volcker rise in interest rates combined with the rise of money market funds and the elimination of Regulation Q in leading to the demise of the Savings and Loans business model. It used excellent microeconomic data, a nice empirical strategy, and it had interesting results.

His current work on mortgage prepayment penalties and moving costs is shaping up to be a great job market paper. He already has an interesting source of variation in prepayment penalty expirations on mortgages that represent a big shock to the cost of moving. His initial set of results shows a powerful first stage, and he is therefore in a great position to estimate the costs of not being able to move given financial constraints associated with mortgages. I think this could be an exceptional paper. He is trying to get Equifax payroll data to capture income; if he is successful, he will be able to show the income foregone from people "trapped" in their existing mortgage because of the prepayment penalty. There is other work on the costs associated with being underwater on a mortgage, but I think Michael's project represents a serious advancement. He also has great modeling skills so that he can say something more broadly about the underlying economic parameters of the household decision to move when facing these mortgage constraints.

I strongly support his application.

Sincerely,

Amir Sufi