RESEARCH INSTITUTE FOR HOUSING AMERICA **SPECIAL REPORT**

Why Are Older Workers Moving Less While Working Longer?

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W.E. Upjohn Institute

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About the Author

Brian Asquith is an applied microeconomist specializing in labor, urban/regional, and public economics. Research interests include the aging of the American workforce, machine learning applications in economics, housing and rent control, and the decline of mobility in the United States.

Asquith's work on rent control has won two national awards, including the American Real Estate and Urban Economics Association (AREUEA) Homer Hoyt Best Dissertation Prize. His work has appeared in *Review of Economics and Statistics, Journal of International Economics, Journal of Regional Science, AEA Papers and Proceedings,* and other outlets. Currently, he is researching why older workers, who are facing rising financial distress and job displacement, are increasingly less likely to relocate, as well as work on housing supply, employment issues, and rent control.

Asquith joined the Upjohn Institute in 2018 after being an Alfred E. Sloan postdoctoral fellow at NBER. Asquith received his PhD in economics from the University of California, Irvine in 2017 and studied mathematics and economics at Brandeis University as an undergraduate.

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ABSTRACT

Older workers' labor force participation (LFP) and migration across state lines have been trending in opposite directions, counter to conventional economic wisdom. This paper investigates what might explain this puzzle using data from the Current Population Survey (CPS) and Health and Retirement Study (HRS).

Descriptive analysis identifies several factors that may explain the decline in migration, including greater housing price dispersion, fewer opportunities for wage arbitrage, and greater geographical sorting.

I employ a series of empirical tests to examine how older workers' LFP, retirement, and migration decisions respond to income and housing wealth losses by exploiting job losses to identify individual income shocks, and shocks to specific labor markets to identify housing wealth losses by using an import competition shock that began in 2001 after Congress ratified permanent normalized trade relations with China in October 2000.

The puzzle appears to be driven by composition effects. For example, in response to a housing wealth shock, non-college educated homeowners (the largest subgroup of older workers) reduce their two-year migration rate by 54% but only slightly reduce their labor supply, while college-educated renters (the smallest subgroup) increase their labor supply by 13% but only weakly increase their propensity to move.

Executive Summary

Since at least the 1990's, older workers' labor force participation (LFP) and migration responses have been trending in opposite directions, counter to conventional wisdom in labor economics. One explanation could be that diverging housing prices across regions suppresses migration, while also prompting more LFP among those homeowners whose housing price appreciation has been perceived as disappointing.

This paper probes the relationships between negative labor market shocks, housing wealth changes, and migration by considering how rising import competition had differential impacts across US housing and labor markets after 2001 to compare shocked and unshocked homeowners and renters (in an augmented differences-in-differences-in-differences regression strategy). This approach thus incorporates both housing wealth shocks as well as income shocks in the form of job displacements to examine how older workers respond to different pressures.

I also review trends in wages, housing prices, and labor supply that might help explain why mobility and LFP trends have decoupled. I show that housing costs (for homes and apartments) and labor force participation do not seem to co-move together in any obvious way, making it unlikely that the housing market is the main driver. For example, labor force participation fell for both renters and homeowners during the Great Recession, even though the two groups were experiencing opposite housing wealth pressures. Labor market outcomes seem the more likely culprit, as the wage gap seems to be much smaller between even the most economically vibrant major metros (e.g., Boston, NYC, and LA — that I label as "Hub Cities") and the metropolitan areas most suffering from deindustrialization (e.g., Detroit, St. Louis and Buffalo — the "Rust Belt") for non-college educated workers than for college-educated workers. This leaves few incentives for a non-college resident to move for greater job opportunities.

I also find that migration might be declining due to better sorting across regions. While overall moving has declined, there have been substantial changes in the relative shares of reasons given for moving for job opportunities/retirement, climate, or family versus moving to adjust housing consumption. Those without a four-year college degree in the Rust Belt and those with one in the Hub Cities have become much more likely to move for housing-related reasons. Looking at shares (in percentages) each individual reason for moving comprises of the total between survey waves mobility rate, I find that housing-related reasons went from 57% to 64% and from 42% to 64% between 1996 to 2016, respectively. By contrast, older workers with a college degree in the Rust Belt and those without in the Hub Cities have become less likely to move to adjust housing consumption, going from 53% to 40% and from 44% to 33% between 1996 to 2016, respectively. This change reflects that non-college educated workers are better matched to the Rust Belt (low wages but low housing costs) and college-educated workers are better matched to the Hub Cities (high housing costs but high wages), so that workers who are already "matched" to their regions just move to adjust their housing costs as they age.

In the regression analysis, I also find little evidence that the divergence between mobility and LFP is caused by mobility-constrained older homeowners increasing their labor supply to recover lost housing wealth. Table i summarizes the main results of the paper, including by education level (i.e., whether or not survey respondents had completed a four-year college degree). I find displacements cause an 8% decrease in LFP among renters and a large 16% decline among homeowners, but a negative housing wealth shock causes a precise zero effect on homeowners' LFP and weakly increases renters' LFP. Results for retirement are similar. Renters, not homeowners, appear to be driving the post-shock increase in LFP, which is more consistent with a story that renters work longer because they judge that the ability to pay rents (even stagnant ones) with retirement looming on the horizon may be threatened.

Table i. Results Summary Table: Percent Changes in Key Outcomes in Response to Shocks

	Renters			Homeowners		
	All Respondents	Non-College Respondents	College Respondents	All Respondents	Non-College Respondents	College Respondents
	(1)	(2)	(3)	(4)	(5)	(6)
In Labor Force						
Displacement	**-8.2%**	**-8.1%**	**-8.6%**	**-16.2%**	**-15.7%**	**-16.6%**
Trade Shock	3.9%	2.1%	**12.3%**	0.0%	-1.3%	5.7%
Retired						
Displacement	**6.6%**	4.2%	**24.2%**	**12.3%**	**11.3%**	**15.6%**
Trade Shock	-4.1%	-2.1%	17.8%	2.3%	3.2%	-7.0%
Move Across Commuting Zones						
Displacement	**83.4%**	**66.8%**	**162.5%**	**101.0%**	**42.0%**	**77.1%**
Trade Shock	-11.6%	-25.0%	4.5%	-29.7%	**-54.1%**	44.3%
Claim Social Security						
Displacement	1.0%	1.8%	-4.6%	-0.2%	-0.9%	1.8%
Trade Shock	1.1%	-0.8%	12.3%	2.4%	0.7%	**10.8%**
Enjoy Work						
Displacement	0.6%	0.8%	8.5%	0.3%	1.5%	-1.5%
Trade Shock	-1.6%	-1.8%	-1.3%	0.4%	0.7%	-1.8%

Notes: Table i summarizes the key results of the paper by reporting how the key outcomes changed for each group in response to either involuntary job loss causing an income shock ("Displacement") or a local labor market shock that also causes housing wealth losses for homeowners ("Trade Shock"). The numerators come from the marginal effects from the author's preferred specifications corresponding to Column 7 in Tables 2-4, Columns 1-6 in Table 5, and Columns 1-3 in Tables 7 and 8, and the denominators are weighted means for each group from the pre-treatment period (i.e., prior to 2002). Results in bold denote that the percent change comes from a marginal effect estimate statistically significant at the 10% or less level.

In terms of mobility, I find that displacements cause large increases in the incidence of moving between labor markets: up 83% among renters and 101% among homeowners. However, both renters and homeowners moved less in response to the negative local labor market shock, but these changes by subgroup were not statistically significant. Nonetheless, taking the results at face value, they indicate that homeowners' migration falls by more than renters (down 30% versus 12%), as one might expect from the difficulties of selling a home versus ending a lease.

The key to why mobility and LFP appear to have diverged seems to be in differences in responses among those with and without a college degree. College-educated renters increase LFP by 12.3%, while non-college renters show much smaller, not statistically significant 2.1% increase. By contrast, educational attainment creates clear divisions among homeowners. Those without a college degree exposed to the trade shock were more likely to withdraw from the workforce (LFP decreases by 1.3%, retirement up by 3.2%), while those with a college degree were more likely to increase their participation (LFP up by 5.7%, retirement down 7.0%), but I caution that changes for both groups are not statistically significant. Similarly, migration responses for homeowners are also divided by homeownership status: those without a degree became 54.1% less likely to move after enduring a negative local labor market shock, but those with a degree are 44% more likely to move, although this last estimate is again not statistically significant. Thus, the evidence above shows that divergence between LFP and migration seems to be caused by a form of Simpson's Paradox among the four subgroups, where a particularly strong negative migration response among non-college homeowners (about 57% of the sample) and a particularly strong positive LFP response by college-educated renters (just 3% of the sample) to the same shock helps create an aggregate impression of migration declining while LFP weakly increases.

Introduction

Workers have been displaced by trade and technology for decades, but the most enduring solution has remained the same: relocate. However, older workers have always been the least likely to relocate because they are more attached to their surroundings, have deeper investments in housing which may be hard to liquidate, and have less remaining time to earn a positive return on moving (Groot and Verberne, 1997).

Nonetheless, recent trends among older workers should have them on the move as perhaps never before. People most often move for work, and labor force participation (LFP) among workers 55 and older was 10 percentage points higher in 2019 than it was in 1995 (46.2% versus 56.3%).[1] Moreover, homeownership, which inhibits moving, has declined among this group from 82.8% in 1995 to 79.9% in 2019. Further, each incoming cohort of older workers is better educated than the one before, which should also boost mobility because college-educated workers move more often for work than non-college educated workers (Wozniak 2010; Malamud and Wozniak, 2012).

Yet, not only is the interstate mobility trending downwards, but it is now at the lowest rate on record.[2] Specifically, the interstate mobility rate for those aged 55-69 has been in decline since the 1990's, and has yet to recover from a steep fall during the Great Recession: going from 13.1% in 1995 to 7.9% in 2010, and only recovering to 8.8% in 2019 at the height of the pre-COVID expansion.[3] For younger workers, mobility decline is mostly ascribed to falling job changing, but puzzlingly, older workers are the only group who are simultaneously moving less and changing jobs more.

The question here is: Why are older workers staying in the labor force longer even as they move less? Is this phenomenon being driven by changes in the housing market, changes in the labor market, or both? It is almost axiomatic among economists that greater labor market participation and falling homeownership should yield more mobility (Molloy, Smith, and Wozniak, 2017), but it is not clear which of the market's signals older workers are no longer responding to as expected.

In this paper, I explore the evidence on how changes in housing and labor markets may be creating unexpected patterns in migration, homeownership, and labor market behavior among older workers described above. I begin by reporting descriptive evidence on housing and labor market trends that focuses on differences among workers by region and by education, which proxy for diverging housing market fortunes (in the case of regions) and diverging labor market fortunes (in the case of education). Similar to Hsieh and Moretti (2018), I contrast the Rust Belt metros against a group of booming cities (that I label the "Hub Cities") to highlight particularly stark regional differences.[4]

Using data from the Current Population Survey (CPS) and the Health and Retirement Study (HRS), I show real wage growth has been roughly flat among non-college workers in both the Rust Belt and in the Hub Cities, but real wages and wage growth have been substantially higher for college-educated workers in the Hub Cities than in the Rust Belt. Second, since 2000, house price appreciation has unsurprisingly been much stronger among those living in

1. The overall LFP rate has been essentially unchanged since 2009, but the rates by age (55-64, 65-74, 75+) and sex reveal that it has increased for all major demographic groups. The reason the overall rate has remained flat is due to Simpson's Paradox: The Baby Boomers are working longer than the Silent Generation, which is pulling the LFP rate up. However, as the very large Boomer cohorts enter retirement ages, the rate is simultaneously being pulled back down due to the mechanical effect of older people working less. The overall rate thus remains flat, because the incoming older worker cohorts from Generation X (who are also working longer) is too small to fully offset the Boomers' retirements. More information can be found at: https://www.bls.gov/emp/tables/civilian-labor-force-participation-rate.htm.

2. Tavernise, Sabrina, November 20, 2019. "Frozen in Place: Americans are Moving at the Lowest Rate on Record," *New York Times.* Last Accessed December 3, 2019.

3. All figures here are the author's calculations from the Current Population Survey. While these figures emphasize the recent fall in interstate migration, other sources indicate that the migration decline may have longer, deeper roots. Molloy, Smith, and Wozniak (2017) show that interstate mobility rate for those aged 55 and over fell 36% between the 1980's and the aughts.

4. This term is borrowed from Michael Lind's coinage of the hyper-prosperous, largely coastal cities in his book, *The New Class War.*

the Hub Cities, but even within those regions, home prices in neighborhoods with high numbers of college-educated workers have performed better than those in neighborhoods populated mostly by people without a college education. Specifically, house prices in the Rust Belt's neighborhoods with mostly non-college workers have still not recovered from their 2006-2007 peak and are in fact barely above their 2000 level. There thus exists a large pool of non-college older workers who may well feel disappointed by their wage and housing wealth growth.

Flat wage and house price growth for these workers may explain why migration has declined, since both the "pull" factor (better income opportunities elsewhere) and the "push" factor (the ability to cash out equity growth) have diminished for these workers. To better disentangle the relevance of push versus pull factors, I use microdata from the Health and Retirement Study (HRS), which samples people aged 50 and over, and longitudinally tracks their employment, retirement behavior, health, wealth, and other demographic information. The survey also asks respondents who move between survey waves to list the reasons why they moved. I find that migration declined during the 2010's relative to the 1990's for all major reasons (moving for family, for climate, for opportunity, etc.). However, the relative likelihood of moving for work or retirement increased among non-college educated respondents in the Hub Cities and college-educated respondents in the Rust Belt, while the relative likelihood of moving to change housing consumption increased among non-college educated respondents in the Rust Belt and college-educated respondents in the Hub Cities. In other words, at least one reason migration may be declining is that people are sorting more efficiently into the regions that "match" their education profiles. Broadly speaking, college-educated workers seek higher wages in the Hub Cities and non-college workers seek lower costs of living in the Rust Belt (or other cheap locales), while the people who already are "matched" to their region move to adjust their housing consumption as they age. Nonetheless, the overall migration decline across categories raises questions about those who are working longer in their home regions, and whether they are more concerned about making up for unrealized income gains, unrealized housing wealth appreciation, or both.

One of the reasons that migration has fallen could be that people have, in recent decades, become better sorted into regions that match their wages and costs of living. For example, non-college workers living in low-cost areas (like the Rust Belt), and college-educated workers in high wage areas (like Boston, NYC, and LA), have become steadily less likely to move out of these areas for job opportunities, better climate, or family, and more likely to move locally to adjust their housing costs.

I next attempt to identify whether older workers are primarily responding to housing or labor market changes when making their migration and labor supply decisions. All studies looking to disentangle housing market versus labor market effects must account for the reality that while individual income shocks (mass layoffs, plant closures, etc.) are reasonably common, individual housing wealth shocks are not. Shocks to housing wealth are almost always the result of shocks to either local labor or housing markets (or both), and feedback loops exist between the two markets even in the short run (Mian and Sufi, 2014; Xu, Ma, and Feenstra, 2019; Notowidigdo 2020). One solution, used by Zhao and Burge (2017) and others, is to compare homeowners and renters, under the assumption that after controlling for observables, renters and homeowners react similarly to local labor/housing market shocks *except* through the

housing wealth channel. The authors then use a differences-in-differences-in-differences (DDD) regression strategy exploiting the housing bust after the Great Recession to compare how workers who lost housing wealth changed their labor supply.[5] There are two drawbacks of this approach. The first is that the pre-bust period witnessed an uneven run-up of housing prices across markets, making the DDD model's assumptions about the similarities between control and treated local labor markets less plausible. Second, as Zhao and Burge acknowledge, renters themselves enjoy a positive (negative) wealth effect when there is a housing bust (boom), so renters serve as an imperfect control group to measure a housing wealth change effect.

I circumvent these problems by amending the Zhao and Burge approach in two ways. First, I use an import competition shock that results from the U.S. government's decision to grant Permanent Normal Trading Relations (PNTR) status to China and acted to lower import barriers that became effective at the end of 2001. This import shock allows me to empirically identify housing and labor market shocks (Autor, Dorn, and Hanson, 2013, ADH hereafter; Pierce and Schott, 2016) since the PTNR status decision created a negative shock in the housing and labor markets that then faced the stiffest Chinese import competition (Feler and Senses (2017), FS hereafter). Throughout, I refer to the impact of granting PNTR to China interchangeably as either the import competition shock or the trade shock. It also has the virtue of a more plausible quasi-random assignment of treatment and control status in the outcomes of interest than the Great Recession, because the pre-period did not witness the same kind of unevenly distributed boom across housing markets that preceded the Great Recession's housing bust.[6] The second difference with Zhao and Burge is to explicitly control for income shocks via job displacements, which account for the elevated likelihood that people experiencing a negative housing wealth shock may also experience an income shock.[7]

Like the other papers mentioned above, I also use HRS microdata on older workers' retirement and labor force behavior to study housing versus labor market responses to shocks. I assign income and housing wealth shocks to respondents in the HRS microdata by using respondents' self-reported job displacements for income shocks and their locations for whether they were subject to the trade shock. Specifically, I use confidential location data to assign to each respondent an indicator for whether they were living in a commuting zone (CZ) that was in the top quartile for being most adversely affected by the trade shock.[8]

I find little evidence that older workers increase their LFP or decrease their retirement likelihood in response to changes in housing wealth. In my preferred specification, homeowners' LFP net change in response to a negative labor market shock that decreases their housing wealth is essentially a precise zero. In response to a job displacement, however, homeowners are substantially more likely than renters to respond by retiring or otherwise leaving the labor force. Faced with the prospect of future rent increases, renters appear to be more reluctant to leave the labor force even after an adverse shock. This occurs even when renters enjoyed a positive wealth effect from the import competition shock, which economic theory holds should encourage renters to reduce their LFP, usually through retirement. Nonetheless, the results strongly suggest that concerns about rent risks trump any short-term wealth effects. Lastly, homeowners are unsurprisingly less likely than renters to move after a displacement, though both groups became less likely to move after the import competition shock, although these estimates are not statistically significant.

Looking at differences between BA and non-BA holders, I find further response heterogeneity. First, non-college homeowners decrease their LFP and increase their retirement propensities in response to a local labor market shock, while college-educated respondents have the opposite response, although neither change is itself statistically significant. Second, while both college-educated and non-college educated renters increase their LFP and decrease their retirement propensity in response to a negative local labor market shock, college-educated renters in particular

5. The differences-in-differences-in-differences strategy is a statistical method that allows you to compare treatment and control groups without the benefit of a fully randomized experiment. The key idea is that as long as the control group and the treatment group are otherwise similar prior to the treatment starting, the control group can provide a proper counterfactual as to what would have happened in the treated group but for the treatment. In this case, Zhao and Burge essentially claim that regions less heavily hurt by the Great Recession act as a control group for the regions most heavily hit.

6. Using negative shocks is likely more informative than positive ones, as a negative shock is more likely to disrupt expectations, and thus induce the kind of behavioral response that might hopefully shed some light on the decoupling of migration from homeownership and labor force participation. By implication, however, the drawback is that responses may not be symmetrical across the sign of the shock, so it is hard to draw conclusions about how older workers respond to positive wealth shocks.

7. A third difference is that I assign homeownership status based on whether a respondent initially owns a home when he or she first enters the HRS. Zhao and Burge do not fix homeownership status in this way, and therefore may have introduced some endogeneity bias in their results. This would occur if people change their homeownership status when they change their labor supply. For example, if people who drop out of the labor force are disproportionately more likely to also switch from homeowning to renting, then it would artificially appear that renters decrease their labor supply in response to a negative shock and homeowners increase it.

8. Appendix A has more information on how I assign quartile ranks to trade-impacted CZs.

exhibit a large, positive increase in LFP, whereas non-college renters have a much more muted, not statistically significant response. Migration also exhibits stronger differences across the educational divide rather than homeownership status: both college-educated homeowners and renters appear to be at least marginally more likely to leave a stricken local labor market, while the non-college educated are less likely to do so, although the decline is only statistically significant for non-college homeowners.

College educated and non-college educated workers appear to react very differently to income and housing wealth shocks by their homeownership status. College-educated homeowners are two times more likely to leave the workforce after a job loss than renters, and all college-educated workers are more likely to move in response to income and wealth shocks than non-college educated workers. Furthermore, college-educated renters strongly increased their labor force participation (LFP) in response to the import trade shock, while non-college homeowners weakly reduced LFP and more strongly reduced their mobility.

Thus, it appears that the puzzle that animated this paper — Why is migration falling while LFP rises among older workers, particularly after a negative shock? — occurs because different subgroups react in opposite ways to the same shock. Assuming that the Great Recession provoked a similar behavioral response among older workers as the (smaller scale) import competition shock, the divergence between migration and LFP was caused by important differences in how college- versus non-college educated workers react to adverse shocks. College-educated workers (particularly renters) increase their LFP but have a muted pro-migration response to a negative local labor market shock that spills over into housing prices, whereas non-college workers (particularly homeowners) react by not changing their labor supply much but decreasing their willingness to migrate to a new labor market. The only group that works longer while moving less are non-college educated renters, but neither response is itself statistically significant. Further investigation to see whether workers compensate for becoming less willing to move by being more likely to claim Social Security or work in jobs they enjoy less provides no definitive evidence. The consequences (if any) for these workers are thus a topic for future research. Nonetheless, older workers appear to value having access to secure housing consumption when the local labor markets weaken, so declining homeownership particularly among non-college educated older workers may be an area for future policy concern.

The structure of the paper proceeds as follows: The next section discusses the existing literature on wealth and income shocks to older workers, and their labor force and migration behaviors. Following that, I review the previous literature on migration, income shocks, and housing wealth shocks among older workers, and discuss this paper's contribution. The section after summarizes how I use the HRS data to learn how individuals responded to housing wealth and income shocks. The next sections review and discuss the results of the analysis, including a discussion of the results in light of the recent COVID recession. Finally, I conclude the paper by recapitulating the main findings.

1. Theoretical Overview

1.1 Migration

The decline in interstate migration worries policymakers and economists, because moving often improves employee-employer matches, thereby boosting income growth for individuals (Jolly, 2015) and enhancing economic efficiency overall. Interstate migration has trended steadily downwards since the 1980's, but no consensus has yet emerged as to why. A comprehensive survey by Molloy, Smith, and Wozniak (2017) rejected several common explanations, including population aging as the sole cause, the rise of dual-career households, pervasive occupational licensing, and job market polarization. The authors conclude that the strongest evidence points to declining job changing as the key culprit in declining interstate migration, but that the chain of causality between declining migration and declining job changing is opaque. Of course, as noted above, the linkage is even more so for older workers, for whom migration is declining while job changing is not.

Recent work has also emphasized the importance of labor market factors, namely that migration is influenced by the business cycle (Saks and Wozniak, 2011) and individuals moving across labor markets to improve their income prospects (Kennan and Walker, 2010, 2011). Perhaps the most compelling explanation is that the geographic distribution of relevant outside offers has made transitions less desirable for everyone, particularly for those without a college degree (Molloy, Smith, and Wozniak, 2014; Bartik, 2018, Autor, 2019), but job transitions for older workers nonetheless seem to be continuing.

However, there are a couple of reasons to think that older workers' migration behaviors are influenced by housing markets more than younger workers. Those aged 55 and over are predominantly homeowners and have the highest homeownership rate of any age bracket (Moore, 2018). Renters are (on average) more mobile than homeowners, as buying and selling a home imposes significant pecuniary costs on homeowners (Chan 1996, 2001; Coulson and Grieco, 2013; Bloze and Skak, 2016). Since renters are growing as a share of older workers, the fact that migration is nonetheless falling strongly suggests that homeowners' migration rates are themselves falling strongly enough to offset the rise in the number of renters.

There are a couple of reasons why homeowners' migration rate might be lower than in the recent past. Homeowners seeking to switch labor markets find it easier to move to the subset of housing markets with similar pricing dynamics as their originating market (Sinai and Souleles, 2013).[9] U.S. housing price trends in the past forty years have seen an increase in price dispersion across metropolitan areas, limiting the number of destination markets with shared price dynamics (Hsieh and Moretti, 2018).[10] How housing wealth changes affect mobility is also not clear cut, because the local labor market shocks that cause housing wealth losses can paradoxically prompt the need to find a new job (or relocate) while simultaneously eroding the ability to do so (Chan, 2001; Ferreira, Gyourko, Tracy, 2010; Sasser Modestino and Dennett, 2013).

Lastly, declining migration may in part be driven by increasing home attachment in previously highly mobile locations (mostly in the Western U.S.), as a natural consequence of these places becoming more settled relative to the Eastern half of the country (Coate and Mangum, 2019). Attachment to place itself has important knock-on labor market consequences. Regions where most residents are strongly attached see less out-migration in response to negative local shocks, which in turn depresses wages and causes greater income volatility (Zabek 2020). One way to reconcile falling migration in depressed regions with greater labor force participation is that these trends may be driven

9. As an example, take a prospective retiree wanting to move from snowy Bangor, Maine to sunny, retirement-friendly Palm Springs, California. The median listing price in Bangor is $175k, but the median in Palm Springs is $495k. This means that even for the homeowner whose mortgage is paid off, he or she would only be able to generate about 35% of the needed equity to buy a house in Palm Springs. Originating a mortgage would then be necessary for financing the balance, which presents problems for older people in particular. One is that the monthly payment would be much higher than what they had to pay in Bangor, just at the time the household was looking to transition to living on a fixed income. The other is that older homebuyers often have a tougher time getting a 30-year mortgage if they indicate to their bank they intend to live on a fixed income and may thus be deterred from buying a home if they instead have to take out a 15-year loan.

10. Hsieh and Moretti (2018) document that the standard deviation in log home prices increased by 63% from 1964 to 2009, largely due to restrictive land-use regulations in coastal metros.

by locally-attached people who accept lower wages and foregone housing wealth appreciation to stay in place in exchange for working longer to then recoup these losses.[11]

1.2 Displacements

There is very little work that has studied how homeownership changes in response to job displacements among older workers, but there are several papers that have looked at general effects of job displacements and wage trends on older workers. Recent research finds that this group is now being displaced at higher rates than younger workers, due to the weakening of tenure protections, rising manufacturing displacement (to which older workers are particularly exposed), and greater labor force attachment of older workers (Zhivan, Soto, Sass, and Munnell, 2012; Couch, 1998). While the authors do not offer a reason why this may be so, it could be due to the manner in which manufacturing employment has fallen. Manufacturing employment has been in secular decline, with particularly weak growth since 2000-2001 (ADH; Pierce and Schott, 2016; Fort, Pierce, and Schott, 2018; Houseman, 2018).

Previous studies on older workers' responses to job loss have provided some interesting findings that vary for men and women. For men, unanticipated job losses in their pre-retirement years (<62) cause them to extend their working years (Chan and Stevens, 2001, 2004), but also cause them to increase their retirement propensity if it occurs in their retirement-eligible years (Chan and Stevens, 2004; Coile and Levine, 2007, 2011a, 2011b; Disney, Ratcliffe, and Smith, 2015). For women, job losses are more likely to prompt retirement at any age if they are married, whereas single women respond more like men when displaced (Chan and Stevens, 2001).

1.3 Housing Wealth Shocks and Labor Supply

How older workers change their labor supply is typically understood through the life-cycle theory of consumption, which predicts that individuals respond to negative wealth shocks by reducing consumption of leisure time and other normal goods. Liquidity-constrained workers may then choose to compensate by delaying or reversing retirement.

A large literature has affirmed that older workers tend to respond to asset shocks as predicted under this model, such as stock market shocks (Gustman, Steinmeier, and Tabatabai, 2010),[12] inheritances (Brown, Coile, Weisbrenner, 2010), and lotteries (Cesarini, Lindqvist, Notowidigdo, and Ostling, 2017; Imbens, Rubin, and Sacerdote, 2001). However, there are several reasons to think that older workers may respond differently to housing wealth fluctuations. First, relatively few older workers own stock or receive inheritances, let alone win the lottery, whereas the majority are homeowners (Coile and Levine, 2011b; Begley and Chan, 2018). Second, housing acts as both investment and consumption for households. Unlike stocks or bonds, houses sell in illiquid markets, have price movements that are hard to observe, and necessitate a change in location upon sale. One consequence is that few households seem to consume out of their household equity, in spite of the existence of sophisticated financial products like reverse mortgages (Cocco and Lopes, 2019).

These cross-pressures may explain why there is conflicting evidence for whether homeowners respond to housing wealth shocks by changing their labor supply. Coile and Levine (2011b) was the first paper to study the question econometrically, and they find no evidence in CPS data that homeowners change their transitions to retirement in response to housing wealth shocks. Goda, Shoven, and Slavov (2012) similarly find using HRS data little relationship between housing wealth fluctuations and retirement intentions, but they note that their results (while significant at only the 10% level) run counter to the predictions of the life-cycle model. Specifically, they find that renters in rising housing markets decreased their expected retirement ages, while homeowners essentially made no changes. In contrast, Farnham and Sevak (2016) use Health and Retire-

11. For example, one could imagine a homeowner living in Flint, MI who has lost their job at a GM plant in their early 50's. Classical economics would predict that the person would be open to relocating to reestablish an income stream with retirement looming, but local ties to friends, family, or even just a preference for familiarity means the homeowner would choose to stay put. The same need for reestablishing an income stream remains, though, so the question is: what would this person turn to with retirement looming? Accept a job at Walmart, which would surely pay lower wages than GM? Apply for disability payments? Etc.

12. Several studies of the 2000 boom include Coile and Levine (2006), (2011b); Hurd, Reti, and Rohwedder, (2009); McFall, (2011); Goda, Shoven, and Slavov, (2012), among others.

ment Study (HRS) data to find significant effects of housing wealth fluctuations on retirement expectations while finding no effect on observed retirement timing.[13]

However, three more recent papers all using HRS data have found changes in observed labor supply. Zhao and Burge (2017) find that homeowners' labor supply decreased (relative to renters) in response to the housing boom of the Aughts, and increased (relative to renters) in response to the housing bust in 2008. Zhao (2017) also uses HRS data and the 2008 financial crisis to differentially test responses and finds that homeowners experiencing a 28% housing price decline decreased their non-durable consumption by 4.8% and increased their LFP by 1%. Begley and Chan (2018) exploit changes in expected housing wealth to compare homeowners in ZIP codes who underperformed or overperformed expectations to homeowners in ZIP codes whose wealth appreciated as expected. They find that men experiencing negative shocks delay retirement, with stronger effects for mortgage holders.

1.4 Contribution

I extend the literature in a couple of ways. First, I use renters as a control group as opposed to Begley and Chan's expectations-based approach, because the direction of the bias on renters is predictable under the life cycle model, whereas the potential bias of which ZIP codes over or under-performed expectations is harder to quantify.[14] My contribution here is to explicitly consider how the renters' positive wealth effect may bias the results. Second, I introduce the import competition shock to this literature. A problem with using the Great Recession's housing bust is that it was preceded by a large, but not evenly distributed, run-up in housing prices, which challenges the parallel pre-trends assumption needed for a valid differences-in-differences design. I present in Section 3.2 evidence for parallel pre-trends between renters and homeowners for those exposed and (relatively) unexposed to the import competition shock and argue that this approach offers a valid means of testing behavioral responses to housing wealth shocks.

Another contribution is to more fully consider spillovers from a poor housing market into the labor market. Since idiosyncratic housing market shocks are extremely rare, all empirical papers must use a local labor market shock which coincides with a housing market shock, or vice-versa. These correlations often mean that individuals are not just losing their jobs, but also losing significant asset and housing wealth (Gustman, Steinmeier, and Tabatabai, 2010; Coile and Levine, 2011a; Hurd and Rohwedder, 2010).[15] Both the import competition shock from China and the Great Recession entailed large employment contractions (Asquith et al., 2019; Xu, Ma, Feenstra, 2019; Mian and Sufi, 2014) as well as housing wealth declines, so that job displacement is important to control for directly. I thus extend the literature on income and housing wealth shocks by controlling for both, and the interaction between the two, to ensure that I can credibly identify how older workers respond to these shocks differentially.

Fourth, because my work is motivated by the desire to understand long-standing, and puzzling, trends among older workers, I study two outcomes not previously considered: whether the respondent moved to another labor market and whether the respondent reports enjoying their job. Most previous work has focused on either specific labor supply measures (in the labor force; being retired; hours worked, etc.) or Social Security claiming behavior, but these outcomes cannot tell us whether people are working because they want to or because they must. Migration and self-enjoyment at work will help better contextualize what the elevated rates of labor force participation mean for the average worker.

Lastly, I contribute to a growing literature on inequality among older workers by region and educational attainment at or near retirement. With the important exception of Coile and Levine (2011b), most of this literature has focused on heterogeneity of responses between the sexes. In keeping with a growing literature on inequality by educational attainment, I examine differences between those with and without a college degree. I also examine trends by region, another previously neglected area.

13. Finding conflicting evidence is not limited to US-based studies. Using data from the UK, Disney, Ratcliffe, and Smith (2015) find that positive housing wealth shocks have little effect on retirement timing, and local labor market conditions matter far more. In contrast, Disney and Gathergood (2017) find housing price effects for older homeowners' labor supply consistent with the life-cycle theory of consumption.

14. Specifically, the coefficient on renters should (ideally) just reflect the effect of the local labor market prospects, and the interaction between the shock and homeownership will then isolate the additional effect of having a housing wealth shock. However, because renters do receive a positive wealth shock themselves in the form of foregone rent increases, this somewhat "biases" the result away from the ideal case where renters serve as a true control group, i.e., untreated.

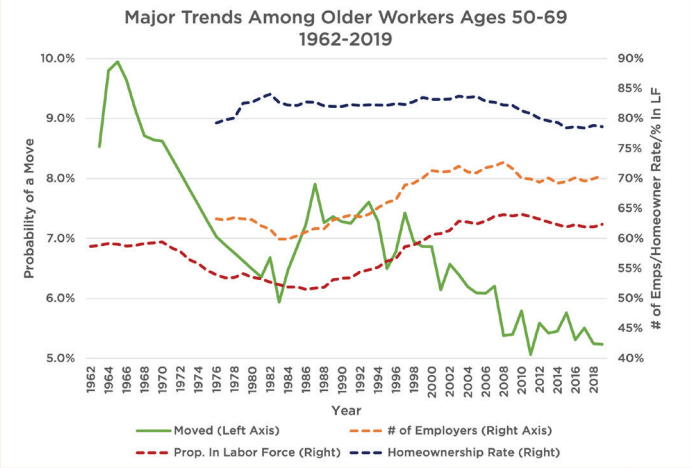
15. Hurd and Rohwedder estimate that 39% of households experienced either unemployment and/or had negative housing equity or were in arrears during the Great Recession.

2. Data and Descriptive Summary: Trends in Migration, Working, and Homeownership

2.1 Evidence from the Current Population Survey

I begin my empirical exploration by highlighting some of the growing inequalities among older workers, particularly by education and region. I start with data from the Annual Social and Economic Supplement of the Current Population Survey (CPS ASEC), a nationally representative survey conducted annually in March focusing on respondents' income and work experience. Publicly-available microdata is then released that allows researchers to construct highly detailed population estimates. Figure 1 illustrates the central problem examined in this paper. Taking advantage of the full longitudinal span of the CPS ASEC microdata (1962-2019), it graphs homeownership, migration, and labor force participation rates, as well as the number of non-consecutive employers in the past year, a proxy for job changing for respondents ages 50-69. The graph underscores that while the fall in homeownership seems to be related to the Great Recession, the fall in migration is long-standing and the increase in labor force participation has been occurring since at least the mid-1990's.

Figure 1. Migration, Labor Force Participation, Job Changing, and Homeownership



Notes: Figure 1 shows trends in job changing, migration, labor force participation, and homeownership rates between 1962-2019 reported from the Current Population Survey (CPS) for people aged 50-69. On the left-hand axis are the scales for the migration rates. On the right-hand axis, are the scales for average number of non-concurrent employers last year, the homeownership rate, and the labor force participation rate.

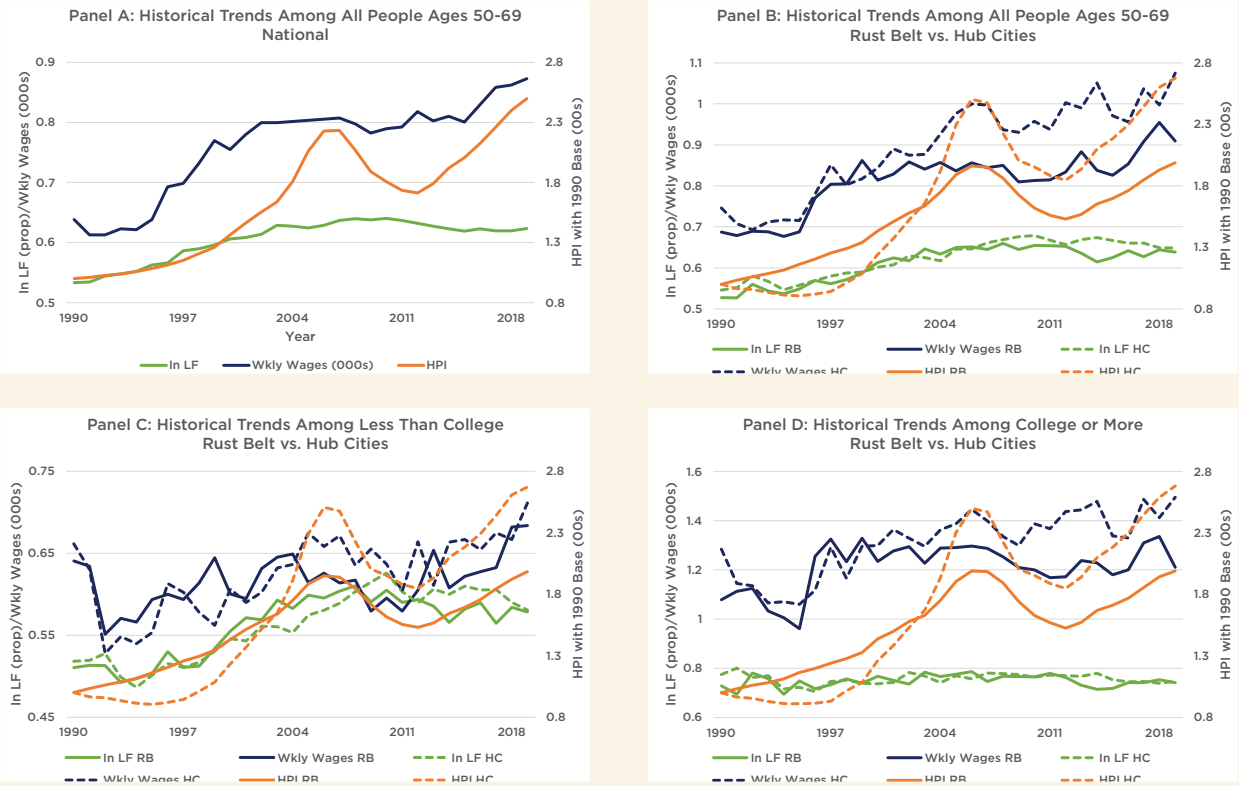
It is hard to know from Figure 1 alone whether these trends are driven by housing or labor market changes. Panel A of Figure 2 illustrates this problem by comparing labor force participation (green line), average weekly real wages (blue line; in thousands), and housing price appreciation from 1990-2019 (orange line; in hundreds). LFP and average weekly real wages are drawn from the CPS ASEC, while housing price appreciation comes from the Federal Housing Finance Agency (FHFA). The FHFA Housing Price Index (HPI) is a quarterly repeat-sales index reported for a variety of US municipal divisions.[16] Most time series FHFA has available span from 1995Q1 to 2018Q2, but for the most populous geographic subunits, some series extend as far back as 1975. I use 1990 as my base year (HPI=100), so that the HPI results can be interpreted as percentage change in housing prices since 1990.

Panel A shows that housing prices rose from 1990-2006 (steeply from 2000-2006), and then gave up much of those gains from 2007-2011, before resuming an upward march. In the same spirit as Hsieh and Moretti (2018), Panel B disaggregates these trends into the Rust Belt (solid lines; Baltimore, Buffalo, Chicago, Cleveland, Detroit, Pittsburgh, St. Louis) versus Hub Cities (dashed lines; Boston, Los Angeles, New York, and San Francisco).[17] Wages, housing prices, and LFP evolve fairly similarly between the two regions, until around 2000, when wages and housing price appreciation start to rise more sharply in the Hub Cities. Labor force participation does not diverge until the Great Recession, when it starts

16. Specifically, this information is obtained from the same group of single-family properties whose mortgages have been purchased or securitized by the Federal Home Loan Mortgage Corporation (Freddie Mac) or the Federal National Mortgage Association (Fannie Mae) after January of 1975.

17. While other cities might fit the description as being in the Rust Belt or being a Hub City, these cities were chosen because they have been the ones most consistently historically observed in the CPS.

Figure 2. Real Wages, Housing Price Appreciation, and LFP



Notes: Figure 2 uses CPS data for respondents aged 50-69 to plot the labor force participation rate, average real weekly wages (in 000's), and housing price index (in 00's) for four samples: the full national sample (Panel A); Rust Belt versus Hub City respondents (Panel B); Rust Belt versus Hub Cities respondents without a college degree (Panel C); and Rust Belt versus Hub City respondents with a college degree (Panel D).

to lag in the Rust Belt. It begins to re-converge around the end of the sample period, possibly because wages in the Rust Belt finally start to converge with Hub City wages.

Wage polarization has occurred more acutely by education than by region (Autor, 2019), so Panels C and D show the same Rust Belt versus Hub Cities graph (Panel B) restricted to people without a bachelor's degree and with a college degree or more, respectively.[18] In Panel C, Rust Belt non-college workers experienced little real wage growth from 1990 to 2018, while housing prices "only" doubled — similar to the growth in inflation over this time period. In the Hub Cities, by contrast, these same workers experienced slightly more real wage growth but saw their housing wealth more than treble, and thus likely experienced real wealth appreciation. Labor force participation rose in both regions until about the Great Recession, whereafter it has been generally higher in the Hub Cities than in the Rust Belt.

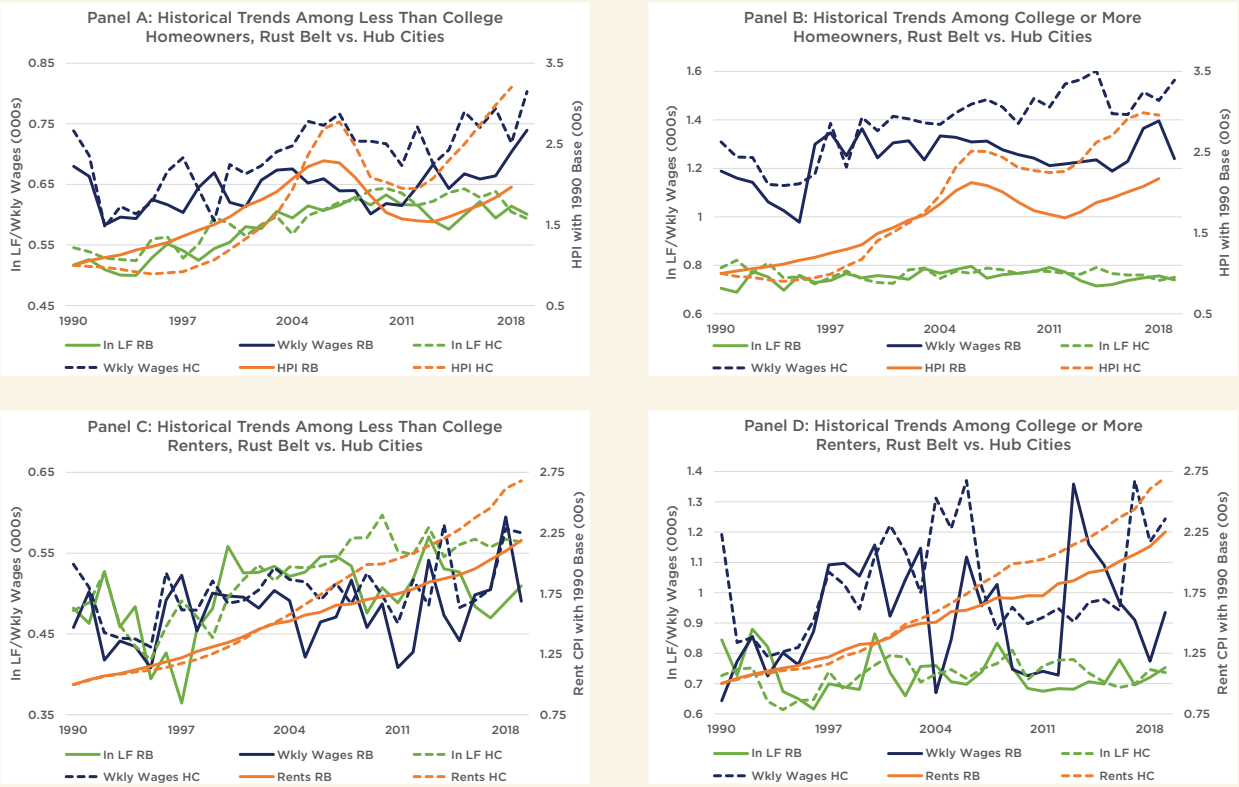
Panel D shows that while college graduates in both regions have experienced real wage growth, it has been somewhat stronger in the Hub Cities. The most striking difference is that housing price appreciation has been much stronger for college graduates in the Hub Cities than in the Rust Belt — a bit more than doubling in the Rust Belt (just beating inflation), and again trebling in the Hub Cities. However, LFP has been essentially flat in both regions throughout the entire period. Thus, while there are interesting region/education differences in how older workers wages and housing wealth have evolved since the end of the Cold War, it is not *ex ante* clear whether housing prices exert the predicted effect on LFP, particularly among those without a college degree.

One reason that LFP was higher in Hub Cities even though housing wealth appreciation was much stronger could be that the homeownership rate in the Hub Cities was lower than in the Rust Belt (66% versus 80% in 2019), so under the assumption that homeowners and renters have opposite responses to a housing wealth shock, one would expect smaller LFP effects of housing price appreciation in the Hub Cities than in the Rust Belt. Figure 3 thus presents Rust Belt versus Hub City trends for those without (Panel A) and with (Panel B) a college degree for just homeowners, and then, for renters in Panels C and D. For rents, I use the consumer price index (CPI) for rents from the St. Louis Fed's FRED database, which reports rent CPIs by Core Based Statistical Areas (similar to MSAs) from 1990 to the present.[19]

18. To measure housing price appreciation by education, I merge ZIP code-level HPI's with Census information to sort ZIP codes into quartiles based on the share of the population in 1990 with a college degree. I then create a population weighted HPI for each quartile within each metro area, and merge on the result to the CPS by metro.

19. Indices for the Buffalo CBSA and the Baltimore-alone CBSA are not available. Further, ZIP code-specific rent indices are not available over this period, so rent indices by education cannot be calculated.

Figure 3. Homeowners' and Renters' Real Wages, Housing Price Appreciation, and LFP



Notes: Figure 3 uses CPS data for respondents aged 50-69 to compare the labor force participation rate, average real weekly wages (in 000's), and housing price index (in 00's) in the Rust Belt versus the Hub Cities for four subsamples: non-college homeowners (Panel A); college-educated homeowners (Panel B); non-college renters (Panel C); and college-educated renters (Panel D).

If there is a housing wealth effect on LFP, it should be magnified for non-college workers who have faced flatter real wages across regions, amplifying the importance of housing wealth changes. However, the evidence is mixed. Panel A (non-college homeowners) shows that LFP rose in tandem with housing prices from the late 1990's until the 2008 Financial Crisis, whereafter housing prices declined in both regions but LFP kept rising. Hub City housing prices declined by 25% from 2007 to 2009, while LFP rose by an additional 6% and wages barely budged. However, Panel C shows that Hub City non-college renters exhibited the same pattern: LFP increased by 5% even though these renters experienced a positive wealth shock during this time as rent increases leveled off. In contrast, Rust Belt workers exhibited the expected pattern: homeowners' (Panel A) LFP increased by 1.6%, while renters' LFP *fell* by 12.8% between 2007 to 2009.

It is somewhat harder to compare trends among college-educated homeowners and renters, because the sample size of college-educated renters (Panel D) is small, making the trends very noisy. However, Panel B (college-educated homeowners) shows no relationship between the HPI and LFP, and perhaps some relationship between real wages and LFP: real weekly wages for this group declined in the Rust Belt before the Great Recession, and their LFP increased slightly, with the reverse trend holding for college-educated workers in the Hub Cities over the same period. Overall, Figure 3 demonstrates why this is a difficult question to resolve — while some groups appear to behave according to the life-cycle theory of consumption, other groups act in ways that appear to contradict its predictions.

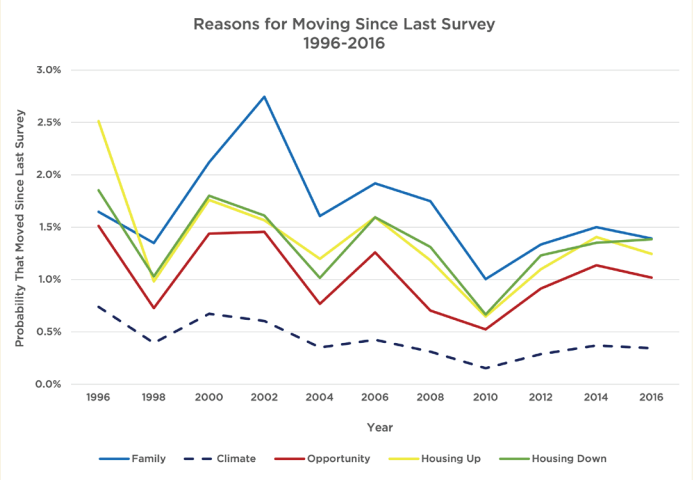
2.2 Evidence from the Health and Retirement Study

While the CPS ASEC provides rich microdata, it does not track respondents longitudinally, making it unsuited to compare outcomes pre- or post- a negative shock. It also does not include detailed information on housing values or provide detailed information on where people are moving to and from. I thus use the Health and Retirement Study (HRS) as my primary data source for the empirical part of this report. The HRS is a nationally-representative longitudinal survey of people aged 50 and over, conducting, since 1992, extensive biannual interviews of respondents and their spouses. The HRS contains six cohorts: the original HRS cohort (born 1931-1941), the AHEAD cohort (born before 1924),[20] the Children of the Depression (added in 1998;

20. AHEAD stands for Asset and Health Dynamics Among the Oldest Old. It was originally a companion study of the HRS that looked at people ages 70 and over in 1993. AHEAD respondents were surveyed separately from the original HRS cohort in 1993 and 1995, and the survivors were merged on to the rest of the HRS in 1998.

born 1924-1930), War Babies (added 1998; born 1942-1947), Early Baby Boomers (added 2004; born 1948-1953), Mid Baby Boomers (added 2010; born 1954-1959), and Late Baby Boomers (added 2016; born 1960-1965). The survey asks respondents and spouses for information on their demographics, health status, employment history, income, Social Security and pensions, and their retirement, financial, and housing wealth.

Figure 4. Reasons for Moving Since Last Survey



Notes: Figure 4 uses HRS data to plot the reasons for moving between 1996-2016 among all HRS respondents aged 44 and over. This relatively generous age band reflects that the HRS primarily samples people aged 50 and over, so that people under the age of 50 are usually spouses of sample respondents. The five reasons for moving are for family (more detail in Footnote 21); for a better climate (see Footnote 22); for job opportunities or retirement (see Footnote 23); to consume more housing (see Footnote 24); and to consume less housing (see Footnote 25).

Throughout, I use respondents aged 44 and over (the same range as Zhao and Burge (2017)) to minimize confidentiality concerns. Most respondents in the HRS are older, but spouses younger than 50 appear in the sample. Cutting off the sample at 44 years old allows me to keep both members of the married pair in the vast majority of cases, without introducing too many respondents whose labor force behavior who would be too unrepresentative of the sample as a whole.

Figure 4 uses HRS data to graph the migration rates from 1996-2016 among respondents for five specific reasons: moved to be closer to family,[21] moved for climate or leisure,[22] moved for work opportunities or retirement,[23] upgrading housing,[24] and downgrading housing.[25] The HRS does not separately report moving for retirement and moving for job opportunities during most of this time series.

Unfortunately, it is not clear from Figure 4 that any one reason was responsible for the particularly large decrease after the Great Recession. Instead, almost all five major reasons for moving did not quite recover fully, although some lagged their pre-crisis values more than others.[26] There was a fairly steady decline in moving for climate/leisure — itself a measure with high overlap with moving for retirement — over this period. Moving for family has also declined substantially over time. Moving to consume less housing ("Housing Down") almost always exceeds moving to consume more ("Housing Up") except briefly during housing boom years, 1996 and 2004. Nonetheless, fewer upgrades or downgrades occurred after the boom than prior to the Great Recession. Bucking these trends somewhat, is that while moving for work (or retirement directly) is decidedly pro-cyclical, the fraction doing so was not that different in 2016 than in 1998. All in all, though, it is not clear that after 2012, suppressed migration was a result of changes in either the labor or housing markets.

Like with the CPS data, I disaggregate the reasons for moving by education and region in Figure 5 to pick up distinct trends by subgroups.[27] It is clear that total migration is lower for all four groups after the Great Recession, but it is also evident that there have been important composition shifts that have played out differently across groups. Moving to be closer to family has declined (as a given reason) for non-college workers, as has moving to a better climate, particularly from the Rust Belt. Non-college respondents in both regions are about as likely to move for opportunity/

21. Responses corresponding to: "near or with children"; "near or with other relatives/friends."

22. Responses corresponding to: "climate or weather"; "leisure activities."

23. Responses corresponding to: "work or retirement related; business opportunities"; "closer to work"; "negative change in economic status of R or spouse/partner"; "R or spouse/partner changed job." (Note that "R" is the survey respondent).

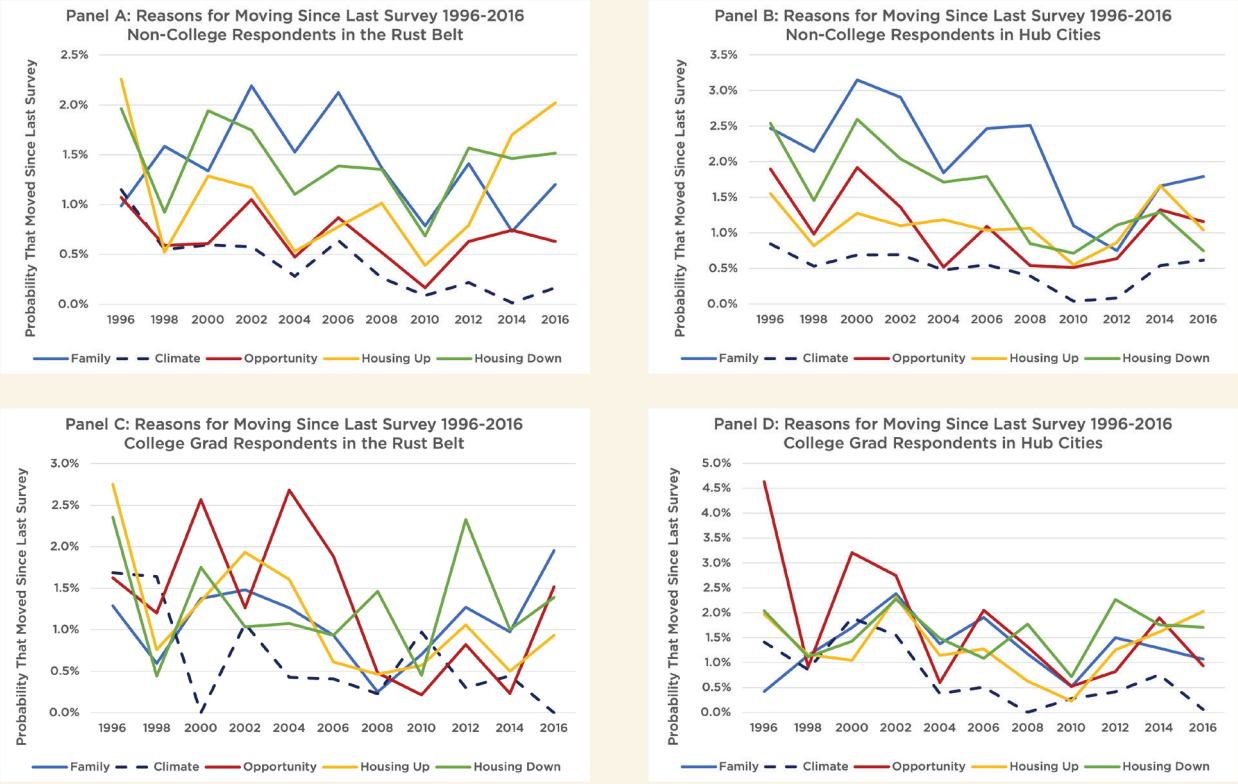
24. Responses corresponding to: "larger home"; "lived in apartment, mobile home, condo before–have now moved into a house"; "new neighborhood"; "location better"; "better area"; "nicer location." (These descriptive terms or similar only). Can also refer to qualities of the area such as "friendly people or having good schools."; "new house/apartment has specific desirable features not size related." (e.g., all on one floor; lake access; view; old home has undesirable features); Other responses include: "Bought own/new home; had new one built; wanted a house, NFS"; "Wanted to own instead of rent"; and "Positive change in economic status (e.g., received inheritance)."

25. Responses corresponding to: "smaller or less expensive home"; "old home too expensive" (e.g., taxes too high; couldn't pay mortgage; rent increased [Not to be confused with code 06 which refers to a smaller or less expensive home])"; "Cheaper, area or NA what (not house related or mentioned)"; "Simpler house to take care of; less upkeep; old home/property too much upkeep".)

26. There are of course more than just these five reasons for moving, and the HRS asks about many of them. However, these five cover the vast majority of moves in the HRS, ranging from 65%-83% in any given survey year.

27. For region, I use the region the person first appears in to establish where someone is moving from.

Figure 5. Reasons for Moving by Region and Education



Notes: Figure 5 uses HRS data to plot the reasons for moving between 1996-2016 by region (Rust Belt (RB) versus Hub Cities (HC)) and educational attainment status for respondents aged 44 and over. This relatively generous age band reflects that the HRS primarily samples people aged 50 and over, so that people under the age of 50 are usually spouses of sample respondents. The five reasons for moving are for family (more detail in Footnote 21); for a better climate (see Footnote 22); for job opportunities or retirement (see Footnote 23); to consume more housing (see Footnote 24); and to consume less housing (see Footnote 25).

retirement as they were in the late 1990's/early 2000's, whereas these moves have clearly declined among the college-educated. In the last survey wave (2016), moving to consume more housing overtook moving to consume less for non-college workers, but college-educated workers continue to be more likely to move down even eight years after the end of the Great Recession.

Perhaps the most interesting trends are in the relative shares of the various reasons for moving. Housing-driven moves became relatively more important among non-college workers in the Rust Belt and among college-educated workers in the Hub Cities. Moving for job opportunities/retirement became more important for non-college workers in the Hub Cities, and college-educated workers in the Rust Belt. Moving for a better climate (which could also be largely retirement-driven) has declined dramatically in relative terms among all groups except non-college educated respondents in Hub Cities, for whom it has become relatively more important.

The simplest interpretation is that workers are engaging in geographic sorting. Non-college workers in the Rust Belt would not make much more in real terms in the Hub Cities but could face far higher housing costs. Moving for job opportunities is thus less reasonable, so adjusting housing consumption becomes relatively more important. Similarly, college-educated workers in Hub Cities have few reasons to relocate for higher wages, so again adjusting housing consumption becomes relatively more important. The reverse holds for non-college educated workers in Hub Cities and college-educated workers in the Rust Belt, who are, in a sense, mismatched with their regions. The rise in moving for climate by non-college respondents in the Hub Cities may well be a case where unexpected housing wealth gains are liquidated to finance moves to cheaper, balmier locales. Thus, it seems like both housing and labor markets are influencing migration decisions, with perhaps labor market effects predominating.

3. Empirical Investigation

I now test empirically how displacement and housing price appreciation shocks alter the labor supply and migration behavior of older workers.

The key identification challenge is that housing wealth shocks often occur because of local labor market shocks, and vice versa, meaning that deteriorating housing wealth often indicates that the local labor market conditions are deteriorating as well.[28]

I overcome this challenge in two ways. First, I identify any effects of the shock on the local labor market separately from the shock on an individual's housing wealth by including both an indicator variable ("dummy") for the shock itself and then an interaction term between the shock and being a homeowner. The identifying assumption is that the effect on local labor market prospects induced by the shock is conditionally the same for both renters and homeowners, so that interactions between homeownership and the shock yield estimates on just the net impact of homeownership's consumption and investment bundle relative to renters. Since the impact of a negative labor demand shock on renters is not wealth-neutral, this effect will be downwardly biased, although it should be not unduly so.[29] Further, because the direction of the bias is known, it is possible to account for it in interpreting the results.

Treatment status is measured as a dummy assigned to respondents whose initial commuting zone (CZ) was in the top quartile for most foregone housing wealth due to the trade shock. Appendix A has more details on exactly how this is calculated. Figure A1 shows the treated CZs shaded in dark red.

The second method I use to overcome the identification challenge (of controlling for how shocks impact labor markets versus housing markets) is to separately control for both housing wealth shocks and income shocks. This recognizes that strong, local negative shocks are also likely to cause spikes in job displacements, and not controlling for these displacements directly is likely to introduce a major omitted variable bias problem. I identify respondents' income shocks from self-reported incidents of job displacement in the same spirit as Chan and Stevens (1999, 2001).

3.1 Effects of Negative Wealth and Income Shocks on Individual Labor Supply

Since I am using two sources of shocks, I calculate an augmented differences-in-differences-in-differences (DDD) estimate of the effects of the two shocks on households labor and migration outcomes as:

$$Outcome_{it} = \beta_1 Displaced_{it} + \beta_2 Displaced_{it} \times Homeowner_i + \beta_3 Shock_{it} + \beta_4 Shock_{it} \times Homeowner_i + \beta_5 Displaced_{it} \times Shock_{it} + \beta_6 Displaced_{it} \times Shock_{it} \times Homeowner_i + X_{it}\zeta + \iota_i + \gamma_t + \epsilon_{it} \quad (1)$$

where $Outcome_{it}$ is either: whether person *i* is retired in time *t*; whether the person is in the labor force; or whether the person has moved since the last survey. The estimates of interest are: β_1, the effect of an income shock to a renter; β_2, the effect of an income shock to homeowners — which should capture the net difference of an income shock on

28. Charles, Hurst, and Notowidigdo (2018) provide a useful model for modeling the general equilibrium results of shocks to one market or the other. Xu, Ma, and Feenstra (2019) discuss this dynamic in the specific context of the Chinese import competition shock, finding that spillover effects into housing markets exacerbated the labor market shock by 20-30%.

29. As discussed above, any positive wealth effect is likely to be small. Using FS' results directly, I find that each $1,000 increase in Chinese import penetration per worker decreases the median annualized rent by only $187, or 2.5%. By contrast, the median owner-occupied house declined by 5.4%.

homeowners relative to renters; β_3, the effect of the trade shock on renters — which can be interpreted as the net effect of a minor positive wealth shock (lower rents) and a weakening of outside employment prospects; $Shock_{it}$, a dummy for being in the top quartile of foregone housing wealth as of 2007, but is only set to one in the affected CZs from 2002 onwards, reflecting that the strongest effects from Chinese import competition occurred after Congress ratified permanent normalized trade relations with China in October 2000 (Pierce and Schott, 2016). β_4 is the effect of the trade shock on homeowners, which can be interpreted as the net impact of owning a home as a consumption and investment bundle; β_5 is the effect on renters experiencing an income shock in a trade-exposed labor market; and β_6 captures the effect on homeowners experiencing both shocks relative to renters.

As explained above, β_3 and β_5 are going to be biased relative to estimating just the impact of poor labor market prospects, because renters in shocked markets are enjoying a (small) positive wealth effect. It is unclear, ex ante, whether the two effects, poor job prospects and higher wealth, work in the same direction, and I will discuss their (likely) interactions throughout. It is further worth emphasizing that β_4 and β_6 are identified relative to the trade shock's effect on renters and cannot be interpreted as the absolute effect of a housing wealth shocks on homeowners. β_4 and β_6 capture the response of people experiencing a wealth shock (namely, as homeowners) *in addition* to poorer local job prospects and, in the case of β_6, a negative income shock as well. This also means that because they are calculated relative to the effect on renters, β_4 and β_6 will be biased by the same amount and in the same direction as the estimates on renters. In the results section, I account for bias on renters to account for what the bias on the homeowner estimates is.

There is no $\beta_7 Homeowner_i$ term because I fix homeownership status as to whether the person was a homeowner in their initial survey wave. This choice prevents bias from entering the estimates, as whether a respondent owns a home is itself both an outcome and a control,[30] and this coefficient is thus subsumed by the individual fixed effects, which enter the equation as ι_i. Some specifications also include the interacted parameters $\gamma_t \times \delta_s$ control for state-by-year economic shocks and policies, such as the property tax rebates discussed in Zhao and Burge (2017) and Shan (2010).

X_{it} represents other controls, including age as a 4th order polynomial, marital status, an indicator for being widowed, an indicator for being Medicare-eligible, indicators for whether the respondent's husband or wife are Medicare age-eligible (if applicable), being age-eligible for claiming Social Security early, and for being age-eligible for claiming "full" Social Security, as well as indicators for whether a person's husband or wife are age-eligible. "Age-eligible" is defined here as being eligible for claiming Social Security based on one's age, either early at age 62 at a monthly amount less than the Primary Insurance Amount (PIA) or a monthly amount equal to the PIA at either age 65 or 66 (full Social Security). Actual eligibility is determined both by age, which varies by year of birth,[31] and earnings history.

30. Including these kinds of variables can cause a form of bias called endogeneity bias, which is a form of selection bias. Because these are outcomes people can change, they may select into (or out of) a control status, possibly in response to a change in the outcome of interest. For example, people who drop out of the labor force due to a disability may be disproportionately more likely to also become renters because they can no longer handle home maintenance themselves. Without fixing homeownership status in advance, the results would be biased to appear like renters respond to a shock by decreasing labor force participation, when the reverse is closer to the truth.

31. For those born before 1943, the PIA could be claimed at age 65. For those born between 1943-1954, the PIA can be claimed at age 66.

Table 1. Summary Statistics, HRS Sample

	All N=229,696		Homeowners N=161,224		Renters N=36,595		Non-College N=181,908		College Educated N=47,788	
	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
Outcomes										
% In LF	0.431	0.495	0.442	0.497	0.416	0.493	0.396	0.489	0.568	0.495
% Retired	0.423	0.494	0.451	0.498	0.323	0.468	0.423	0.494	0.423	0.494
% Moved Across CZs	0.051	0.219	0.047	0.212	0.063	0.242	0.050	0.219	0.052	0.221
% Claiming SS	0.505	0.500	0.519	0.500	0.428	0.495	0.526	0.499	0.425	0.494
% Enjoy Work	0.897	0.305	0.897	0.304	0.888	0.315	0.891	0.311	0.910	0.287
Controls										
Age	65.8	11.0	66.1	10.9	64.2	11.1	66.2	11.1	64.5	10.5
% Married	0.630	0.483	0.699	0.459	0.378	0.485	0.609	0.488	0.713	0.453
% Widowed	0.176	0.380	0.164	0.370	0.202	0.402	0.196	0.397	0.099	0.299
% Medicare	0.484	0.500	0.500	0.500	0.402	0.490	0.496	0.500	0.435	0.496
% In Excellent Health	0.088	0.284	0.069	0.254	0.147	0.354	0.102	0.303	0.036	0.187
% Displaced	0.033	0.177	0.032	0.175	0.038	0.191	0.033	0.179	0.030	0.169
Other										
% Male	0.423	0.494	0.434	0.496	0.389	0.488	0.402	0.490	0.503	0.500
% White	0.774	0.418	0.815	0.388	0.550	0.498	0.757	0.429	0.838	0.368
% Black	0.165	0.371	0.138	0.345	0.337	0.473	0.180	0.384	0.107	0.309
% College Educated	0.208	0.406	0.245	0.430	0.129	0.336				
% Homeowners	0.689	0.463					0.654	0.476	0.824	0.381
House Value			179,352	263,517			114,722	204,565	259,796	393,301
Monthly Rent					575.9	871.9	463.4	820.3	803.7	2,057

Notes: Table 1 shows selected summary statistics for all in-sample Health and Retirement Study (HRS) respondents, defined as being aged 44 and over, and by selected characteristics. Note that "SD" refers to the standard deviation.

For simplicity (and to avoid endogeneity bias), I measure eligibility only on a respondent's (or their spouse's) birth year and age.

Table 1 shows summary statistics for the full HRS sample for respondents aged 44 and over and for various subsets, including homeowners, renters, non-college and college-educated respondents. The mean respondent is 65.8 years old. 43% are in the labor force, and 42% are retired. The sample is whiter (77%), less-college educated (only 21%), more female (58%), and more likely to be a homeowner (69%) than the population as a whole.

Table 1 also shows that homeowners and renters are different along a couple of important dimensions. Notably, homeowners are less likely than renters to move across CZs in between survey waves (4.7% versus 6.3%) but are more likely to be retired than renters (45% versus 32%). While 89% of homeowners are either retired or otherwise in the labor force, true of only 74% of renters, implying that there is a large pool of renters who are not working or looking for work, but are not retired either. Renters are also much less likely to be married (38% versus 70%), are more likely to be widowed (40% versus 37%), much less likely to be white (55% versus 82%) or have a college degree (13% versus 25%), but more likely to report being in excellent health (15% versus 7%) and about as likely to report having a job displacement since the last survey wave (3.8% versus 3.2%).

The differences between college-educated and non-college educated respondents are even more stark than between renters and homeowners. Non-college educated respondents are more than twice as likely to report being in excellent health (10% versus 4%) than college-educated respondents. However, by most other metrics, non-college respondents appear to be faring more poorly. Nearly 100% of college-educated respondents are in the labor force or retired, compared to just 82% of non-college respondents. This difference is driven exclusively by the shares who are in the labor force, as the share retired are identical at 42%. Nonetheless, non-BA holders are much more likely to claim Social Security (53% versus 43%) and are slightly less likely to report enjoying their jobs (89% versus 91%). Non-BA holders are much less likely to be married (61% versus 71%), more likely to be widowed (20% versus 10%), more likely to be female (60% versus 50%), less likely to be white (76% versus 84%), and less likely to be homeowners (65% versus 82%). Non-college homeowners' houses are (on average)

Figure 6. Pre-Trends in Outcomes by Treatment and Homeownership Status

Notes: Figure 6 uses HRS data for respondents aged 44 and over to show trends in selected outcomes by homeownership status and treatment status (in a heavily trade-impacted commuting zone with an import shock or in a CZ with no import shock). This trade shock was active from 2002 onwards, so trends prior to 2002 help establish the plausibility of using the non-shocked regions as a control group for the shocked regions. Divergences between the two regions from 2002 onwards may then reflect how the trade shock changed outcomes across the two regions.

worth less than half of BA-holders' homes ($115,000 versus $260,000) in nominal terms, and their monthly rents are $361 less than the rents paid by BA-holders ($463 versus $804).

This table reinforces the value of studying college-educated and non-college educated respondents separately, but also raises concerns about how well renters can actually serve as a control group for homeowners, and even whether the regression controls will be effective at leaving just the housing consumption/investment bundle as the only mediating difference in renters' versus homeowners' labor supply. I thus directly address how using renters as a control group may bias the results. However, the results below (generally) indicate that any such bias would not fundamentally change the direction of the results.

3.2 Validity of Differences-in-Differences-in-Differences Approach

Before presenting the results, I address whether the import competition shock is appropriate for the differences-in-differences-in-differences (DDD) exercise. In this design, absolute differences between groups are less important if they exhibit parallel trends in their outcome variables prior to treatment.[32] Ideally, there would be evidence for parallel pre-trends not just between renters and homeowners, but also between treated and control renters and treated and control homeowners. In Figure 6, I show the pre-trends, by treatment and homeownership status, for four outcomes: in the labor force (Panel A), retired (Panel B), moving across CZs (Panel C), and claiming Social Security (Panel D). I do not present the graph for enjoying work, because its much smaller sample size (as a result of needing to condition on having a job) makes it very noisy. Nonetheless, I note here for completeness that the Enjoys Work graph shows no evidence of parallel pre-trends, but also no evidence for a differential trend that might cause bias in any one group.

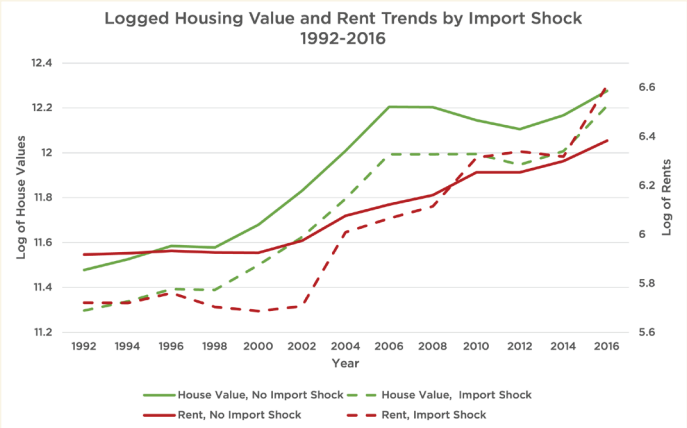
Reassuringly, not only is there compelling evidence for parallel pre-trends between homeowners and renters, but also within renters and homeowners — whether or not they were exposed to the import competition shock. Marking the start of the import competition shock to the 2002 survey, being in the labor force, being retired, and claiming Social Security all trended together in the pre-period. The mobility

32. While parallel pre-trends are neither necessary nor sufficient for the experiment to generate the needed counterfactual parallel trends, they are strong evidence in favor of its validity. Right now, there is not a definitive pre-test one could perform to evaluate *ex ante* whether the DDD design is valid and plausible (Kahn-Lang and Lang, 2019).

graphs show more movement and less consistency in the pre-trends, but importantly the groups clearly co-move prior to the import competition shock and there is no obvious differential trend in any subgroup that might bias the results. Also important is that all four graphs show a breakdown in the parallel trends from 2002 onwards, with the trade shock groups clearly diverging from the control groups by the end of the sample period. This is perhaps most dramatically visible in Panel D (claiming Social Security), where all four groups are bunched very closely together until around 2002, whereafter the two treatment groups start to drift away from their respective control groups.

Another key component is that if changes in housing values and rents are channels for changing labor supply, then they too would ideally exhibit parallel pre-trends followed by diverging trajectories after the trade shock. Figure 7 plots logged self-reported housing values for homeowners and contract rents for renters. The graph shows clear parallel pre-trends among homeowners and among renters across treatment regions, with a clearly diverging rent trend after 2002 and a more subtle divergence among housing values.[33] Altogether, the evidence from Figures 6 and 7 support using the import competition shock-by-homeownership status in a DDD design to test housing wealth and income shocks.

Figure 7. Housing Price Trends by Region



Notes: Figure 7 uses HRS data for respondents aged 44 and over to show trends in housing prices (for homeowners) and rents (for renters) by treatment status. Treatment status is assigned by whether or not the respondents were in heavily trade-impacted commuting zones with an import shock. The trade shock was active from 2002 onwards, so trends prior to 2002 help establish the plausibility of using the non-shocked regions as a control group for the shocked regions. Divergences between the two regions from 2002 onwards may then reflect how the trade shock changed outcomes across the two regions.

33. Interestingly, rents in the treated region increase faster than in the control region. This could be because displacements and anemic income growth in the trade shock region made it harder for workers to buy homes, raising the demand for rentals.

4. Results

Labor Force Participation: I begin by looking at how labor force participation (LFP) changes in response to housing wealth and income shocks. These are shown in Table 2. Starting with just income shocks, a job displacement since the last survey causes a person to be 6.9 percentage points more likely to be out of the labor force (Column 1), but Column 2 reveals that the response is quite different by homeownership status: renters are 3.7 percentage points less likely to be in the labor force, and homeowners are an additional 4.5 percentage points less likely than renters to be in the labor force after a displacement.

All the results tables are formatted in two panels: Panel A shows the raw coefficient estimates generated by estimating Equation 1. Panel B reports the net effect of either displacements or the import shock on renters or homeowners, which accounts for the weighted size of each treatment and the interactions between the income and wealth shocks.

Similarly, decomposing the effect of a regional shock on renters and homeowners reveals important differences in LFP responses. Column 3 shows that respondents are about 1.6 percentage points more likely to be in the labor force after an adverse shock (significant at the 10% level), but Column 4 again reveals that responses differ meaningfully by homeownership status: renters increase LFP by 2.9 points (significant at the 5% level) but homeowners are 1.9 percentage points less likely (Panel A) than renters to increase their LFP, leading to a net LFP increase of only by 1 point (Panel B) and neither the interaction effect nor the total marginal effect are significant.

Column 4's result runs counter to most findings in the literature to date. Not only are homeowners less likely to increase their LFP than renters in response to a housing wealth shock, but renters outright *increase* their LFP. This result is also striking because any bias from renters' countervailing positive wealth effect would be pushing the coefficient towards zero. While I cannot rule out a wealth effect that operates in line with the life cycle theory of consumption's predictions, Column 4's results on renters are consistent with the net effect of the import competition shock being dominated by changes in forward-looking working expectations *over* any wealth effects. For homeowners, the smaller-than-renters net labor supply response seems hard to rationalize as being in response to lost housing wealth. Instead, comparing Column 4 (local labor market shock that spills over into the housing market) to Column 2 (idiosyncratic income shock), the consilience between them is that homeowners in both cases react to adverse events by being somewhat less attached to the labor force than renters. This indicates that the key difference between homeowners and renters is perhaps not changes in housing wealth, but housing consumption security in the face of a future living on a fixed income.

Columns 5-7 estimate Equation (1), which pools together the models of Columns 2 and 4 and adds interactions between *Displaced×Shock* and *Displaced×Shock×Homeowner,* to fully control for the effects of both shocks. Bolstering the idea that not controlling for the other shock can bias the results, the two new parameters cause shifts in the magnitudes of the previously-measured effects. The absolute value of the coefficient on *Displaced* shrinks from 3.7 to 2.1 points and loses significance. In contrast, the coefficient on *Shock* increases from 2.9 to 3.1 percentage points. Part of the reason these shifts occur is that the joint effect (being displaced into a shocked local labor market) is very large: -8.5 percentage points and significant at the 1% level for a total 25.6% decline, when both *Displaced* and *Displaced×Shock* are added together.

The relative displacement effect on homeowners grows from -4.5 to -5.6 points (still significant at the 1% level), and the relative trade shock effect grows even more negative (from -1.9 to -2.0 points), although this coefficient remains

Table 2. In Labor Force Response to Displacement and Housing Market Shocks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)
Panel A: Coefficient Estimates							
Displaced	-0.0691***	-0.0369***			-0.0211	-0.0208	-0.0226
	(0.0068)	(0.0132)			(0.0145)	(0.0146)	(0.0143)
×Homeowner		-0.0451***			-0.0561***	-0.0576***	-0.0575***
		(0.0165)			(0.0171)	(0.0172)	(0.0172)
Shock			0.0155*	0.0286**	0.0306**	0.0302**	0.0206
			(0.0087)	(0.0142)	(0.0145)	(0.0143)	(0.0146)
×Homeowner				-0.0185	-0.0195	-0.0191	-0.0195
				(0.0139)	(0.0145)	(0.0145)	(0.0149)
Displaced×Shock					-0.0852***	-0.0854***	-0.0826**
					(0.0318)	(0.0318)	(0.0321)
×Homeowner					0.0518	0.0533	0.0537
					(0.0412)	(0.0413)	(0.0417)
Adj. R^2	0.655	0.655	0.655	0.655	0.656	0.656	0.658
F	142.9	140.6	133.2	130.8	140.2	136.8	111.6
N	201,267	201,267	201,267	201,267	201,267	200,642	200,556
Panel B: Marginal Effects							
Renters							
Displaced		-0.0369***			-0.0362***	-0.0361***	-0.0373***
		(0.0132)			(0.0130)	(0.0130)	(0.0128)
Shock				0.0286**	0.0278**	0.0274**	0.0179
				(0.0142)	(0.0140)	(0.0139)	(0.0142)
Homeowners							
Displaced		-0.0820***			-0.0831***	-0.0841***	-0.0852***
		(0.0085)			(0.0089)	(0.0089)	(0.0089)
Shock				0.0102	0.0100	0.0100	0.0002
				(0.0090)	(0.0089)	(0.0087)	(0.0091)
Great Recession Controls	N	N	N	N	N	Y	Y
State-by-Year FEs	N	N	N	N	N	N	Y

Notes: Table 2 reports the results from estimating Equation 1 on being in the labor force. Income shocks are identified through job displacements *(Displaced),* a housing wealth shock identified through being in a commuting zone highly exposed to import competition *(Shock),* and to both shocks *(Displaced×Shock).* Coefficients in rows without the *Homeowner* term can be interpreted as the effect on renters, and coefficients in rows with that term can be interpreted as the effect on homeowners relative to the renters' response. All regressions use respondent survey weights and standard errors are clustered at the commuting zone level. *b* refers to the coefficient estimate and *se* refers to the estimated standard error.

* p<0.10, ** p<0.05, *** p<0.01

statistically insignificant. The relative effect on homeowners of being displaced into the trade shock is large and positive: 5.2 percentage points, but not statistically significant.

Why the effect on renters displaced into the trade shock should be so large (and negative) is not obvious, but one possibility is that twice shocked renters and homeowners more explicitly account for relative changes in housing wealth after having lost their incomes. Displaced renters may be more likely to reason that they can drop out of the labor force in a depressed local labor market because rent risk has decreased. Or they may instead feel compelled to turn to programs like Social Security Disability Insurance (SSDI) to cover their expenses, which has rules against working for "substantial gainful activity." Since homeowners displaced in a heavily trade-impacted CZ are also simultaneously experiencing a negative wealth shock, they may be more inclined to try to keep working than renters, either because they have more secure housing consumption access, or because they want to offset losses to both income and wealth, or both. Nonetheless, the effect on homeowners of being twice shocked is net negative (adding together *Displaced×Shock* and *Displaced×Shock×Homeowner*), so the predicted wealth effect does not predominate even in this subset. Another possibility is bias from the renters' positive wealth effect. This model assumes that renters identify just the effect on

local labor markets of *Shock* and do not act on any real or perceived housing wealth shock themselves. Since this is unlikely to be true, *Shock* is in practice downwardly biased, but since its effect is positive (and statistically significant in Columns 3-6), the presence of this bias should impart *more* confidence that renters are in fact increasing their LFP in response to the import competition shock. By the same token, bias may be making *Displaced×Shock* larger than it would be if the empirical assumption strictly held, so while the coefficients' signs are likely robust to bias, the exact magnitudes should be interpreted carefully.

Nonetheless, while the double shocked coefficients are large, they do not seem to have much effect on the weighted marginal effects, because they are a relatively small part of the overall universe of displacements. Panel B, Column 5 shows that pooling the two shocks together does not change much the magnitudes of the estimated effects. Column 6 adds controls for the Great Recession's effect on housing prices, which also changes the results very little.[34] Column 7 adds state-by-year fixed effects, and this makes a much more substantial difference to the estimates on the trade shock variable. The coefficient on *Shock* in Panel A declines from 3.0 percentage points to 2.1 and loses significance, while the total marginal effect for renters in Panel B declines from 2.7 to 1.8 percentage points and also loses significance.

Lastly, the total marginal effect of *Shock* on homeowners' LFP shrinks all the way to 0.02 percentage points — effectively zero. This is an important result for two reasons. First, a zero result for homeowners coupled with a positive result for renters is strong evidence against wealth effects being the dominant driver of older workers' labor supply decisions. Second, the results are robust to bias from a positive wealth effect on renters' labor supply. This wealth effect (under the life cycle theory) would make both *Shock* and *Displaced×Shock* smaller, because removing this bias would make both coefficients more positive (contra the life cycle theory), and the total marginal effect would also remain positive (and increase). Similarly, removing the bias would move both *Shock×Homeowner* and *Displaced×Shock×Homeowner* negatively along the real line to compensate, not fundamentally changing the underlying results.[35] Thus, even under generous assumptions about potential bias from renters' unobserved positive wealth shock, removing it in some fashion would only confirm the findings in Table 2.

Both renters and homeowners leave the labor force after a job displacement, but the decrease in labor force participation (LFP) is larger among homeowners (-8.5 percentage points) than renters (-3.7 percentage points). Renters may increase their LFP in response to a negative local labor market shock, but we find no evidence that homeowners change their LFP in response to a housing wealth shock and the net effect of the import trade shock on this group is a precise zero.

Retired: Table 3 shows the results of estimating the same models with retirement as the outcome of interest. Unsurprisingly, the gist of the results is fairly similar to those in Table 2, with the signs flipped reflecting that retirement is a "fuzzy" additive inverse for being in the labor force for many older workers. Like with LFP, Columns 1 and 2 shows that homeownership amplifies the negative effect of a displacement on labor supply: overall, displaced workers become 3.4 percentage points more likely to retire (Column 1), while adding an interaction term with homeownership reveals that displaced renters are 1.9 percentage points more likely to retire, and homeowners are an additional 2.2 percentage points more likely to retire although this difference with renters is not significant. Similarly, Column 3 shows that a small, non-significant decline in retirement of 0.5 percentage points in response to a regional shock. As above, adding an interaction with initial homeownership status (Column 4) introduces substantial response differences: renters drive the retirement decline (declining 2.1 percentage points, significant at the 10% level), while homeowners effectively do not react on net at all: homeowners are 2.2 percentage points more likely to retire in response to the trade shock relative to renters, for a total marginal effect among homeowners of effectively zero (Panel B).

The fully specified model estimates in Table 3 Columns 5-7 also tell a very similar story to the results in Table 2. Homeowners are more likely than renters to retire in response to a displacement, and less likely to change their retirement propensity in response to the trade shock. As with being in the labor force, the coefficients on twice-shocked renters and homeowners are very large and opposite signed. Adding state-by-year fixed effects (Column 7) effectively sets the marginal effect (Panel B) of the trade shock to a statistical zero for both renters and homeowners, although the point estimates have opposite signs for the two groups, with renters responding by being 1.2 percentage points less likely to retire and homeowners being 0.8 percentage

34. The Great Recession control is a binary status assigned to people living in the top quartile of CZs whose housing prices experienced the greatest falls (in percentage terms) from 2008 to 2012. This is similar in spirit to how Zhao and Burge (2017) calculated their treatment status for whether a homeowner experienced a negative housing price shock.

35. This would occur because one could imagine that there is some term, ϖ, that represents the additive bias from the renters' positive wealth effect. Since the coefficients on the terms interacted with *Homeownership* are measuring just the difference between the homeowners' response relative to the renters' response, it means that if one were to somehow completely unbias the renters' coefficients, the homeowners' coefficients would then have to change as well to reflect the new differences in the levels between the renters' response and the homeowners'.

Table 3. Retirement Response to Displacement and Housing Market Shocks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)
Panel A: Coefficient Estimates							
Displaced	0.0342***	0.0188*			0.0063	0.0063	0.0069
	(0.0052)	(0.0113)			(0.0104)	(0.0105)	(0.0102)
×Homeowner		0.0215			0.0315**	0.0324**	0.0331**
		(0.0139)			(0.0129)	(0.0130)	(0.0128)
Shock			-0.0054	-0.0213*	-0.0228*	-0.0214*	-0.0139
			(0.0080)	(0.0128)	(0.0129)	(0.0128)	(0.0122)
×Homeowner				0.0223	0.0233	0.0221	0.0213
				(0.0138)	(0.0142)	(0.0142)	(0.0149)
Displaced×Shock					0.0674***	0.0674***	0.0653**
					(0.0255)	(0.0255)	(0.0255)
×Homeowner					-0.0498	-0.0509	-0.0506
					(0.0379)	(0.0378)	(0.0373)
Adj. R^2	0.597	0.597	0.597	0.597	0.597	0.597	0.599
F	132.3	130.5	132.1	128.7	117.2	114.6	117.2
N	201,267	201,267	201,267	201,267	201,267	200,642	200,556
Panel B: Marginal Effects							
Renters							
Displaced		0.0188*			0.0183*	0.0184*	0.0186*
		(0.0113)			(0.0099)	(0.0100)	(0.0096)
Shock				-0.0213*	-0.0206	-0.0192	-0.0117
				(0.0128)	(0.0127)	(0.0126)	(0.0119)
Homeowners							
Displaced		0.0403***			0.0409***	0.0417***	0.0426***
		(0.0065)			(0.0068)	(0.0068)	(0.0067)
Shock				0.0010	0.0011	0.0013	0.0079
				(0.0089)	(0.0089)	(0.0089)	(0.0082)
Great Recession Controls	N	N	N	N	N	Y	Y
State-by-Year FEs	N	N	N	N	N	N	Y

Notes: Table 3 reports the results from estimating Equation 1 on being retired. Income shocks are identified through job displacements *(Displaced),* a housing wealth shock identified through being in a commuting zone highly exposed to Chinese import competition *(Shock),* and to both shocks *(Displaced×Shock).* Coefficients in rows without the *Homeowner* term can be interpreted as the effect on renters, and coefficients in rows with that term can be interpreted as the effect on homeowners relative to the renters' response. All regressions use respondent survey weights and standard errors are clustered at the commuting zone level. *b* refers to the coefficient estimate and *se* refers to the estimated standard error.

* p<0.10, ** p<0.05, *** p<0.01

points more likely. These are the opposite results expected if wealth effects did predominate, although neither marginal effect is statistically significant.

Like the LFP results, retirements increase after a job displacement, but more strongly among homeowners than renters (up 4.3 percentage points versus 1.9 percentage points). However, neither group shows a clear retirement response to a local labor market/housing wealth shock.

Moving Across CZs: Lastly, I estimate the impact of these shocks on the propensity to move across CZs, which proxies for the willingness to change labor markets. A job displacement increases the probability of moving by 3.9 percentage points (Column 1; significant at the 1% level) overall, and Column 2 reveals that renters are in fact 4.4 percentage points more likely to move, with homeowners being 0.8 less likely than renters (but not statistically significant), for a net effect of 3.6 percentage points (Panel B), and significant at the 1% level.

Table 4. Moving Response to Displacement and Housing Market Shocks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)
Panel A: Coefficient Estimates							
Displaced	0.0385***	0.0444***			0.0431***	0.0431***	0.0434***
	(0.0049)	(0.0094)			(0.0105)	(0.0106)	(0.0102)
×Homeowner		-0.0083			-0.0041	-0.0042	-0.004
		(0.0106)			(0.0111)	(0.0112)	(0.0105)
Shock			-0.0091**	-0.0101	-0.0097	-0.0102	-0.0064
			(0.0046)	(0.0099)	(0.0099)	(0.0096)	(0.0138)
×Homeowner				0.0014	0.0012	0.0012	-0.0036
				(0.0089)	(0.0090)	(0.0091)	(0.0099)
Displaced×Shock					0.0069	0.0068	0.0065
					(0.0223)	(0.0223)	(0.0210)
×Homeowner					-0.0262	-0.0260	-0.0250
					(0.0282)	(0.0282)	(0.0268)
Adj. R^2	0.099	0.098	0.098	0.098	0.099	0.099	0.121
F	34.7	33.4	31.4	30.3	29.4	31.4	34.0
N	201,267	201,267	201,267	201,267	201,267	200,642	200,556
Panel B: Marginal Effects							
Renters							
Displaced		0.0444***			0.0443***	0.0443***	0.0446***
		(0.0094)			(0.0093)	(0.0093)	(0.0091)
Shock				-0.0101	-0.0094	-0.0100	-0.0062
				(0.0099)	(0.0097)	(0.0094)	(0.0137)
Homeowners							
Displaced		0.0362***			0.0356***	0.0355***	0.0361***
		(0.0055)			(0.0055)	(0.0055)	(0.0053)
Shock				-0.0087**	-0.0090**	-0.0097***	-0.0106
				(0.0036)	(0.0036)	(0.0035)	(0.0070)
Great Recession Controls	N	N	N	N	N	Y	Y
State-by-Year FEs	N	N	N	N	N	N	Y

Notes: Table 4 reports the results from estimating Equation 1 on moving commuting zones between survey waves. Income shocks are identified through job displacements *(Displaced),* a housing wealth shock identified through being in a commuting zone highly exposed to Chinese import competition *(Shock),* and to both shocks *(Displaced×Shock).* Coefficients in rows without the *Homeowner* term can be interpreted as the effect on renters, and coefficients in rows with that term can be interpreted as the effect on homeowners relative to the renters' response. All regressions use respondent survey weights and standard errors are clustered at the commuting zone level. *b* refers to the coefficient estimate and *se* refers to the estimated standard error.

* p<0.10, ** p<0.05, *** p<0.01

Column 3 shows that the trade shock decreased cross-labor market migration overall by 0.9 percentage points (significant at the 5% level). This is a striking finding, because it is an econometric demonstration that the import competition shock also produced (on a smaller scale) the same phenomenon as the Great Recession: LFP rose in response to a negative local labor market shock (Table 2), but migration nonetheless declined (Table 4). As with LFP and retirement, there are important behavioral differences between renters and homeowners. When the interaction term with homeownership is added (Column 4), renters are shown to be less likely to respond by moving than homeowners. The caveat is that neither estimated effect is significant, but it is notable that the total marginal effect on homeowners (Panel B) is -0.9 percentage points and is significant at the 5% level. This may be driven (partly) by wealth effects, as renters may be more reluctant than homeowners to leave a depressed area because lower rents locally may partially offset the prospect of higher wage gains elsewhere (Notowidigdo, 2019).

As above, the results of estimating Equation (1) are presented in Column 5; adding controls for the Great Recession are in Column 6; and then adding state-by-year fixed effects in

Column 7. In Panel A, *Displaced* is the only coefficient with a statistically significant result: displaced renters are 4.3 percentage points more likely to move across CZs (significant at the 1% level) in Columns 5-7. All other coefficients have t-statistics less than 1, but the total marginal effects in Panel B show interesting patterns. The net marginal effect on renters of the trade shock was to make them 0.9 percentage points (not significant) less likely to move, but homeowners are as well less likely to move (0.9 percentage points less, significant at the 5% level). Adding the controls for the Great Recession (Column 6) changes little but adding state-by-year fixed effects causes the marginal effect for homeowners to grow from -1.0 percentage points in Column 6 to 1.1 percentage points in Column 7 while losing statistical significance.

Displacements increase people's willingness to move (up 4.4 percentage points among renters, 3.6 percentage points among homeowners). The net effects of the import trade shock on moving are negative, but they are not statistically significant.

Overall, the results in Tables 2-4 show that idiosyncratic income shocks influence labor supply and migration decisions more robustly than the state of the local labor market or housing wealth fluctuations. Tables 2 and 3 present little evidence that older homeowners increase their labor force participation in response to lost housing wealth — if anything, the evidence is the opposite. Instead, the results are more consistent with renters and homeowners responding to perceived changes in their present and future ability to work in a negatively shocked local labor market and the implications for their ability to continue to pay for secure housing consumption. However, Table 4's results show that renters and homeowners in negatively shocked regions ultimately are less likely to relocate, despite the state of their local labor market.

4.1 Results by Educational Attainment

One concern is that renters are (on average) less likely to have a four-year degree than homeowners, and as Figure 3 shows, outcomes have diverged by education since around 2000, approximately the same time as the import competition shock began. Dynamic changes in the returns to education may thus be partially reflected in homeownership status in ways that are difficult to control for directly. To partially filter out bias from the effects of time-varying changes in the returns to education, I next look at the results after conditioning on either having or not having a bachelor's degree.

Table 5 reports the results of re-estimating Equation (1) augmented with state-by-year fixed effects and controls for the Great Recession by respondent's educational attainment for the three main outcomes of interest. Columns 1-3 report results for non-college respondents, and Columns 4-6 reports results for college-educated respondents. As above, Panel A reports the coefficient estimates for Equation (1), and Panel B reports the marginal effects of *Displaced* and *Shock* for renters and homeowners. In general, workers without a bachelor's degree appear to be less responsive to displacement shocks than the sample as a whole. Looking at Panel B's marginal effects, displaced renters are 3.5 percentage points less likely to be in the labor force (versus 3.7 percentage points in Table 2 Column 7), only 1.2 percentage points more likely to be retired and not statistically significant (versus 1.8 points in the full sample, and significant at the

Table 5. Responses by Educational Attainment to Displacement and Housing Market Shocks

	Without BA			With BA		
	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Coefficient Estimates						
Outcome Variable	*In LF*	*Retired*	*Moved*	*In LF*	*Retired*	*Moved*
Displaced	-0.0224	-0.0011	0.0337***	-0.0325	0.0558*	0.0974***
	(0.0147)	(0.0111)	(0.0108)	(0.0362)	(0.0314)	(0.0279)
×Homeowner	-0.0465***	0.0338**	0.0061	-0.0758*	0.0063	-0.0602**
	(0.0168)	(0.0152)	(0.0120)	(0.0410)	(0.0329)	(0.0297)
Shock	0.0110	-0.0082	-0.0134	0.0881**	-0.0471	0.0021
	(0.0135)	(0.0133)	(0.0150)	(0.0425)	(0.0340)	(0.0217)
×Homeowner	-0.0160	0.0217	-0.0049	-0.0517	0.0232	0.0169
	(0.0156)	(0.0159)	(0.0114)	(0.0356)	(0.0340)	(0.0190)
Displaced×Shock	-0.0651**	0.0698***	0.0068	-0.1653*	0.0429	0.0212
	(0.0310)	(0.0265)	(0.0198)	(0.0931)	(0.0723)	(0.1056)
×Homeowner	0.0192	-0.0370	-0.0199	0.1757*	-0.0809	-0.0605
	(0.0436)	(0.0422)	(0.0281)	(0.1056)	(0.0753)	(0.1006)
Adj. R^2	0.647	0.592	0.12	0.657	0.625	0.143
F	124.2	115.0	25.1	18.9	49.4	14.8
N	158,649	158,649	158,649	41,882	41,882	41,882
Panel B: Marginal Effects						
Renters						
Displaced	-0.0345***	0.0119	0.0350***	-0.0584*	0.0625**	0.1007***
	(0.0127)	(0.0102)	(0.0096)	(0.0320)	(0.0278)	(0.0284)
Shock	0.0088	-0.0059	-0.0131	0.0829*	-0.0458	0.0028
	(0.0133)	(0.0131)	(0.0152)	(0.0432)	(0.0341)	(0.0227)
Homeowners						
Displaced	-0.0774***	0.0388***	0.0374***	-0.1067***	0.0562***	0.0310***
	(0.0100)	(0.0083)	(0.0058)	(0.0152)	(0.0132)	(0.0109)
Shock	-0.0066	0.0145	-0.0187***	0.0368	-0.0252	0.0178
	(0.0103)	(0.0090)	(0.0071)	(0.0241)	(0.0162)	(0.0142)

Notes: Table 5 reports the results from estimating Equation 1 with Great Recession controls and state-by-year fixed effects by educational attainment. Income shocks are identified through job displacements *(Displaced),* a housing wealth shock identified through being in a commuting zone highly exposed to Chinese import competition *(Shock),* and to both shocks *(Displaced×Shock).* Coefficients in rows without the *Homeowner* term can be interpreted as the effect on renters, and coefficients in rows with that term can be interpreted as the effect on homeowners relative to the renters' response. All regressions are weighted with survey weights and standard errors are clustered at the commuting zone level. *b* refers to the coefficient estimate and *se* refers to the estimated standard error.

* p<0.10, ** p<0.05, *** p<0.01

10% level), and are 3.5 percentage points (significant at the 1% level) more likely to move, versus 4.5 percentage points in the full sample. Similarly, displaced homeowners are 7.7 percentage points less likely to be in the labor force (versus 8.5 in Table 2, Column 7), are 3.9 percentage points more likely to be retired (significant at the 1% level) versus 4.3 percentage points in Table 3, and are 3.1 percentage points more likely to move (significant at the 1% level) versus 3.6 percentage points in Table 4's Column 7. Those without a college degree seem to generally not change their labor supply in response to a negative labor market shock, while these homeowners are 1.9 percentage points (significant at the 1% level) less likely to move, versus 1.1 percentage points (not significant) in the full sample.

College-educated respondents, by contrast, are measurably more willing to adjust their labor supply and migration decisions in response to negative shocks. The results in Columns 4-6 tend to have larger confidence intervals than those in 1-3, in part because the college-educated sample is about one-quarter the size of the non-college sample. Nonetheless, the point estimates are almost all larger among the college-educated sample. Panel B shows that displaced renters are

5.8 percentage points (significant at the 1% level) less likely to be in the labor force, 6.3 points more likely to be retired (significant at the 5% level), and 10.1 (significant at the 1% level) points more likely to have moved to a different CZ. Displaced homeowners are 10.7 percentage points less likely to be in the labor force (significant at the 1% level), 5.6 points more likely to be retired (significant at the 1% level), and 3.1 points more likely to have moved to another CZ (significant at the 1% level).

By contrast, the marginal effect on the trade shock for the college-educated is very noisy across outcomes and home-ownership status. One notable result is that college-educated homeowners are 1.8 percentage points more likely to move to a different CZ, against non-college educated homeowners being 1.9 percentage points less likely to move. The result for college-educated homeowners is not significant at conventional levels, but it is nonetheless worth noting that the two groups react with opposite impulses. This reinforces the findings presented in Figure 3, that college-educated workers have had more opportunities for wage arbitrage across labor markets than non-college workers.

College-educated renters have a large, positive LFP response to the import trade shock, increasing by participation by 8.3 percentage points, while non-college homeowners have a large, negative mobility response to the import trade shock, decreasing participation by 1.9 percentage points. College-educated homeowners are twice as likely to leave the workforce after a job displacement than renters, but renters are more than twice as likely to move to a new labor market than homeowners. Non-college workers also reduce their LFP and increase their retirement propensities in response to a job displacement, but at lower rates than the college-educated.

4.2 Robustness and Further Heterogeneity of Response

It is possible that these results are not driven as much by differing labor market dynamics among those with or without a college degree, but instead by other factors. One possibility is that an import competition effect might be obscured by compensating changes in non-housing financial assets. As the returns on trade-impacted housing assets declined, homeowners might have chosen to invest less in housing maintenance, and shifted instead into financial asset markets, which would have yielded much better returns

over this time period.[36] If true, this might explain why they appear to retire at higher rates than renters in response to the shock (Table 3). Similarly, renters might have decreased their investments in other assets as they enjoyed wealth gains from stagnating rents. Thus, as a robustness check, I control for the subset of respondents who report having no other sources of wealth beyond housing at the outset of the study.[37] The idea here is that if you do not have any other non-housing assets by late middle age, you are less likely to do so going forward than someone who already has an established pattern of investment.[38] If there is a countervailing effect of selection into buying other assets as trade-impacted local housing markets underperformed, then the results on this subsample should look more like the predictions of the life cycle model coupled with a smaller migration response, because those with less wealth have fewer resources to draw on to finance a move.

36. The S&P Index increased 98% from December 11, 2001 (when China ascended to the World Trade Organization) to December 11, 2016 (during the last year of the study period), or 6.5% per annum. By contrast, the national housing price index increased by 82.1% over the same period, or 5.5% per annum, with the areas most exposed to import competition lagging the S&P even further (FS, 2017).

37. Specifically, this excludes people who initially had real estate wealth beyond their primary home — an individual retirement account, CDs or T-Bills, market bonds, pension income, or expected future pension income from a current job. I also include people who initially have non-zero checking/savings balances and vehicle wealth because those are far more universally held. Further. I include people who initially report receiving non-zero business income, because it is hard to distinguish in the data between business income and self-employment income.

38. This is not the ideal means for checking this source of bias, because of course respondents could still go on to start shifting into non-housing assets. However, this may be the best way to do so that does not generate further bias from people switching in and out of this subsample based on their decision to acquire non-housing assets.

Table 6. Heterogeneity of Responses to Displacement and Housing Market Shocks No Initial Non-Housing Wealth and Live Outside State of Birth

	No Non-Housing Wealth			Live Outside Birth State		
	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Coefficient Estimates						
Outcome Variable	*In LF*	*Retired*	*Moved*	*In LF*	*Retired*	*Moved*
Displaced	-0.0154	-0.0017	0.0359***	-0.0487***	0.007	0.0584***
	(0.0188)	(0.0127)	(0.0096)	(0.0171)	(0.0145)	(0.0149)
×Homeowner	-0.0224	0.0302*	0.0076	-0.0181	0.0326*	-0.0199
	(0.0246)	(0.0173)	(0.0125)	(0.0221)	(0.0172)	(0.0169)
Shock	0.0256	-0.025	-0.0224	0.0161	-0.0057	-0.0090
	(0.0192)	(0.0161)	(0.0137)	(0.0300)	(0.0182)	(0.0222)
×Homeowner	-0.032	0.0206	-0.0022	-0.0026	0.0103	0.0000
	(0.0271)	(0.0220)	(0.0133)	(0.0266)	(0.0161)	(0.0150)
Displaced×Shock	-0.0648*	0.0395	-0.0059	-0.0271	0.0318	-0.0183
	(0.0381)	(0.0304)	(0.0217)	(0.0413)	(0.0267)	(0.0285)
×Homeowner	0.0105	-0.0132	-0.0024	-0.0238	-0.0315	-0.0034
	(0.0693)	(0.0597)	(0.0323)	(0.0583)	(0.0360)	(0.0329)
Adj. R^2	0.653	0.549	0.137	0.667	0.600	0.120
F	54.3	68.5	17.2	55.7	77.6	29.9
N	81,045	81,045	81,045	100,974	100,974	100,974
Panel B: Marginal Effects						
Renters						
Displaced	-0.0290*	0.0066	0.0347***	-0.0531***	0.0122	0.0554***
	(0.0156)	(0.0121)	(0.0087)	(0.0145)	(0.0131)	(0.0131)
Shock	0.0231	-0.0235	-0.0226	0.0152	-0.0046	-0.0096
	(0.0188)	(0.0159)	(0.0140)	(0.0292)	(0.0179)	(0.0219)
Homeowners						
Displaced	-0.0492***	0.0341***	0.0418***	-0.0750***	0.0396***	0.0350***
	(0.0150)	(0.0115)	(0.0101)	(0.0131)	(0.0085)	(0.0079)
Shock	-0.0084	-0.0034	-0.0249***	0.0118	0.0046	-0.0097
	(0.0187)	(0.0149)	(0.0086)	(0.0136)	(0.0117)	(0.0133)

Notes: Table 6 reports the results from estimating Equation 1 with Great Recession controls and state-by-year fixed effects for two subsamples: those without any initial non-housing wealth and those who initially live outside their state of birth. Income shocks are identified through job displacements *(Displaced),* a housing wealth shock identified through being in a commuting zone highly exposed to Chinese import competition *(Shock),* and to both shocks *(Displaced×Shock).* Coefficients in rows without the *Homeowner* term can be interpreted as the effect on renters, and coefficients in rows with that term can be interpreted as the effect on homeowners relative to the renters' response. All regressions are weighted with survey weights and standard errors are clustered at the commuting zone level. *b* refers to the coefficient estimate and *se* refers to the estimated standard error.

* p<0.10, ** p<0.05, *** p<0.01

Another possibility is that there might be important variation in how people respond based on how "tied" people are to a local area, and these local ties have been increasing over time. As discussed in this report's introduction, this phenomenon leads to a form of hysteresis in labor market prospects after a negative local shock, wherein people with stronger local ties stay in place and often accept lower real incomes than people who move on. Further, strong local ties might mean that you care less about the value of your home (since you have no intention of eventually selling it), and thus factor housing wealth fluctuations less into your labor supply decisions.

Table 6 reports the results of estimating Equation (1) with state-by-year fixed effects and controls for the Great Recession for the subsample of people with no initial non-housing wealth (Columns 1-3) and for people who live outside their state of birth (Columns 4-6). The results only partially coincide with the predictions made above that assumed that there might be an obscured housing wealth response.

Focusing on Panel B's total marginal effects for concision, the displacement coefficients grow in almost every case, except the migration response for displaced renters. The migration responses to *Shock* (Column 3) decrease as predicted: for renters, going from -0.6 percentage points in Table 4 Column 7 to -2.3 percentage points in Table 6, and for homeowners, going from -1.1 percentage points to 2.5 percentage points (significant at the 1% level). However, labor force and retirement responses to *Shock* largely trend in the opposite-than-predicted directions (vis-à-vis the life cycle model), relative to the results in Tables 2-4. Renters' LFP response increases from 1.8 to 2.3 percentage points and their retirement response decreases from -1.2 to -2.4 percentage points, while homeowners' LFP response decreases from 0.0 to -0.8 percentage points but their retirement response decreases from 0.8 to -0.3 percentage points. Instead of magnifying expected housing wealth effects, dropping people with non-housing assets acts to strengthen (on balance) the results in the main sample.

Columns 4-6 in Table 6 show the results on the subsample of people who live outside their state of birth. There is a slight shift in the results that might suggest a stronger housing wealth effect than the sample as a whole. Comparing again Panel B in Table 6 to Panels B in Tables 2 and 3, the effect of *Shock* on renters' LFP decreases slightly from 1.8 to 1.5 percentage points, the effect on retirement increases from -1.2 to -0.5 percentage points, and the effect on moving decreases slightly (-0.6 to -1.0 percentage points). For homeowners, the effect of *Shock* on LFP increases from 0.0 to 1.2 percentage points, the effect on retirement decreases from 0.8 to 0.5 percentage points, and the effect on moving is effectively unchanged. Here, the shifts in the coefficients follow the life cycle theory of consumption's predictions (less LFP/more retirement for renters, more LFP/less retirement for homeowners), but even so, the overall signs for the coefficients still do not match the model: renters' LFP increases in response to *Shock* more than homeowners' (Column 4, 1.5 versus 1.2), while renters are still less likely and homeowners more likely to retire in response to *Shock* (-0.5 percentage points versus 0.5 percentage points). Both groups show an equal decline in propensity, equal to -1.0 percentage points, to move to a new labor market.

These robustness checks underscore the main findings above that housing wealth effects appear to be swamped by workers' forward-looking prospects in local labor markets. Renters may be enjoying stagnating rents but are nonetheless motivated to stay more attached to the labor force, perhaps from concerns about holding onto a job that allows them to pay rent. By contrast, homeowners more secure access to housing consumption seems to empower them to embrace retirement in the face of poor local labor market conditions, rather than working longer to recapture lost housing wealth.

4.3 Further Consequences of Homeownership After Receiving a Negative Income or Housing Wealth Shock

In this subsection I briefly discuss how my findings relate to the current public policy environment. Policymakers generally seek to encourage greater labor force attachment, one reason being that working longer and delaying Social Security has positive effects on public finances. Further, working longer has positive mental and physical health externalities (Börsch-Supan and Schuth, 2014), and may also lessen per capita Medicare expenditures.

Table 7. Claiming Social Security in Response to Displacement and Housing Market Shocks

	All Respondents	Non-College Respondents	College Respondents	No Non-Housing Wealth	Live Outside State of Birth
	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)
	(1)	(2)	(3)	(4)	(5)
Panel A: Coefficient Estimates					
Displaced	0.0050	0.0082	-0.0111	-0.0018	0.0156
	(0.0082)	(0.0100)	(0.0243)	(0.0116)	(0.0100)
×Homeowner	-0.0139	-0.0180	0.0050	-0.0176	-0.0235*
	(0.0103)	(0.0118)	(0.0245)	(0.0128)	(0.0135)
Shock	0.0039	-0.0023	0.0324	-0.017	0.0043
	(0.0071)	(0.0071)	(0.0225)	(0.0107)	(0.0123)
×Homeowner	0.0030	0.0037	-0.0038	0.0114	0.0172
	(0.0084)	(0.0073)	(0.0306)	(0.0140)	(0.0180)
Displaced×Shock	-0.0084	-0.0109	-0.0063	0.0246	-0.0085
	(0.0218)	(0.0235)	(0.0551)	(0.0260)	(0.0347)
×Homeowner	0.0551**	0.0468	0.0785	0.0360	0.0676
	(0.0275)	(0.0301)	(0.0713)	(0.0402)	(0.0463)
Adj. R^2	0.797	0.798	0.789	0.758	0.795
F	1,400.4	1,437.3	459.4	577.4	641.4
N	200,556	158,649	41,882	81,045	100,974
Panel B: Marginal Effects					
Renters					
Displaced	0.0035	0.0062	-0.0121	0.0034	0.0142
	(0.0078)	(0.0092)	(0.0218)	(0.0106)	(0.0100)
Shock	0.0036	-0.0027	0.0322	-0.0161	0.0040
	(0.0069)	(0.0070)	(0.0227)	(0.0105)	(0.0115)
Homeowners					
Displaced	-0.0006	-0.0032	0.0052	-0.0067	0.0017
	(0.0052)	(0.0068)	(0.0081)	(0.0080)	(0.0082)
Shock	0.0084	0.0026	0.0309**	-0.0032	0.0235**
	(0.0065)	(0.0054)	(0.0147)	(0.0107)	(0.0093)

Notes: Table 7 reports the results from estimating Equation 1, which tests respondents' Social Security claiming propensity in response to shocks. Income shocks are identified through job displacements *(Displaced),* a housing wealth shock identified through being in a commuting zone highly exposed to Chinese import competition *(Shock),* and to both shocks *(Displaced×Shock).* Coefficients in rows without the *Homeowner* term can be interpreted as the effect on renters, and coefficients in rows with that term can be interpreted as the effect on homeowners experiencing a housing wealth shock relative to the renters' response. All regressions are weighted with survey weights and standard errors are clustered at the commuting zone level. *b* refers to the coefficient estimate and *se* refers to the estimated standard error.

* p<0.10, ** p<0.05, *** p<0.01

I thus examine Social Security claiming and self-reported job satisfaction. Table 7 shows the results for the empirical analysis where the outcome variable is a dummy for claiming Social Security. Column 1 reports results for all respondents, Column 2 just non-college respondents, Column 3 just college-educated respondents, Column 4 just respondents with no initial non-housing wealth, and Column 5 just those who initially live outside their state of birth. I find little evidence that job displacements encourage either renters or homeowners to increase their likelihood of claiming Social Security. However, Panels A and B have two interesting findings. The first is that non-college and college-educated respondents exhibit opposite responses to displacements by homeownership status — although none of these coefficients or marginal effects are statistically significant, except for those who initially live outside their state of birth, where displaced homeowners are 2.4 percentage points less likely than renters to claim Social Security. Still, as none of the total marginal effects on displacements in Panel B are statistically significant, it is hard to draw strong inferences from these differences.

Table 7 shows that almost none of the shock-related coefficients are statistically significant, except in Column 1 (All Respondents), where homeowners displaced into a trade-impacted local labor market are 5.5 percentage points more

Table 8. Changes in Enjoying Work in Response to Displacement and Housing Market Shocks

	All Respondents	Non-College Respondents	College Respondents	No Non-Housing Wealth	Live Outside State of Birth
	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)
	(1)	(2)	(3)	(4)	(5)
Panel A: Coefficient Estimates					
Displaced	0.0118	0.0172	-0.0077	0.0163	0.0102
	(0.0210)	(0.0213)	(0.0570)	(0.0283)	(0.0325)
×Homeowner	-0.0071	0.0075	-0.0172	0.0144	-0.0179
	(0.0264)	(0.0297)	(0.0631)	(0.0398)	(0.0331)
Shock	-0.0128	-0.0133	-0.0143	-0.0051	0.0207
	(0.0133)	(0.0165)	(0.0226)	(0.0194)	(0.0252)
×Homeowner	0.0169	0.0214	-0.0042	0.0102	-0.0261
	(0.0146)	(0.0207)	(0.0178)	(0.0177)	(0.0237)
Displaced×Shock	-0.0374	-0.0602	0.0982	-0.0179	-0.053
	(0.0376)	(0.0375)	(0.0908)	(0.0583)	(0.0621)
×Homeowner	0.0223	-0.0083	-0.0241	0.0586	0.0672
	(0.0586)	(0.0526)	(0.1414)	(0.0762)	(0.0825)
Adj. R^2	0.364	0.360	0.383	0.344	0.369
F	5.4	4.6	3.3	4.6	7.1
N	64,597	45,663	18,892	26,309	32,769
Panel B: Marginal Effects					
Renters					
Displaced	0.0055	0.0067	0.0077	0.0128	0.0020
	(0.0183)	(0.0182)	(0.0495)	(0.0253)	(0.0287)
Shock	-0.0140	-0.0153	-0.0116	-0.0058	0.0190
	(0.0132)	(0.0164)	(0.0224)	(0.0190)	(0.0242)
Homeowners					
Displaced	0.0022	0.0127	-0.0133	0.0387**	-0.0055
	(0.0104)	(0.0142)	(0.0198)	(0.0191)	(0.0108)
Shock	0.0035	0.0058	-0.0165	0.0067	-0.0050
	(0.0141)	(0.0162)	(0.0178)	(0.0196)	(0.0206)

Notes: Table 8 reports the results from estimating Equation 1, which tests whether or not employed respondents' report enjoying work. Income shocks are identified through job displacements *(Displaced),* a housing wealth shock identified through being in a commuting zone highly exposed to Chinese import competition *(Shock),* and to both shocks *(Displaced×Shock).* Coefficients in rows without the *Homeowner* term can be interpreted as the effect on renters, and coefficients in rows with that term can be interpreted as the effect on homeowners experiencing a housing wealth shock relative to the renters' response. All regressions are weighted with survey weights and standard errors are clustered at the commuting zone level. *b* refers to the coefficient estimate and *se* refers to the estimated standard error.

* p<0.10, ** p<0.05, *** p<0.01

likely (significant at the 5% level) to claim Social Security than similarly situated renters. This could be an example of intertemporal substitution of wealth consumption, as people whose housing wealth declines may then turn to other sources of wealth for consumption smoothing purposes.

There are two subsamples where the marginal effect of *Shock* is statistically significant for homeowners: college-educated respondents (claiming increases by 3.1 percentage points, significant at the 5% level) and those who live outside their state of birth (claiming increases by 2.4 percentage points, significant at the 5% level). This is harder to interpret, particularly for the college-educated, as the results in Table 6 indicate that college-educated workers increase their LFP/decrease their propensity to be retired in response to *Shock* (although neither marginal effect in that table was statistically significant at conventional levels). Perhaps some college-educated homeowners are inclined to work longer, while others begin claiming Social Security to partially compensate for housing wealth losses. However, this story seems somewhat unlikely, because the coefficient on renters is of practically the same magnitude (3.2 percentage points), just not statistically significant, meaning that renters seemed to have exhibited the same behavior as homeowners even while receiving a positive wealth shock. Further study here is needed.

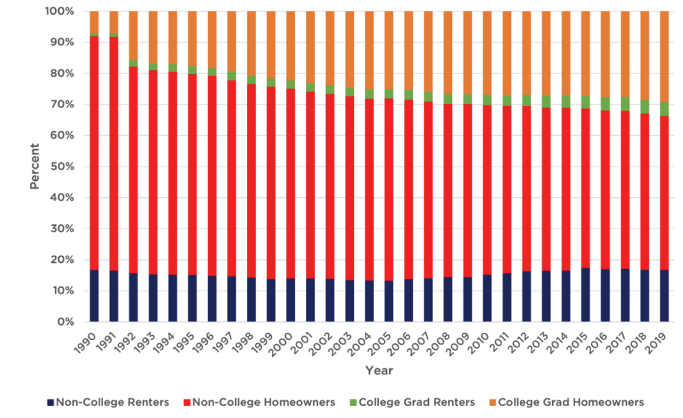
Lastly, Table 8 shows how people rate their enjoyment at work in response to income and regional shocks. This conditions the sample further to just people who are employed, and perhaps for this reason, none of the coefficients in Panel A are statistically significant. The sample restriction also changes the context on the *Displaced*-related coefficients to be the behavior of people who lost their jobs in between waves but are currently employed. For that reason, the coefficients on *Displaced* are mostly positive, but very noisy — people are (on balance) happier in their new job than the one they were let go from, but the difference is not large or precisely-measured enough to be statistically significant in most cases. One exception are displaced homeowners who lacked initial wealth, as the marginal effect of *Displaced* shows that their job satisfaction in the new job is 3.9 percentage points higher (significant at the 5% level). Housing wealth access may allow homeowners to engage in longer job searches that result in better matches, but since this marginal effect is not consistent across samples, it is hard to be sure what exact mechanism is at play here.

5. Discussion

Both the Great Recession (nationally) and the import competition shock from granting China PNTR (in specific regions) seem to have increased the LFP of older workers, while decreasing their overall propensity to move between labor markets. Should we expect a similar dynamic during the recovery from the COVID-19 Recession?

The ongoing aging of the workforce has made this an even more pressing question than it was during the previous two shocks. Splitting the sample into four groups based on homeownership status and college attainment, the sample of non-college homeowners is still by far the largest: a full 52% of the sample falls into this group, more than twice the size of the next largest group (non-college renters). It thus is unsurprising that their negative migration response to a shock seems to dominate the aggregate trends. While they remain the largest subgroup, they make up a smaller share of older Americans than they did at the onset of the Great Recession. Figure 8 shows changes in the composition of older workers divided into four groups by educational attainment (college versus non-college) and homeownership status. Non-college homeowners went from 55.8% of those aged 50-69 in 2008 to 49.5%, while all other groups gained in share.

Figure 8. Composition Trends by Educational Attainment and Homeownership



Notes: Figure 8 uses CPS data to show composition trends for four subgroups of respondents aged 50-69.

6. Conclusion

Since at least the 1990's, older workers' labor force participation (LFP) and migration responses have been trending in opposite directions, raising concerns about the quality of this group's job matches. One explanation could be that diverging housing prices across regions suppresses migration, particularly for this high homeownership group, while also prompting more LFP by those living in regions where housing price appreciation has disappointed.

This paper probes the relationships between negative labor market shocks, housing wealth changes, and migration by exploiting the trade shock created when strong Chinese import competition arrived in US markets after Congress granted Permanent Normal Trading Relations to China and it ascended to the World Trade Organization in 2001. This policy change caused differential impacts across US housing and labor markets and allows me to create an augmented differences-in-differences-in-differences empirical strategy based on exposure to the shock. This strategy incorporates both housing wealth shocks (via the trade shock), as well as income shocks in the form of job displacements to tease apart how older workers respond to different financial pressures.

I find little evidence supporting the hypothesis that the divergence between mobility and LFP is caused by mobility-constrained older homeowners increasing their labor supply to recover lost housing wealth. In fact, the evidence points in the opposite direction: homeowners respond to negative shocks of either kind by being relatively more likely to retire or otherwise leave the labor force. I find displacements cause an 8% decrease in labor force participation (LFP) among renters and a large 16% decline among homeowners, but a negative housing wealth shock causes a precise zero effect on homeowners' LFP and a weakly increases renters' LFP, which is the opposite of the life cycle theory of consumption's predictions. Results for retirement are similar. Renters, not homeowners, appear to be driving the post-shock increase in LFP, which is more consistent with a story that renters work longer in response to shocks because they judge that their ability to pay rent with retirement looming on the horizon (even if their rents are not increasing), may be threatened.

Unsurprisingly, I find that displacements cause large increases in the incidence of moving between labor markets (by 83% among renters and 101% among homeowners), but both renters and homeowners moved less in response to a negative local labor market shock, although these changes by subgroup were not statistically significant. Nonetheless, the point estimates indicate that homeowners' migration falls by more than renters, as one might expect from the difficulties of selling a home versus ending a lease.

To further establish the degree to which labor market inequality by education might be influencing the results, I also examine responses by those with and without a four-year degree. Here I find substantial differences. Renters across educational attainment levels increase their LFP, but college-educated renters show particularly large, statistically significant increases, while non-college respondents show much smaller, not statistically significant increases. By contrast, educational attainment creates clear divisions among homeowners. Those without a college degree exposed to the import competition shock were more likely to withdraw from the workforce, while those with a college degree were more likely to increase their participation, but changes for both groups are not statistically significant. Similarly, migration responses for homeowners are also divided by educational attainment: those without a degree became 54% less likely to move after enduring a negative local labor market shock, while those with a degree are 44% *more* likely to move, although this last estimate is not statistically significant. Subsample analysis reveals that the results are robust to several potential channels for bias.

Thus, the evidence above shows that divergence between LFP and migration seems to be caused by a form of Simpson's Paradox among the four subgroups, where a particularly strong negative migration response among non-college homeowners (the plurality of older workers) and a particularly strong positive LFP response by college-educated renters (a relatively small subgroup) to the same shock help create an aggregate impression of migration declining while LFP weakly increases. While non-college renters do appear to exhibit the worrying response of increasing LFP while decreasing migration in response to a negative local labor market shock, neither response is statistically significant, and I find no evidence that they experience decreasing job satisfaction or increase their Social Security claiming to compensate. Further research can examine the details of how non-college older workers adjust to shocks, as how this group compensates for diminished local job opportunities is not yet clear.

Appendix A

The empirical strategy I use to estimate which areas experienced the strongest negative shocks to their housing value appreciations mimics the approach used in Feler and Senses (2017) who also estimated the impact of trade shocks on local housing prices. The key difference between my approach and theirs is that they looked at changes to median housing values to ultimately compute the impact on public good provision by way of changes in property tax collections, which are sensitive to changes in levels.

By contrast, I estimate foregone housing wealth appreciation, given that homeowners already factor in their initial housing wealth stock when making their retirement decisions, but are more concerned about their appreciation prospects.

The change in import penetration per worker in local labor markets is measured as:

$$\Delta IPW_{it} = \sum_j \left(\frac{L_{ijt_{initial}}}{L_{jt_{initial}}} \right) \frac{\Delta M^C_{jt}}{L_{it_{initial}}} \quad (2)$$

where ΔM^C_{jt} is the change in the real value (in 2007 dollars) of imports from China in sector *j* in *t* = {2000, 2007}. $L_{ijt_{initial}}$ is the total employment during the initial time period, in commuting zone *i* and sector *j,* where *j* is defined as either tradeable exposed, tradeable nonexposed, and nontradeable nonexposed.[39] Correspondingly, $L_{jt_{initial}}$ is the total initial employment in sector *j* and $L_{it_{initial}}$ is the total initial employment in commuting zone *i.*

To address concerns that unobserved local demand shocks occurred concurrently with the introduction of import competition that would occlude identification of the causal effects of freer trade with China, I follow the ADH and FS convention and instrument for US import penetration per worker using the previous period's import penetration per worker from eight other high-income countries.[40] This instrument takes the form:

$$\Delta IPW_{oit} = \sum_j \left(\frac{L_{ijt_{initial-1}}}{L_{jt_{initial-1}}} \right) \frac{\Delta M^O_{jt}}{L_{jt_{initial-1}}} \quad (3)$$

where ΔM^O_{jt} is the change in the real value of goods imported from China to the eight other high-income countries in sector *j.* Using 1980 employment figures instead of 1990 employment figures mitigates the possibility that contemporary employment was not reacting to anticipated changes in Chinese trade terms.

I then estimate the impacts of Chinese import competition on housing price appreciation as:

$$\Delta HPI_{it} = \alpha + \beta \Delta IPW_{it} + X_{it}\theta + \delta_t + \epsilon_{it} \quad (4)$$

where ΔHPI_{it} is the change in housing price appreciation over two time periods, 1990-2000 and 2000-2007,[41] where the latter period is rescaled to yield a ten-year equivalent change. X_{it} is composed of the same controls used by FS.[42] I also include Census division time trends to capture region-specific trends. Standard errors are clustered at the commuting zone level. HPI_{it} is drawn from the Federal Housing Finance Agency's Housing Price Appreciation County Indices.[43] Many counties report the indices normalized to 1990, which I use to be synchronous with the FS approach. As FHFA does not generate these indices for commuting

39. See Autor, Dorn, and Hanson, 2013 (ADH) and Fler and Senses, 2017 (FS) for more information how these classifications were performed.

40. These are Australia, Denmark, Finland, Germany, Japan, New Zealand, Spain, and Switzerland. See ADH for more information.

41. 2007 chosen both to avoid the confounding effects of the Great Recession and the limitations created by the replication files made available by FS and ADH.

42. These include the initial share of employment in manufacturing, the share of the population that is college-educated, the foreign-born share, the share of women in the workforce, the routine occupation share in employment, and the index for the average offshorability of occupations in commuting zone *i.*

43. https://www.fhfa.gov/DataTools/Downloads/Pages/House-Price-Index-Datasets.aspx#mpo

Table A1. Estimated Lost Housing Price Appreciation From Chinese Trade Shock in Local Labor Markets (*N* = 1, 046)

	OLS			IV		
	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)	(b/se)
Δ Chinese imports per worker	-6.08***	-4.70***	-3.96***	-10.82***	-12.19***	-9.74***
	(1.96)	(1.55)	(1.40)	(3.73)	(2.70)	(2.48)
Controls	N	Y	Y	N	Y	Y
Region-Specific Time Trends	N	N	Y	N	N	Y

Notes: Table A1 reports the results from estimating the three iterations of the Feler and Senses (2017) approach given in Equation (4). The coefficients report the impact on FHFA's housing price appreciation index (1990 = 100) of increasing Chinese import penetration per worker by $1,000. Regressions are weighted with each commuting zone's share of the 1990 national population, and standard errors are clustered at the commuting level. *b* refers to the coefficient estimate and *se* refers to the estimated standard error.

* p<0.10, ** p<0.05, *** p<0.01

zones, I create commuting zone-level indices by taking the annual average across all counties in a commuting zone, weighted by the number of owner-occupied housing units in each county in 1990. For 199 commuting zones, no counties had 1990 normalized indices, so these observations are dropped from the regressions.

The results from estimating Equation (4) are in Table A1. I present the OLS and IV results as (a) without X_{it}, (b) with X_{it} controls, and (c) with X_{it} and Census division-specific time trends. It is clear that in all cases, a naive OLS regression would understate (in absolute value) the impact of Chinese trade competition, which would likely occur if (as theorized by ADH and FS) confounding increases in US demand for sector-specific goods occurred at the same time as there was rising Chinese import competition. These demand increases would boost both Chinese importers and domestic producers, allaying some of the negative impact of increased competition. The full model with controls and time trends yields the smallest point estimates, so I will refer from here on out only to the results from (c).

All coefficients are interpreted as the impact of a $1,000 increase in Chinese imports per worker on the housing price appreciation in a commuting zone relative to the base year of 1990. I find here that a $1,000 increase in Chinese imports per worker lowered appreciation relative to the baseline by 9.7 percentage points over a 10-year period. The median home in the U.S. in 1990 was valued at $125,676 (in 2007 dollars),[44] so a commuting zone that saw a $1,000 increase in Chinese import penetration per worker per decade would have the median house be worth (on average) $24,381 less.

Using the same strategy as ADH, I then construct the counterfactual housing price appreciation scenario by commuting zone using:

$$\Delta HPI_{it}^{cf} = -\beta_1 \Delta \overline{IPW_{it}} \quad (5)$$

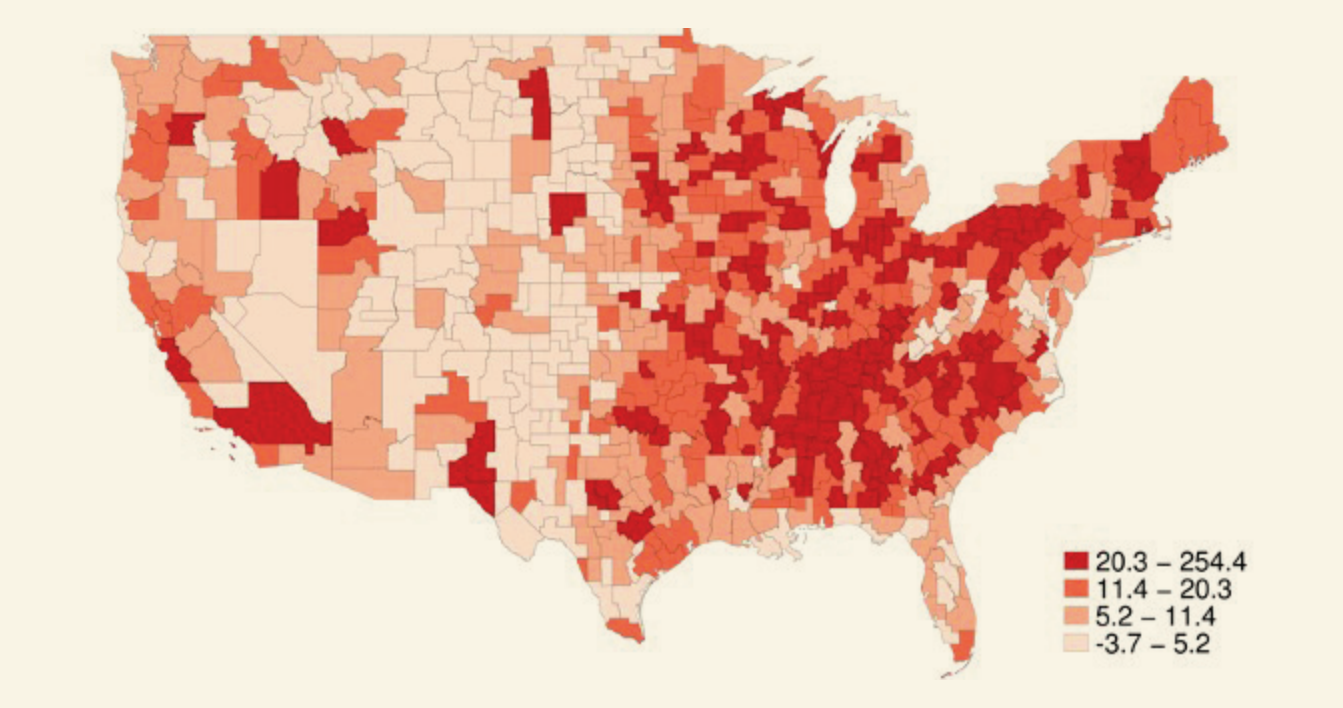
where

$$\Delta \overline{IPW_{it}} = 0.6063 * \Delta IPW_{it} \quad (6)$$

which is the observed change in import competition per worker times the R-squared statistic from the first stage of instrumenting ΔIPW_{it} on ΔIPW_{oit}.

44. Source: NHGIS, Steven Manson, Jonathan Schroeder, David Van Riper, and Steven Ruggles. IPUMS National Historical Geographic Information System: Version 13.0 [Database]. Minneapolis: University of Minnesota. 2018. http://doi.org/10.18128/D050.V13.0

Figure A1. Home Value Appreciation Lost Due to Chinese Import Competition by 2007



Notes: Figure A1 shows areas by quartile of foregone housing price appreciation due to Chinese Import Competition by 2007.

Figure A1 presents the results by quartile of foregone price appreciation, along with the intra-quartile range. Several observations emerge from Figure A1. The first is that with some notable exceptions, more rural, whiter, and areas with older populations suffered greater losses in wealth appreciation. Secondly, the intra-quartile range in the top quartile is much larger than the intra-quartile range in the other three quartiles. However, this is a bit misleading, since the 99th percentile is 78.78, meaning that the right tail in foregone housing price appreciation is quite long.[45] Nonetheless it is clear that homeowners in the top quartile were disproportionately more adversely affected than people in the bottom three quartiles, even when accounting for outliers.

45. Only two commuting zones have foregone price appreciation above 100 percentage points: the first is 25402, which is a one-county commuting zone in southwest Kentucky encompassing Calloway County. The other is the Sioux City, Iowa area, which experienced extraordinarily high import penetration per worker, almost twice as high as the next highest commuting zone. Thus, the very end of the intra-quartile range is dominated by unmistakable outliers.

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