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Cyclical and Sectoral Transitions in the U.S. Housing Market

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Abstract:

Using data from the Panel Study of Income Dynamics, this paper examines the flow of U.S. households within and between two distinct segments of the housing market—renter-occupied properties and owner-occupied properties. The paper provides relevant empirical moments for microfounded models of the housing sector. In particular, net flows in the housing market are substantially smaller than the gross flows, as is the case in the literature on labor market flows. Housing market turnover also exhibits substantial heterogeneity in household moving rates, the long-run moving trends, and the cyclical patterns of household moving decisions. Moves by renters tend to lead movements in real GDP, while moves by homeowners are procyclical and/or slightly lag the cycle. The paper further shows that the secular decline in household moves over time is driven by reduced within-sector moves. Taken together, the paper's results imply that models aiming to describe housing market flows will have to feature substantial nonlinearities and/or multiple sector-specific (owner versus renter) shocks.

JEL Classifications: E30, E32, R21

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1 Introduction

There has been extensive empirical work on job and worker flows in the labor market (see Davis and Haltiwanger, 1999; Elsby, Michaels, and Solon, 2009; Elsby, Hobjin, and Şhayin, 2011; Shimer, 2005). This research shows strong heterogeneity and large gross flows underlying the comparatively small aggregate net labor market flows. Housing tenancy changes by households can similarly be described in terms of flows. In particular, we view the housing market as made up of two distinct sectors—renter-occupied and owner-occupied—that households can transition within and between over time. Our results show that gross flows in the housing market are substantially greater than the net flows. There is also substantial heterogeneity in terms of the absolute level of household moves, the long-run moving trends, and the cyclical behavior of household tenancy changes—all these patterns support viewing the housing market as being composed of two distinct sectors. To our knowledge we are the first to document such flows in the housing market. Our findings are relevant for constructing and calibrating microfounded models of the housing sector.

We study housing market flows using longitudinal data from the Panel Study of Income Dynamics (PSID), which tracks annual data on household moves, housing tenure (own versus rent), and other characteristics from 1968 to 1997 and biennial data on these traits from 1999 to 2009. Specifically, we tabulate and analyze household transitions from homeownership to renting (own2rent), renting to homeownership (rent2own), moving from one rental property to another (rent2rent), or moving from one owner-occupied property to another (own2own).

The data on overall household moving rates (turnover) in the PSID match the well-documented trend that household migration in the United States has declined since about 1980 (see Saks, Smith, and Wozniak, 2011; Kaplan and Schulhofer-Wohl, 2012).[1] We do not engage the debate about the cause of the decline in overall household migration; instead we focus on the trends in households' disaggregated turnover rates—how movement between the two sectors of the housing market have changed over time. We find that much of the decline in household moves over time is due to rent2rent and own2own turnover rates trending down. We also show that, on average, housing turnover within the rental sector occurs most

[1] We use terms "flows between sectors" and "turnover rates" interchangeably to describe household moves.

often, followed by turnover within the owner-occupied sector, and then cross-sector moves (rent2own and own2rent). That is, there appears to be less within-sector movement over time even though transitions in which households maintain their same tenancy status occur most often on average. Moves in which households change their housing tenancy, however, are not trivial. Own2rent and rent2own moves account for roughly 25 percent of all housing turnover.

We also find that household moves exhibit interesting dynamics at a business cycle frequency. Moves by renters tend to lead the business cycle while moves by owner-occupants tend to coincide with and/or slightly lag the cycle. In particular, moves within the rental sector occur well in advance of cyclical movements in real GDP, and are followed by renters switching to homeownership, a transition that also occurs in advance of changes in real output. Moves from one owner-occupied property to another occur last; these moves are procyclical and/or slightly lag movements in real GDP. We interpret these results as suggesting that renters move in advance of the business cycle to take advantage of economic opportunities and/or future house price growth. In contrast, homeowners wait until the expansion has taken hold to lock in housing gains and/or trade up their housing stock.

In addition, we find that household moves between the two housing market sectors exhibit the most variation, while within-sector moves are the least variable. In particular, the coefficient of variation for rent2own moves is more than double that of own2own moves and more than triple the variation in rent2rent moves. This result suggests that own2own and rent2rent moves occur with more regularity than the more involved decision a household makes to enter homeownership or shift from being their own landlords to renting their residence from someone else.

Our results further show that the gross flows in the owner-occupied sector of the housing market are four times as large as the net flows. That is, the net turnover within the owner-occupied sector is relatively small, but the combined number of rent2own and own2rent moves are relatively large. This result parallels the labor market evidence that large gross labor flows underlie relatively small net flows. Gross turnover in the owner-occupied sector occurs contemporaneously with the business cycle, and perhaps even slightly *leads* the cycle. This trend is not surprising given that rent2own moves occur 1.5 times more often, on average,

than rent2own moves.

Taken together, this paper's findings provide important moments to match when designing, calibrating, and evaluating models of household search and transitions within the housing sector. Currently there is a growing theoretical literature that uses search and matching frameworks to model the housing market—similar to the approach used in the labor market (see Diaz and Jerez, 2010; Genesove and Han, 2012). Yet the current housing market search and matching models lack the empirical underpinnings that the related labor market models enjoy, so this paper helps fill that gap. We speculate that the empirical moving patterns we observe exclude employing a simple one-sector, one-shock, near-linear model to describe the housing market. Models aiming to describe housing market turnover will have to feature substantial nonlinearities and/or multiple sector-specific (owner versus renter) shocks.

The remainder of the paper proceeds as follows. Section 2 discusses the data and our methodology. Section 3 compares our data to other sources of household moving data, and section 4 presents our baseline results. Section 5 considers the robustness of our findings. Section 6 concludes.

2 Data and Methodology

2.1 Data

The data used in this paper come from the Panel Study of Income Dynamics (PSID), which began in 1968 with 4,800 households. Sixty percent of the initial PSID households belong to a cross-national sample from the 48 contiguous states, while the remaining 40 percent are a national sample of low-income families taken from the Survey of Economic Opportunity (SEO). The PSID contains extensive socioeconomic and demographic information on the households surveyed. The PSID waves occurred annually through 1997 and biennially thereafter. The panel dimension of the PSID facilitates tracking household moves over time—especially changes in a household's housing tenure, which requires multiple observations per household.

This paper's analysis focuses primarily on the PSID question about whether a household has moved since the previous wave. While these data are self-reported, as discussed in section 3, the information lines up well with household-level moving data obtained from other surveys. We also use data on a household's homeownership status (owner versus renter) in consecutive waves to determine whether a household changed its housing tenancy when it moved. In particular, the paper focuses on four types of household moves: own2own (o2o), own2rent (o2r), rent2rent (r2r), and rent2own (r2o).[2]

More formally, let m_{it} be an indicator variable that equals 1 if household i moved between period $t-1$ and t and is 0 otherwise. Similarly, let τ_{it} equal 1 if household i owned their home in period t and equal to 0 if the household rented its home during that period. The four types of household moves are therefore defined as follows:

$$o2o_{it} = \begin{cases} 1 & \text{if } m_{it} = 1 \;\&\; \tau_{it} = 1 \;\&\; \tau_{i,t-1} = 1 \\ 0 & \text{if } m_{it} = 0 \text{ or } m_{it} = 1 \;\&\; (\tau_{it} \neq 1 \text{ or } \tau_{i,t-1} \neq 1)\,, \end{cases} \tag{1}$$

$$o2r_{it} = \begin{cases} 1 & \text{if } m_{it} = 1 \;\&\; \tau_{it} = 0 \;\&\; \tau_{i,t-1} = 1 \\ 0 & \text{if } m_{it} = 0 \text{ or } m_{it} = 1 \;\&\; ((\tau_{it} = 1 \;\&\; \tau_{i,t-1} = 1) \text{ or } (\tau_{it} = 1 \;\&\; \tau_{i,t-1} = 0))\,, \end{cases} \tag{2}$$

$$r2r_{it} = \begin{cases} 1 & \text{if } m_{it} = 1 \;\&\; \tau_{it} = 0 \;\&\; \tau_{i,t-1} = 0 \\ 0 & \text{if } m_{it} = 0 \text{ or } m_{it} = 1 \;\&\; (\tau_{it} \neq 0 \text{ and/or } \tau_{i,t-1} \neq 0)\,, \end{cases} \tag{3}$$

$$r2o_{it} = \begin{cases} 1 & \text{if } m_{it} = 1 \;\&\; \tau_{it} = 1 \;\&\; \tau_{i,t-1} = 0 \\ 0 & \text{if } m_{it} = 0 \text{ or } m_{it} = 1 \;\&\; ((\tau_{it} = 0 \;\&\; \tau_{i,t-1} = 1) \text{ or } (\tau_{it} = 0 \;\&\; \tau_{i,t-1} = 0))\,. \end{cases} \tag{4}$$

This approach generates disaggregated annual moving rates between 1970 and 1997. The

[2] A very small share of households in our sample (less than 1 percent) report not having moved, but indicate that their housing tenure choice (owner versus renter) has changed. This data pattern could be the result of household reporting error. However, some households may have purchased a property that they previously were leasing and/or sold a property they had owned and then leased it back. We do not analyze such nonmoves given the limited frequency with which these unusual situations occur. These households are, however, included in the total count of nonmovers that is used to calculate moving *rates*.

same approach is used to construct two-year moving rates from 1999 onward when the PSID data are biennial. The only difference is that in the timing convention noted above, period t represents the current PSID wave and period $t-1$ represents the previous wave—a difference of two calendar years.

Housing turnover (moving) rates are calculated by summing the number of moves by type and dividing this amount by the number of households (movers and nonmovers) in in period t. Households must meet the sample criterion discussed in the next section to be included in the calculation of household moving rates. The turnover rate for move type x at time t ($tr_{x,t}$) is defined as

$$tr_{x,t} = \frac{\sum_i x_{it}}{\sum_i r2o_{it} + \sum_i r2r_{it} + \sum_i o2r_{it} + \sum_i o2o_{it} + \sum_i nm_{it}} \ , \tag{5}$$

where:

$$\begin{aligned} x &= \text{Type of move (e.g. o2o)} \\ nm &= \text{Nonmover} \ . \end{aligned}$$

2.2 Analysis Sample

We restrict the PSID sample to households that are present in consecutive waves and for which there are no missing data regarding their housing tenure (owner versus renter) in these waves as well as data supplied on whether they moved (current wave). This selection criteria is necessary in order to track potential changes in a household's housing tenancy choice when they change residences.[3] These restrictions eliminate about 13 percent of the original 236, 328 household observations available in the PSID.

Households belonging to or derived from the SEO sample are excluded from our baseline analysis, as are households from the immigrant and Latino samples that were added to the PSID for short periods in the 1990s. Low-income households and immigrant households likely have very different propensities to move than does the average U.S. household, so we

[3]Note that between 1 and 2 percent of PSID households report neither owning nor renting their living quarters in a given year. An inspection of the data suggests that many of these households are college-aged and likely living in university residence halls. We do not include these households in our analysis.

do not want these different moving patterns to adversely influence our results. This sample restriction does not noticeably impact our findings. The appendix contains estimates that include the SEO and immigrant households in the analysis and the results are very similar to our baseline findings.

Our baseline analysis uses household moving data from 1970 to 1997. This time horizon gives us the longest span of continuous data on household moves at the same frequency (annual) in the PSID. As noted earlier, the PSID waves are biennial after 1997. Section 5 discusses how our analysis incorporates data through 2007 as a robustness check. The 1970 to 2007 results are similar to our baseline findings that only use the data through 1997.

3 Data Validity and Choice

3.1 Data Validity

Figure 1 compares the overall moving rate in the PSID to the respective moving rates in the March *Current Population Survey* (CPS) as well as the American Housing Survey (AHS). The AHS data (blue line) are biennial, while the other data are annual. We are able to plot annual moving rates from the PSID from 2001 forward using supplemental household event history data. Among other things, these data track all household moves from 2001 onward—even moves in the years (2000, 2002, and so on) in which the PSID was not conducted. The event history data do not, however, contain information about household housing tenancy, so we cannot use these data for our overall analysis.[4]

The overall household moving rate in the PSID is consistent with the moving data in other household surveys. In particular, the PSID moving data capture the secular decline in the percent of U.S. households that move over time. Although the PSID moving rates are somewhat lower than the equivalent rates in the CPS and AHS, Figure 1 confirms that the PSID is not grossly overcounting or undercounting household moves.

In addition, it is worth noting that while the CPS moving rate continued to trend down

[4]The event history data are available in the supplemental data portion of the PSID website http://simba.isr.umich.edu/Zips/zipSupp.aspx. The PSID data used in Figure 1 are unweighted since weights are not available for the even years. The weighted PSID moving rates (not shown) are very similar.

during the 2000s, the PSID and AHS moving rates rose between 2001 and 2005 before declining concurrently with the U.S. housing market crash that began in 2006.[5] The rising PSID and AHS moving rates in the early 2000s are consistent with anecdotal evidence that renters and homeowners had an increased propensity to move and trade up their housing during the early-to-mid 2000s housing boom when mortgage credit was easy to obtain. Indeed, homeownership rose roughly 2 percentage points between 2000 and 2005. The continued downward tend in the CPS moving rate data, in contrast, is inconsistent with this evidence from the PSID and AHS.

3.2 Data Choice

Using the PSID allows us to track household moves at an annual frequency for 28 years (1970 to 1997), and longer if we incorporate the biennial data. This time horizon covers a number of economic expansions and contractions. The PSID is also beneficial for our analysis because it follows the same households over time so an individual household's tenancy status both before and after a move is known, information which is necessary to track a household's possible transition(s) between housing market sectors. In comparison, the March CPS only records a household's current homeownership status along with whether it changed residences. The AHS has information on housing tenancy changes, but it is a housing unit survey, not a household survey, and the data are only available on a biennial basis starting in 1985.[6]

A potential concern with using the PSID is that it potentially undercounts household moves given the panel nature of the data—households that move from wave to wave are harder to track down and re-interview. To date, no one has studied the relationship between sample attrition and household moves in the PSID. Lillard and Panis (1998) finds however, that the sample attrition that does occur appears to be random. In addition, the moving rates from the PSID are comparable to other household surveys like the CPS, and thus sample attrition does not appear to adversely impact the PSID moving rate data relative to other data sources. To the extent that sample attrition is indeed random, we would also not expect to miss more moves by homeowners than renters or vice versa. If anything, the

[5]The two-year moving rates reported in the main PSID data (family files) exhibit a similar trend.
[6]The AHS was conducted prior to 1985, but the data are not easily comparable to the post-1985 data.

loss of observed household moves due to sample attrition suggests that we have calculated a lower bound for household moving rates.

4 Results

4.1 Trends in U.S. Household Mobility

On average, roughly 15.5 percent of U.S. households moved each year between 1970 and 1997 according to the PSID.[7] The annual moving rate peaked at more than 18 percent in 1978 before falling steadily to about 13 percent in 1997. This downward trend in moves by U.S. households has been documented previously in the literature in different contexts (see Saks, Smith, and Wozniak, 2011; Kaplan and Schulhofer-Wohl, 2012).

Figure 2 plots households' disaggregated moving rates over time (own2own, rent2rent, and so on). Each of the four housing market transitions display somewhat of a downward trend over time, beginning at different points in the 1970s and 1980s. The secular decline is most noticeable for rent2rent moves, while the percentage of households making the transition from owning to renting is relatively stable over time. This latter result is not surprising since owners most often switch to renting when they downsize later in life—a life-cycle decision that is likely less impacted by economic fluctuations than moving decisions made by younger households. Overall, U.S. households appear less mobile over time irrespective of whether or not they are changing their housing tenancy.

We also calculate the contribution of the trends in household moves by type to the roughly 5 percentage point decline in the overall household moving rate between 1978 and 1997. Rent2rent and rent2own moves both contribute 1.6 percentage points to the 5 percentage point overall decline in moving, while the decrease in own2own contributes 1.4 percentage points and the slide in own2rent contributes about 0.5 percentage point.[8] These results show that the decline in moves by households who initially were renters dominates the downward trend in total household moves—contributing more than 60 percent to the overall decrease.

[7] The annual average moving rates in the CPS and AHS over somewhat different time periods are slightly higher.

[8] The numbers do not add up exactly due to rounding.

In addition, rent2rent moves exhibit the largest downward trend over time (2.5 percentage points) when the peak rent2rent moving rate in 1984 is compared to the rate in 1997.

Overall, our results suggest that renters have made fewer housing market transitions over time than homeowners, and have played a larger role in the secular decline in household moving rates. One potential explanation for this trend is that over time more renters have purchased the properties they were previously renting.[9]

Figure 2 also highlights some additional facts about the long-run patterns in housing market transitions. In particular, the percent of households who move from one rental property to another is anywhere from two to four times greater than the percentage of households that make an alternate housing market transition. This finding is consistent with the idea that renter households tend to be highly transient. Own2own moves occur with the second highest frequency, which suggests that on average households tend to maintain their initial housing status when they move. In addition, rent2own moves occur nearly twice as often as own2rent moves, a finding that implies households are much more likely to trade-up into owner-occupancy than they are to sell their home and transition out of the owner-occupied sector.

Further evidence suggests that moving by young households—those where the household head is between 20 and 29 years old—has declined the most over time as shown in Figure 3. In particular, over 57 percent of households headed by a 20-to-29 year-old reported moving in 1972, while only 47 percent moved in 1997.[10] This finding is consistent with the fact that fewer moves by renters contributes a lot to the secular decline in household moves—young households tend to rent while deciding where to live in the long-run and/or while saving money for a mortgage downpayment.

[9]Homeowners could also be increasingly selling the houses they live in and then leasing them back from the buyer.

[10]The decline in moving by young households is not driven simply by shifts in the distribution of households by age group in the PSID.

4.2 Cyclical Fluctuations

Overall Moving Rate

To analyze cyclical fluctuations in household moves we detrend the annual PSID moving rates using a Hodrick-Prescott (HP) filter with a penalty parameter of 400. Despite using the annual data, we choose a relatively high penalty parameter in order not to take out too many of the cyclical fluctuations given that we are detrending moving *rate* data.[11] Our baseline cyclical analysis compares fluctuations in household moving rates with fluctuations in real GDP. We detrend real GDP by taking logs and then using a HP filter with a penalty parameter of 6.25, following Uhlig and Ravn (2002).[12] The appendix shows the results using unemployment and real PCE as alternative cyclical indicators, and all the results are very similar.

Figure 4 plots the detrended household moving rates versus detrended GDP. At a glance, household moves appear procyclical. A more formal cyclical analysis appears below in Table 1. The row labeled $t-3$ in the table reports the correlation between real GDP dated at time t and the percent of movers three periods *prior* to t. Similarly the row labeled $t+3$ reports the correlation between contemporaneous GDP and the percent of movers three periods *later* and so on. The correlations confirm that the overall U.S. moving rate is procyclical—the contemporaneous correlation between moving rates and output is about 0.5. When the U.S. economy is growing households tend to move from one residence to another, and when the economy contracts households remain where they are already living. This finding is consistent with the fact that moving is costly. When the economy is expanding, bearing the transaction costs of moving is less onerous because households that move can take advantage of additional economic opportunities, whereas during a slump the implicit benefit for households moving to a new area for job-related or other reasons is much more limited.

[11] Shimer (2005) employs a similar approach. In particular, he uses a penalty parameter of 100,000 for quarterly unemployment rates, instead of the usual 1,600.

[12] Alternative penalty parameters, such as 400, yield similar results.

TABLE 1: Correlation of Total Household Moving Rate with Real Output

	t-3	t-2	t-1	t	t+1	t+2	t+3
Correlation	–0.109	–0.036	0.392	0.473	0.042	–0.512	–0.521

Notes: The table shows the correlation between detrended moving rates and detrended real output. For example, the column labeled $t-3$ reports the correlation between real GDP dated at time t and the percent of households who move three periods *earlier*. Similarly the column labeled $t+3$ reports the correlation between contemporaneous GDP and the percent movers three periods *later* and so on. Moving rates are detrended using an HP filter with a stiff penalty parameter ($\lambda = 400$). Output is detrended using a penalty parameter of 6.25.

There is also a positive correlation between movements in real GDP and household moves one period *prior*. That is, there is some evidence that household relocations also lead movements in real output. This correlation is less strong than the contemporaneous one, but it suggests that some moves also occur in anticipation of an improving economy. In addition, the standard deviation of (detrended) household moves is 0.9 percentage point, and the coefficient of variation is about 5 percent—suggesting that there is somewhat limited volatility in household moving rates.

Disaggregated Moving Rates

Household moving patterns by the type of move exhibit interesting cyclical dynamics. Figure 5 plots the correlation between these moves and movements in real GDP, with the horizontal axis indicating the timing of moving rates relative to contemporaneous movements in real output.[13] The figure shows that transitions within the rental market occur well in advance of economic activity picking up, while transitions from renting to owning occur somewhat in advance of movements in real GDP. Moves within the homeownership sector are the last to occur relative to movements in output, while own2rent moves are acyclical.

This dynamic pattern of household moves is consistent with renters moving in advance of the business cycle to better position themselves to take advantage of better economic opportunities. In comparison, homeowners transition to other owner-occupied properties once the economic expansion has taken hold. House prices tend to rise as the economy expands so this moving behavior by homeowners is broadly consistent with them waiting to experience housing equity gains before moving to another property. Such own2own movers

[13]Figure A.1 in the appendix plots the actual moving rates relative to real GDP.

could be using the equity gain in their current home to trade up to a larger property or trade down to a small property to realize a capital gain. The fact that own2rent moves are acyclical is inconsistent with the notion of homeowners being forced to move during economic downturns.

In addition, there is a negative correlation between changes in real GDP and the subsequent household moves that occur, implying that moves drop off following an economic expansion. The slowdown in housing transitions occurs first in rent2rent moves, followed by rent2own, and then own2own. This finding suggests that households curtail their movement after ramping up their housing market transitions prior to and in conjunction with an economic expansion. The dynamic correlations in Figure 5 also imply that the converse of these moving patterns is also true—households move less prior to and during economic downturns, but then relocations pick up following declines in real output, perhaps in anticipation of the next cyclical expansion.

The volatility of household moves also differs by the type of housing market transition. Table 2 reports the standard deviation of each move type and the resulting coefficient of variation. The data show that rent2own moves are more than two times as variable as other types of moves, while rent2rent moves exhibit the least volatility. However, the difference in variability between own2own, own2rent, and rent2rent moves is not large.

Overall, the results presented in Figure 5 and Table 2 show that even though the overall household moving rate in the United States is procyclical, there are interesting dynamic patterns in the underlying data on households moves within and between the two housing market sectors. A properly microfounded model of the housing market should take into account that the mobility patterns of renters and owners respond to current or expected economic shocks which cause movements in real output.

4.3 Gross Flows and Net Flows

Following the labor literature, we examine gross versus net flows in the housing market using the disaggregated moving rate data. In particular, we examine whether there are important differences in the long-term and/or dynamic properties of overall (gross) movement versus net movement between housing market sectors. A relevant question is whether there are

TABLE 2: Volatility of Disaggregated Household Moves

	Own2Own	**Own2Rent**	**Rent2Own**	**Rent2Rent**
Std. Dev.	0.6	0.4	1.2	1.2
Coeff. Var. (%)	19.8	22.4	49.7	14.7

Notes: The table shows the standard deviation of the detrended moving rates as well as their coefficient of variation. The disaggregated moving rates are detrended using an HP filter with a stiff penalty parameter ($\lambda = 400$).

relatively small net flows between housing sectors compared to relatively large gross flows, as in the labor market.

We focus on three housing market flows: *ownership turnover* [OT], *ownership excess turnover* [OET], and the *net change in ownership* [NCO]. These flows are defined as follows:

$$\begin{aligned} \text{OT} &= \text{rent2own} + \text{own2rent} \\ \text{NCO} &= \text{rent2own} - \text{own2rent} \\ \text{OET} &= \text{own2rent} + \text{rent2own} - |\text{rent2own} - \text{own2rent}| \ . \end{aligned}$$

OT captures the total mobility in the owner-occupied housing sector (movers in plus movers out), while the NCO quantifies the extent to which the number of households joining the owner-occupied sector outpaces the number of households exiting this sector. In addition, OET captures the total household moves in the owner-occupied sector relative to the net flow into that sector. This flow quantifies how much total mobility in the owner-occupied sector exceeds the net flow of households *into* homeownership. That is, there may appear to be little or no net flow of households into homeownership when in fact the actual number of households moving into the owner-occupied sector is quite large.

Trends

Table 3 reports mean gross and net flow rates from 1970 to 1997. On average, the gross flows (OT) in the housing market are roughly four times larger than the net flows (NCO). The average amount of OET further confirms that there is much more movement in the

renter-occupied and the owner-occupied sectors of the housing market than the net flow into homeownership would imply. In addition, NCO in any year is quite small—averaging less than 1 percent per year.

TABLE 3: Average Housing Market Gross and Net Flows

	Percent
Net Change Ownership (NCO)	0.9
Ownership Turnover (OT)	4.1
Ownership Excess Turnover (OET)	3.2

Notes: The table shows the average gross and net flow rates in the PSID 0between 1970 and 1997.

Overall, these data show that as in the labor market, the housing market also experiences relatively large gross flows underlying the relatively small net flows.

Cyclical Fluctuations

Even though the size of the OT and OET rates are similar on average, these rates have very different cyclical properties as shown in Figure 6. OET is acyclical while OT is highly procyclical. This suggests that even though total flows into and out of homeownership occur in conjunction with movements in real output, movements between the two housing market sectors in excess of the NCO do not display any particular cyclical pattern.

The NCO itself is relatively procyclical although the correlations with movements in real output are not as strong as for the OT rate. The plotted correlations also imply that compared to OT, the NCO may somewhat lead the cycle. That is, more people flow into owner-occupied housing than flow out of this tenancy status, and this transition slightly precedes movements in real output. This finding suggests that conditional on the decision to move, households prefer to become homeowners and/or prefer to remain homeowners during economic expansions.

The net flow into owner-occupancy also exhibits high variability—especially compared to the gross flows. In particular, Table 4 shows that for the NCO, the coefficient of variation is about 50 percent, while the coefficient of variation for OT and OET are roughly 12 percent and 16 percent, respectively. These findings suggest that even though the NCO rate is relatively low, on average, it is highly variable over time.

TABLE 4: Gross and Net Flow Volatility

	Net Change Ownership	Ownership Turnover	Ownership Excess Turnover
Std. Dev.	0.43	0.49	0.52
Coeff. Var. (%)	50.5	12.1	16.0

Notes: The table shows the standard deviation of the detrended gross and net moving flows rates along with the coefficients of variation. Gross flow rates are detrended using a HP filter with a stiff penalty parameter ($\lambda = 400$).

5 Robustness

We perform additional analyses to examine the robustness of our dynamic (cyclical) results. This section focuses on extending our sample horizon to include the 1998 to 2007 period in order to ensure that our results are not specific to our baseline sample period.[14] The appendix shows results that include using the full sample of PSID households between 1970 and 1997, not just the nonpoverty sample, as well as estimates using the unemployment rate and real household consumption (PCE) as alternative cyclical indicators. All of the results are very similar to our baseline findings.

To analyze the full time horizon of the PSID data (1970 to 2007), we must first make the biennial and annual data compatible since it is not possible to analyze annual and biennial data as a single time series. This requires a two-step process. First we construct two-year moving rates prior to 1997 to be consistent with the two-year moving data available from 1999 onward—both the overall moving rate as well as the disaggregated moving rates (own2own etcetera). The details of these calculations are provided in the appendix.

The resulting data are an annual series of two-year moving rates from 1971 until 1997, which we then use in conjunction with the actual one-year data to generate a relationship between the one-year and two-year moves and ultimately a series of *annual* moving data. In particular, we estimate the empirical relationship between one-year and two-year moves from 1971 through 1997.[15] This empirical relationship is then used to project the one-year moving rate in the PSID waves after 1997 (1999, 2001, and so on). The annual moving

[14] The PSID data are available through 2009. We exclude this latest data point to avoid any undue influence the the Great Recession might have on our calculations.

[15] The two-year moving rates are not simply twice the one-year rates. The estimated empirical relationships are shown in the appendix.

rates for the even (non-PSID) years are linearly interpolated. Combining these data with the actual yearly moving rates from 1970 to 1997 generates a series of annual moving rates at an annual frequency from 1970 through 2007 (hereafter extended annual data). We align the timing of the real GDP data to match the timing of these moving data for the cyclical analysis.

Figure 7 shows the correlation results using the extended annual data. Since the pattern and the magnitude of these results are very similar to the baseline findings, it does not appear that our results are specific to the sample period we use. In particular, rent2rent moves occur well in advance of movements in real GDP, and then are cyclically followed by rent2own. Own2own moves occur in conjunction with movements in real GDP and/or with a lag, and the correlation of all three series with real output turns negative after their initial peak. These findings again suggest that renters move in advance of changes in real output while homeowners tend to wait for economic expansions to occur before moving. Once households have positioned themselves to take advantage of the economic fluctuations occurring over the course of the business cycle that will prove most beneficial to their individual circumstances, they tend to keep their same tenancy status, causing moving rates to drop off and become inversely related to changes in real output.

6 Conclusion

This paper examines the cyclical and long-run behavior of household moving rates in the United States, paying particular attention to household moves within versus between the rental and ownership sectors of the housing market. The paper documents a number of key findings beyond the already established result that there has been a downward secular trend in household mobility over time. In particular, the vast majority of household moves are composed of renters transitioning within the rental sector, and while the net flows into homeownership are very small, on average, the gross flows within the owner-occupied housing sector are substantially larger. In addition, renters move well in advance of movements in real output, while own2own moves occur in conjunction with or slightly after fluctuations in real output. That is, over the course of a typical business cycle renters move within the rental

market first, followed by renters transitioning into homeownership, and then homeowners moving from one owner-occupied property to another.

Our results provide a set of moments for microfounded models of the housing market to match. Such models should account for the different long-run and dynamic properties of household transitions within and between the rental and ownership sectors. The dynamic patterns we observe in the data likely exclude a simple one-shock, near-linear model of the housing market. Instead, a proper microfounded model will have to feature substantial nonlinearities and/or multiple sector-specific shocks to generate the moving patterns we observe. One way to potentially capture the fact that renters appear to move in anticipation of movements in real output would be a model that includes a form of rational inattention where renters endogenously react more to news shocks or other indicators of future economic growth.

Overall, the analysis and results in this paper provide a useful starting point for future theoretical work modeling the housing market.

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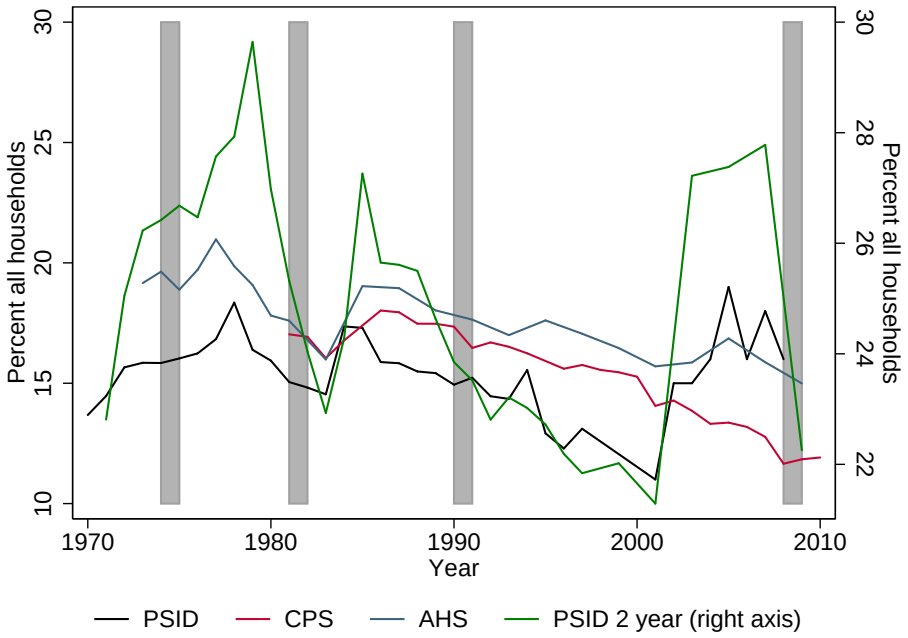
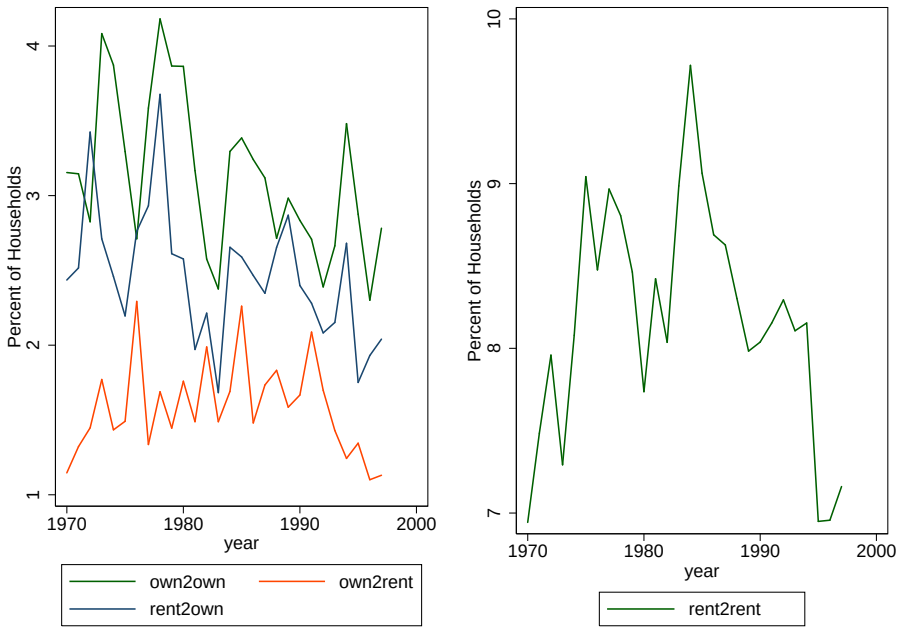
FIGURE 1: Moving Rates over Time



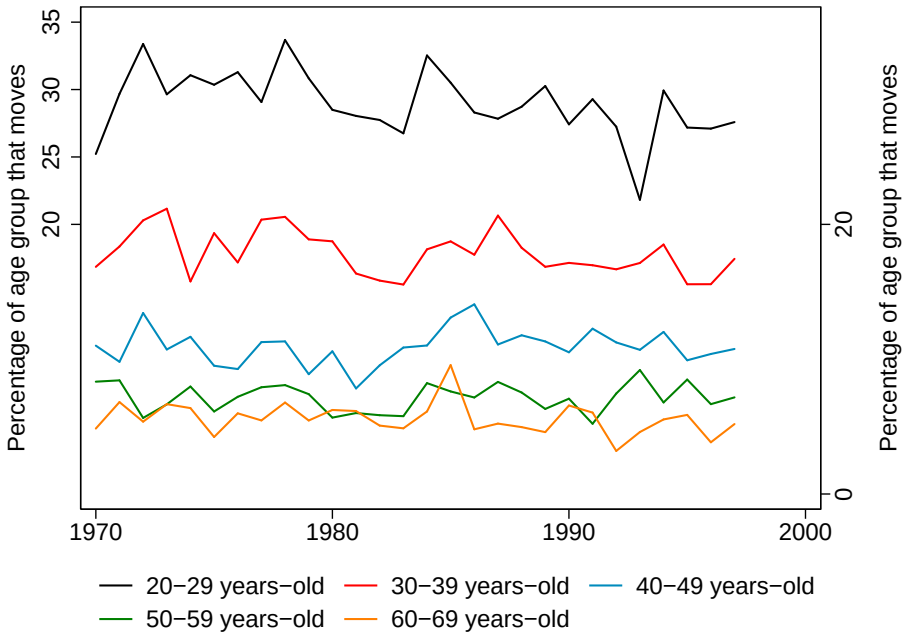
Source: Authors' calculations based on PSID, CPS, and AHS data.
Shaded bars represent NBER recession dates.

FIGURE 2: Disaggregated Household Moving Rates



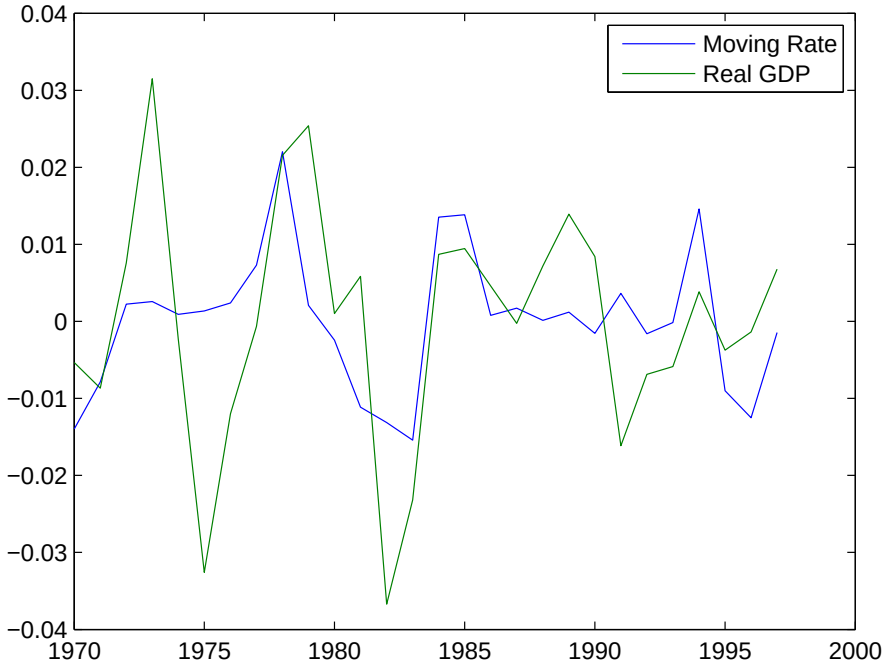
Source: Authors' calculations based on PSID data.

FIGURE 3: Household Moves by Age Group



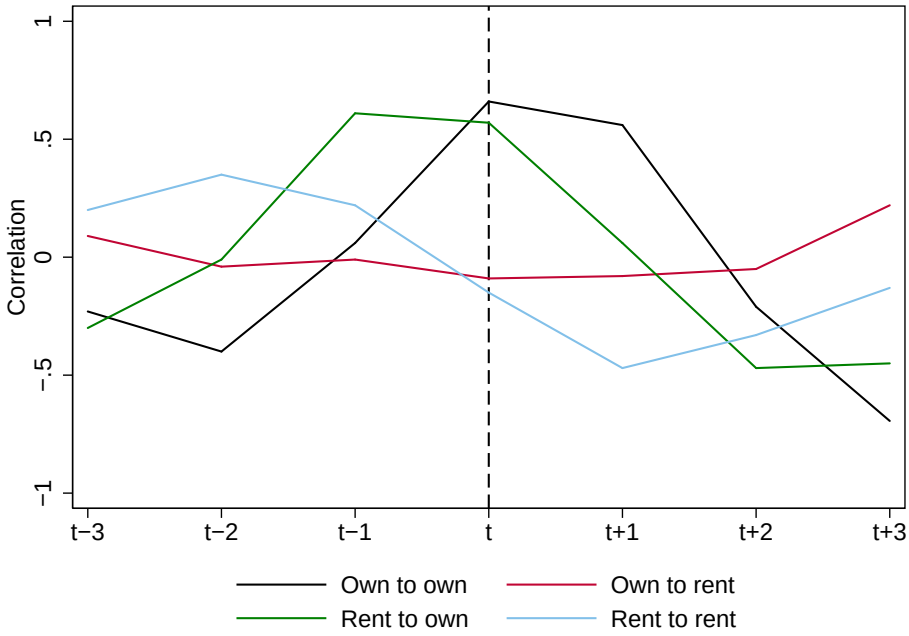
Source: Authors' calculations based on PSID data.

FIGURE 4: Household Moving Rate and Real GDP Fluctuations



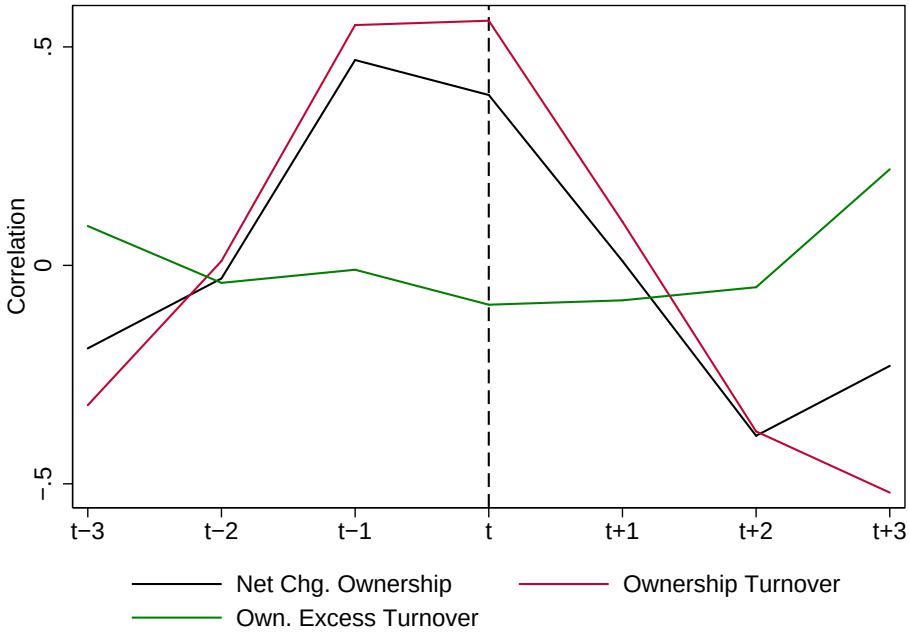
Source: Authors' calculations based on PSID and NIPA data.
Note: The data are detrended using an HP-filter with a penalty parameter of 6.25 for real GDP and 400 for the moving rates.

FIGURE 5: Correlations between Disaggregated Moves and Real GDP (Baseline)



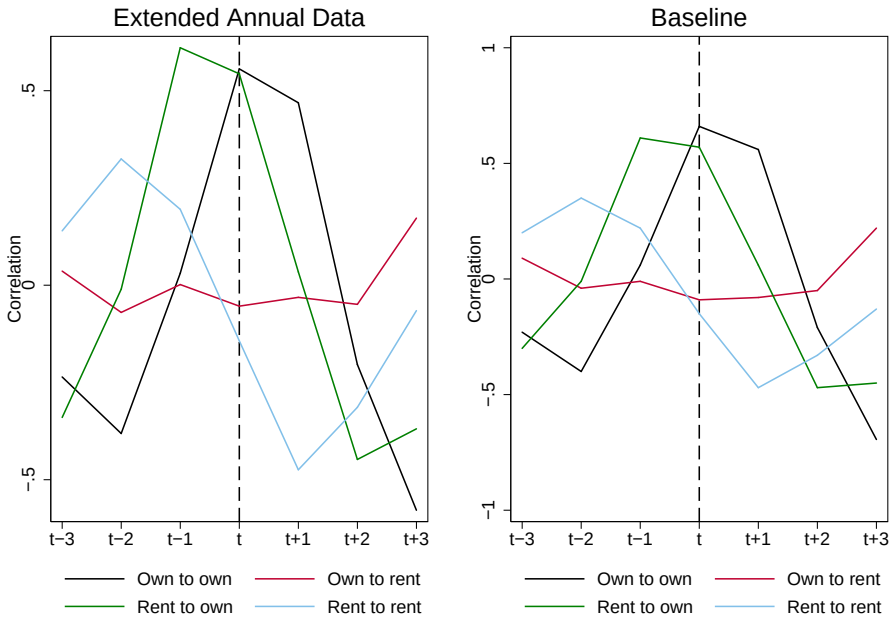
Source: Authors' calculations based on PSID and NIPA data.

FIGURE 6: Gross and Net Flow Correlations with Real GDP



Source: Authors' calculations based on PSID and NIPA data.

FIGURE 7: Extended Annual Data Correlations with Real GDP versus Baseline Results



Source: Authors' calculations based on PSID and NIPA data.

A Appendix

A.1 Additional Results and Robustness Tests

Figure A.2 shows the cyclical correlations between the disaggregated household moving rates and real household consumption (PCE), and Figure A.3 shows the correlation of these rates with movements in unemployment. These alternative indicators of economic activity are used in place of real GDP in the baseline analysis, yet the overall results are very similar to our baseline findings (presented in the right hand panel of each of the figures). For renters, within-sector moves by renters occur well in advance of cyclical movements in real PCE or the unemployment rate. Rent2own moves also tend to lead movements in these economic activity indicators, and are followed by own2own moves that occur concurrently with or slightly after fluctuations in real PCE or the unemployment rate. Note that the signs on the correlation of household moves with the unemployment rate are opposite those of the correlations with real GDP or real PCE because the unemployment rate fluctuates inversely with measures of economic activity.

In addition, Figure A.4 shows the correlation between disaggregated household moving rates and movements in real GDP using the full sample of PSID households. Once again, the pattern of results is very similar to the baseline case (right-hand panel), as are the results that analyze the baseline sample of households, using unweighted rather than weighted moving rates (see Figure A.5).

Our findings are also similar when we compute flow rates instead of turnover rates. Flow rates capture the percent of households that move relative to number of households in the sector they are transitioning out of. For instance, the rent2rent flow rate equals the number of rent2rent movers relative to the total number of renters at the beginning of the period in which they move. These results are shown in Figure A.6, and once again the pattern of correlations are very similar to the baseline case.

A.2 Technical Details

Calculating Two-year Household Moves (1971–1997)

When we calculate two-year household moves from 1971 to 1997 our goal is to mimic as well as possible the available information and calculations when we compute the two-year moves with the biennial PSID waves. In particular, with the biennial data we know in year t whether the household moved in the two years since the previous wave (year $t-2$), and what their housing status was at time $t-2$ and time t.

As in the main text, let m_{it} be an indicator variable that equals 1 if household i moved

between period $t-1$ and t and is 0 otherwise. A household is considered to have moved over a two-year period if they report having moved in the last year in the current period t or in the previous period $t-1$. The two-year moving rate $m2_{it}$ (consistent with the biennial data) is therefore defined as follows:

$$m2_{it} = \begin{cases} 1 & \text{if } m_{it} = 1 \text{ or } m_{i,t-1} = 1 \\ 0 & \text{if } m_{it} = 0 \text{ and } m_{i,t-1} = 0\,. \end{cases} \tag{A.1}$$

As before, the constructed two-year moving variable is combined with households' housing status to create the disaggregated moving rates. Let τ_{it} equal 1 if household i owned its home in period t and equal 0 if the household rented in that period. Two-year household moves by type are defined as follows:

$$o2o_{it}^2 = \begin{cases} 1 & \text{if } m_{it}^2 = 1 \;\&\; \tau_{it} = 1 \;\&\; \tau_{i,t-2} = 1 \\ 0 & \text{if } m_{it}^2 = 0 \text{ or } m_{it}^2 = 1 \;\&\; (\tau_{it} \neq 1 \text{ or } \tau_{i,t-2} \neq 1)\,, \end{cases} \tag{A.2}$$

$$o2r_{it}^2 = \begin{cases} 1 & \text{if } m_{it}^2 = 1 \;\&\; \tau_{it} = 0 \;\&\; \tau_{i,t-2} = 1 \\ 0 & \text{if } m_{it}^2 = 0 \text{ or } m_{it}^2 = 1 \;\&\; ((\tau_{it} = 1 \;\&\; \tau_{i,t-2} = 1) \text{ or } (\tau_{it} = 1 \;\&\; \tau_{i,t-2} = 0))\,, \end{cases} \tag{A.3}$$

$$r2r_{it}^2 = \begin{cases} 1 & \text{if } m_{it}^2 = 1 \;\&\; \tau_{it} = 0 \;\&\; \tau_{i,t-2} = 0 \\ 0 & \text{if } m_{it}^2 = 0 \text{ or } m_{it}^2 = 1 \;\&\; (\tau_{it} \neq 0 \text{ and/or } \tau_{i,t-2} \neq 0)\,, \end{cases} \tag{A.4}$$

$$r2o_{it}^2 = \begin{cases} 1 & \text{if } m_{it}^2 = 1 \;\&\; \tau_{it} = 1 \;\&\; \tau_{i,t-2} = 0 \\ 0 & \text{if } m_{it}^2 = 0 \text{ or } m_{it}^2 = 1 \;\&\; ((\tau_{it} = 0 \;\&\; \tau_{i,t-2} = 1) \text{ or } (\tau_{it} = 0 \;\&\; \tau_{i,t-2} = 0))\,. \end{cases} \tag{A.5}$$

As with the one-year moving data and two-year biennial data, households must have no moving data missing in period t and period $t-1$ as well as no missing housing tenancy data for periods t and $t-2$.

Regression Results: Predicting One-Year Moves

We extend the time horizon of our analysis by projecting one-year moving rates from 1998 to 2007. In the odd years (PSID wave years) we calculate one-year moving rates based on the estimated relationship between one- and two-year moving rates in the pre-1998 data. We then linearly interpolate between the odd years to get even-year moving rates. The relationship between two-year and one-year household moves is estimated using data from

TABLE A.1: Equation A.6 Estimates

	Own2Own		Own2rent		Rent2Own		Rent2Rent	
	Coeff.	Std. err.	Coeff.	Std. err.	Coeff.	Std. err.	Coeff.	Std. err.
β_0	0.001	0.004	0.001	0.003	0.003	0.003	0.022	0.009
β_1	0.503	0.071	0.563	0.113	0.504	0.077	0.554	0.084
Adjusted R^2	0.66		0.49		0.62		0.62	

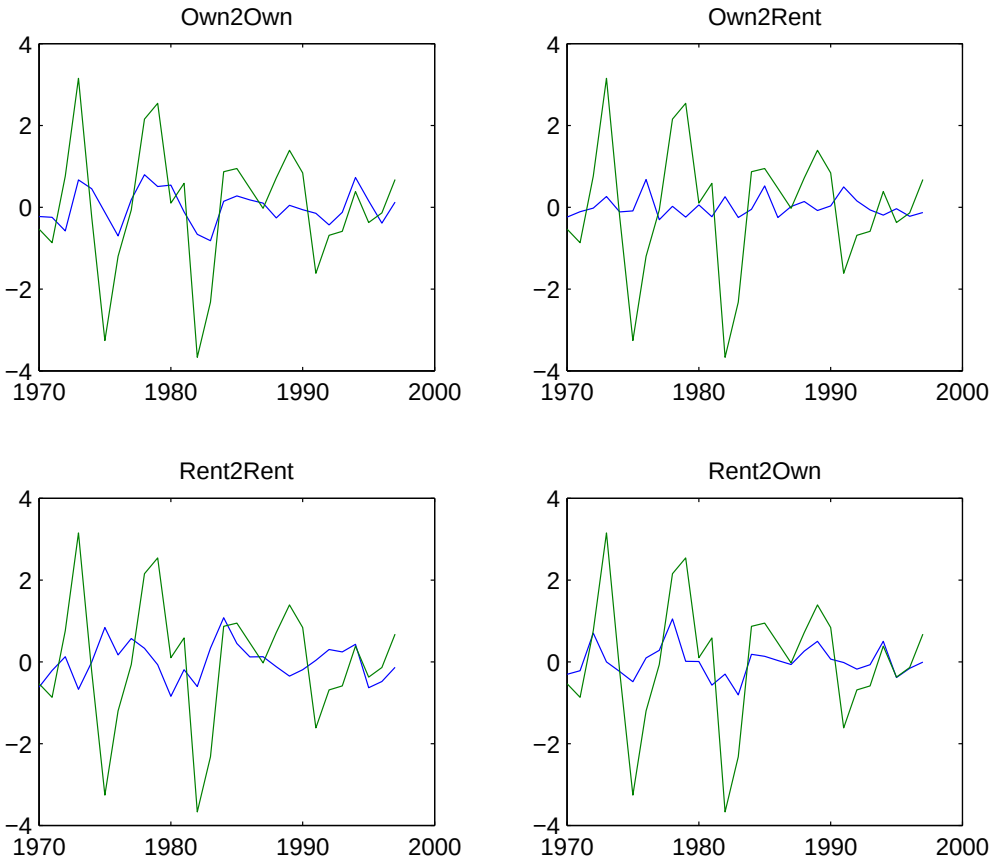
Note: Equations are estimated between 1971 and 1997.

1970 through 1997 as follows:

$$m_t^{1,j} = \beta_0 + \beta_1 m_t^{2,j} + \epsilon \ , \tag{A.6}$$

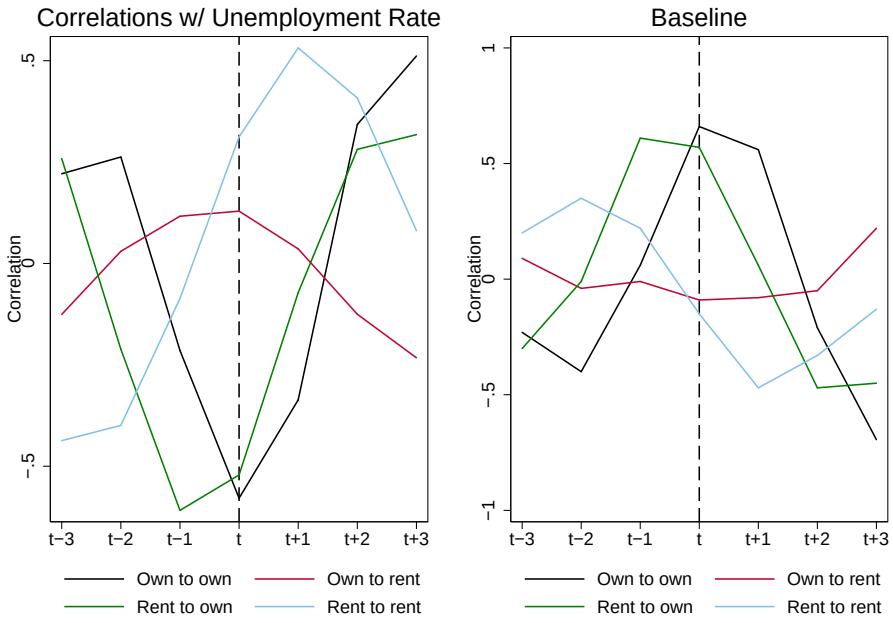
where $m_t^{1,j}$ is the one-year moving rate for move type j (for instance, own2own), and $m_t^{2,j}$ is the corresponding two-year moving rate calculated as described in the previous section. The estimated coefficients and standard errors by move type are shown in Table A.1.

FIGURE A.1: Disaggregated Household Moving Rates and Real GDP Fluctuations



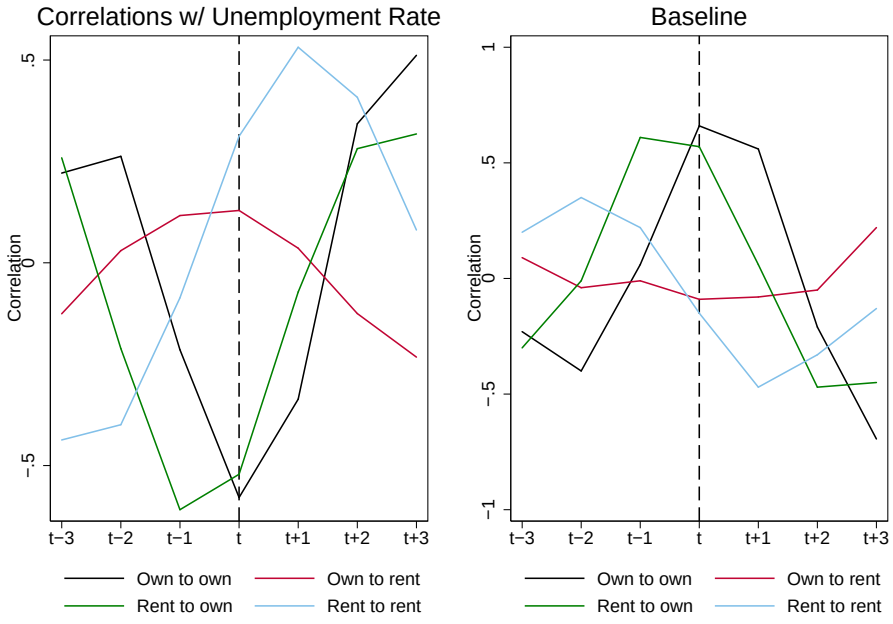
Source: Authors' calculations based on PSID and NIPA data. The data are detrended using an HP-filter with a penalty parameter of 6.25 for real GDP and 400 for the moving rates. GDP data are shown in green.

FIGURE A.2: Correlations with Real PCE versus Baseline Results



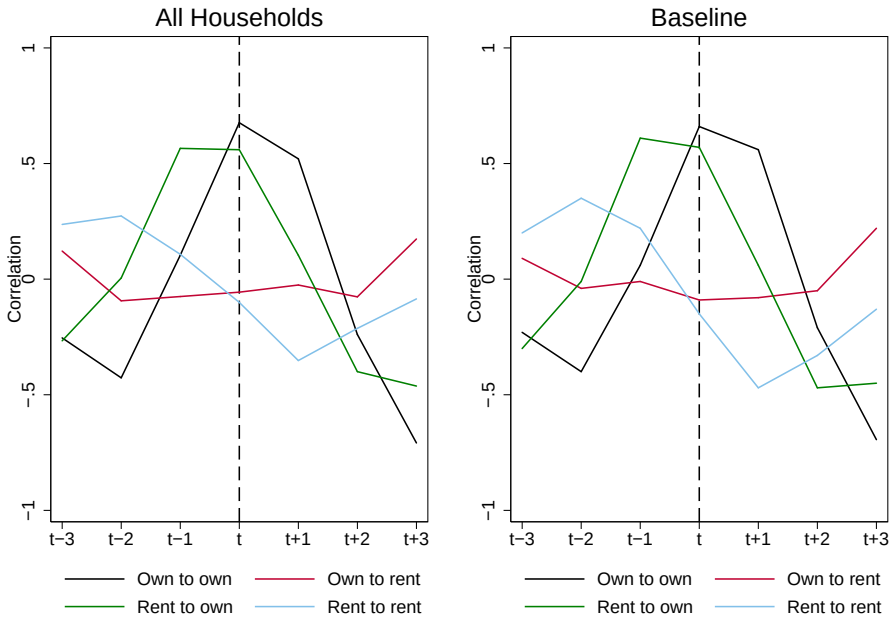
Source: Authors' calculations based on PSID and NIPA data.

FIGURE A.3: Correlations with Unemployment Rate versus Baseline Results



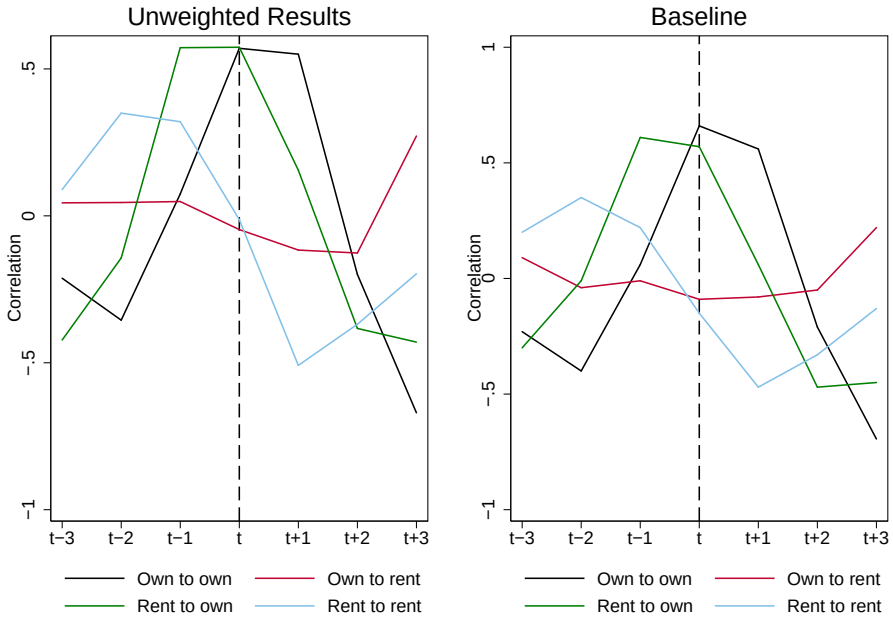
Source: Authors' calculations based on PSID and NIPA data.

FIGURE A.4: All Households versus Baseline Results



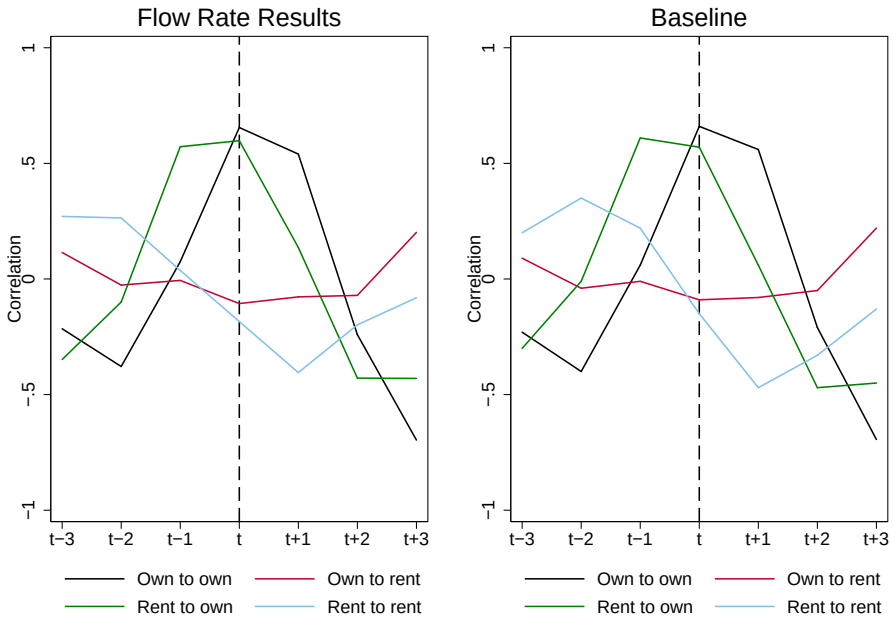
Source: Authors' calculations based on PSID and NIPA data.

FIGURE A.5: Unweighted Results versus Baseline Results



Source: Authors' calculations based on PSID and NIPA data.

FIGURE A.6: Flow Rate Results versus Baseline Results



Source: Authors' calculations based on PSID and NIPA data.