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Prospect theory and the decision to move or stay

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Migration has always involved stress and risk. More risk-averse households are less likely to move, while less risk-averse households will seek out opportunities and migrate. We investigate how the theoretical contributions of prospect theory, and specifically the endowment effect, can provide new understanding about decisions whether to migrate or not. We test the hypothesis that risk aversion extends the length of stay in the dwelling and, by extension, in the local labor and housing markets. How long people remain in place is a function, we hypothesize, of their independently self-assessed propensity to take risks, after controlling for a range of demographic and socioeconomic characteristics. We use the theoretical insights of prospect theory and the endowment effect (the notion of the "use value" differing from the "exchange value") to explain the likelihood of staying after controlling for life-course events. The results confirm the explanatory power of self-assessed risk in the decision to migrate or stay and, equally important, confirm the role of the endowment effect.

migration | prospect theory | endowment effect

The primary focus in studies of residential mobility is on the process of mobility: who moves, and what is the underlying decision-making that leads to a move. While these studies implicitly ask why the move did not occur, they have tended to focus primarily on how disruptions in the life course (such as divorce and job change) have generated moves. There is also a secondary, parallel interest in staying, and that literature focuses on the duration of residence: on those who stayed and how long they stayed. Those studies relate duration to levels of satisfaction with the dwelling and neighborhood and community attachment. Thus, the household's familiarity with the local area, and its social ties, and feelings of security in the current location all interact to increase the length of residence and lead to the decision not to move.

In this paper using Australian survey data, we provide an alternative focus, one which does not privilege moving or staying but instead evaluates the moving or staying decision in the context of both risk and a contextualized evaluation of the current situation. That is, we show how the insights from prospect theory and the endowment effect—introduced at length below—can help us understand the risky decision of whether to move or not. To sharpen the focus of our models, we model migration—moves that entail leaving the local community, which have greater uncertainty and attendant risk than moves within the local community. To some extent the studies that examine the attachment of the household to their house and to their neighborhood—their familiarity with the area, their social ties, and their feelings of security, and even their predisposition to stay (1)—have implicitly created the context for the analysis we outline in the following study.

In this context, households have spells of staying interrupted by moving. This process is part of an ongoing dynamic process that evaluates the current residential situation and the desired residential situation and assesses whether a move should be made to bring the two into better agreement. Thus, the process is focused on the decision to move but in the context of attachment and, as we will show, what can be identified as an endowment effect.

At least in part, the refocus on staying is an interest in creating a unified model of both moving and staying rather than understanding one or the other. Bringing staying back into the evaluation process is a response to the observation that within any window that we examine, movers typically make up a minority of the population, and it is stayers, by virtue of their predominance in the population, who exercise the major influence on social structure simply by aging in place. Thus, the question of what explains their staying is socially and economically important. The renewed interest in staying is also a response to the slowing frequency of moving in the United States (2, 3). Understanding the interlinked decision of whether to move or stay will contribute to understanding the consequences of the mobility process both for labor market flexibility and for the stability and social cohesion of residential communities.

The research focus on movers has been guided by the assumption that people and households move when they view the gains from moving as greater than those from staying. This perspective from neo-classical economics privileges the notion that the decision to move or stay is largely an economic one. Thus, the substantial body of the literature on migration largely focuses on wage returns (4). However, there is a growing literature arguing that moves are about much more than economic gains and that often there are considerable gains from nonjob moves (5). We use prospect theory as a way of thinking about the integrated process of moving or staying, a way which unpacks the behavioral underpinning of the process and shifts us away from a neo-classical economic equilibrium approach to migration.

The Theoretical Context

The notion that there are noneconomic or psychic costs to migration appears in the literature as early as 1962, and to that extent the idea is not new (6, 7). However, these studies do not attempt to actually measure psychic costs but simply assert their existence. Economic costs are the main focus in these studies; risk is limited to issues about obtaining employment. Still, the migration literature recognizes that migration decisions are inherently risky, and, as a consequence, we would expect risk and

Significance

We use prospect theory and the endowment effect to provide a theoretical basis for an integrated approach to residential moving and residential staying. We link measures of risk aversion and the endowment effect to explain the tradeoff between moving and staying. We test Kahneman and Tervsky's observation that endowment effects are especially likely in goods that are not regularly traded, e.g., houses. Their use value creates the endowment effect, which works in favor of the locational status quo, increasing the probability of staying. We analyze survey data to confirm that a general self-assessed risk aversion is important in decisions to migrate or stay, and the endowment effect, measured as tenure and duration, is a substantial factor in residential decision-making.

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our willingness to entertain it to play a significant role in the individual decision to migrate (8).

Recent work picks up this thread and quantifies risk and its effects. One posits a model in which risk-averse individuals are less likely to migrate and examines the interaction of unemployment benefits and risk aversion (9). Another conducts a direct measure of risk tolerance and migration; we discuss this at length below (10). A third more generally questions whether the standard economic theory of decision-making under uncertainty—expected utility theory—is at all suited as the basis for understanding housing choices (11). It is that notion in the work of Kahneman and Tversky (12–14) which provides the fundamental theoretical structure for examining mobility and risk and using the notion of the endowment effect as a core element of the explanatory model.

Prospect Theory. As outlined by Kahneman, prospect theory questions the assumption that, because rational decision-makers by definition know what they will like, the experienced utility of outcomes can be inferred from the decision utility (ref. 12, p. 17). Kahneman and Tversky suggest a world in which a person's view of the world is limited by the information that is available at a given moment and therefore the decisions a person makes may not be consistent and logical (13). Moreover, their preferences change with changing contexts. We also know that most people dislike risk and wish to avoid the worst outcome and that a risk-averse decision-maker may choose a sure outcome with a lower value than an unsure outcome with a higher expected value, in effect paying a premium to avoid uncertainty. Importantly, in Kahneman and Tversky's behavioral model, people's choices are based not on dollar values but on the psychological values of outcomes. This is likely especially true in migration decisions (15).

Central to the arguments about risk is the thesis that people will not necessarily choose the highest expected utility because they are more concerned about losing what they have than about what they might gain. In other words, they value what they have beyond its actual use value. Thus, loss aversion becomes the central concern in understanding behavior in the market. Kahneman and Tversky's contribution was to show that what matters is not the absolute level of wealth but the relative level—relative to what the decision maker already has. This notion of the reference point is the central reason why prospect theory is so relevant to understanding staying, because the reference point adds value to staying. Thus, people make different choices about the same likely outcomes of moving depending on their reference points.

It follows that an individual's history is important in understanding what choice they will make when faced with any expected utilities generated on the basis of known probabilities. Thus, two people will not make the same choice even when they are faced with the same expected utilities because their reference points are different. In short, people think in terms of gains and losses, not in terms of absolute wealth. In prospect theory, it is the gains and losses relative to a reference level that matter; in the case of residential mobility the reference level is the status quo. In the strict, labor model of mobility, for example, gains and losses to mobility are measured simply in monetary terms, i.e., the income gains to be made from moving. By contrast, the contribution of prospect theory lies in demonstrating that "a given state can be assigned quite different utilities depending on the state that preceded it, and quite different states can be assigned approximately the same utility if they represent the same change relative to the reference level" (ref. 12, p. 17).

Endowment Effects. The aversion to changing location occurs precisely because people's tastes change with occupancy. As they experience their location, they accumulate a store of locational advantages and disadvantages—the convenient shops and restaurants, the noisy upstairs neighbor—that together form an endowment. In sum, moving would entail the loss of this endowment, with the risk that the advantages and disadvantages of a new location will not offset the loss. The endowment effect creates that aversion to loss, and thus aversion to risk of loss, that lowers the likelihood of change and strongly biases choices in favor of the reference situation (ref. 14, p. 292). An additional important contribution of the Kahneman conceptualization is that endowment effects are especially likely in goods that are not regularly traded, such as houses. What creates the endowment effect is their use value, and this works in favor of the locational status quo. In the situations where use value is not present, for example among those who simply speculate or trade in houses, endowment effects do not arise.

Over time people become accustomed to the possession and are unwilling to depart with it simply on the basis of its "exchange value" on the market. When considering an alternative, the occupant will use their present reference point, their dwelling, as a basis for evaluating alternatives, and, importantly, the use value of that reference point will be higher than its exchange value; in other words, the endowment effect is such that an occupant is less willing to give up the current location than would otherwise be the rational decision. We draw these threads together in summary form to emphasize that the value of the prospect (moving) is uncertain, and that the greater the endowment effect is, the greater is the value of the current state, which in the case studied here is staying. The greater the endowment effect is, the lower is the difference between the values of moving and staying.

Previous Research on Staying and Duration of Residence

The concept that moving and staying form an interlinked dynamic was proposed several decades ago in a paper that argued that the mover–stayer model should be refined so that it could be used to describe movers and stayers on a continuum rather than as members of two discrete classes (15, 16). However, this observation was not followed up, and the ensuing research literature focuses almost exclusively on the decision to move and the role of disequilibrium, either in housing space or in the economic match of workers and jobs.

Research on staying focused on the nature of duration and how duration affected the probability of a move in the future (17, 18). However, even when the focus is ostensibly on duration, the concern is, in fact, with leaving the current residence. Models of expected length of stay (19) and of the effect of transaction costs of selling a house on staying (20) are still actually models of mobility and are framed as neo-classical models of expected

Table 1. HILDA survey variables used in the analysis

Modeling concept	HILDA variable
Age	jhgage
Sex	jhgsex
Family status	jhhrih
Marital status	jmrcurr
Country of birth	janbcob
Highest education	jedhigh1
Household income	jhifefp, jhifefn
Labor force status	jesbrd
Tenure	jhstenr
Time at current address	jhsyrcad
Neighborhood SES	jhhad10
Risk tolerance index	npntrisk
Changed address	kmhli-nmhli
Distance moved	khhmovek-nhhmovek

mobility. Moreover, although duration was included in models of mobility, it had little theoretical context. It was a catch-all measure to address the empirical finding that the likelihood of moving decreased with length of residence. Why duration matters needs a theoretical explanation, and that is what the endowment effect provides.

In fact, the focus on place attachment and roots in the community (21–23) are attempts to capture the role of duration and how residential duration is linked to the accumulation of social capital and place-based attachment, which in turn is related to the way in which future plans for mobility are formulated (24). Another study concludes that people with ties are less prone to move simply because they have what has been called "location-specific insider advantages" (25). Psychic costs—the emotional impact of leaving family and friends and having to cope with an unfamiliar environment—also play a role (21, 26). Implicitly these studies are capturing the endowment effects of prospect theory. Over longer periods gains accrue to stayers, who accumulate advantages that are nontransferable. Previous studies introduced duration simply as a measure of length of residence without a theoretical base for its contribution.

Another dimension of research on staying focuses on the premise that the psychological consequences of moving are important deterrents (26–28). These are the nonmonetary costs that dispose the risk-averse to be stayers. There is considerable stress involved in moving (29), and moving carries considerable social consequences, including the way friendships are structured (30). The combination of the attractiveness of the status quo (place attachment and family and friends' connections) and the stress of moving interact together to lower the general probability of moving, and those with "sunk costs," i.e., those with investment in their homes, are much less likely to entertain moving.

Previous tests document the relationship of risk and migration. Among skilled people, those who are less risk averse are more willing to migrate to culturally different regions in Germany (31). Research on expatriate networks and international migration timing suggests that as the size of expatriate networks increases over time, finding employment after migration becomes less uncertain, inducing more risk-averse individuals to migrate (32). A direct test of the role of risk is that by Jaeger et al. (10), which uses direct measures of a self-reported "willing to take risks" measure in the German Socio-Economic Panel to show that

Table 2. Selected descriptive statistics for the modeling population

	All, n = 7,091	Migrators, n = 636	Stayers, n = 6,455
Categorical variables, *N* (%)			
Risk aversion threshold			
5 or below	3,910 (55.1)	428 (67.3)	3,482 (53.9)
6 or above	3,181 (44.9)	208 (32.7)	2,973 (46.1)
Sex			
Male	3,250 (45.8)	281 (44.2)	2,969 (46.0)
Female	3,841 (54.2)	355 (55.8)	3,486 (54.0)
Family status			
Couple w/ children	3,254 (45.9)	215 (33.8)	3,039 (47.1)
Couple w/o children	2,279 (32.1)	217 (34.1)	2,062 (31.9)
Single parent	474 (6.7)	40 (6.3)	434 (6.7)
Lone person	1,084 (15.3)	164 (25.8)	920 (14.3)
Marital status			
Legally married	4,177 (58.9)	272 (42.8)	3,905 (60.5)
Cohabiting	1,382 (19.5)	161 (25.3)	1,221 (18.9)
Other	1,532 (21.6)	203 (31.9)	1,329 (20.6)
Couple formation and dissolution			
Neither	6,249 (88.1)	483 (75.9)	5,766 (89.3)
Formed or dissolved	842 (11.9)	153 (24.1)	689 (10.7)
Labor force status			
Employed	5,461 (77.0)	474 (74.5)	4,987 (77.3)
Unemployed	220 (3.1)	37 (5.8)	183 (2.8)
Not in the labor force	1,410 (19.9)	125 (19.7)	1,285 (19.9)
Tenure			
Owner	4,956 (69.9)	263 (41.4)	4,693 (72.7)
Renter	2,135 (30.1)	373 (58.6)	1,762 (27.3)
Time at current address			
Under 5 y	3,624 (51.1)	505 (79.4)	3,119 (48.3)
5–9 y	1,371 (19.3)	76 (11.9)	1,295 (20.1)
10+ y	2,096 (29.6)	55 (8.6)	2,041 (31.6)
Neighborhood SES			
Lowest quintile	1,304 (18.4)	125 (19.7)	1,179 (18.3)
Second quintile	1,399 (19.7)	138 (21.7)	1,261 (19.5)
Middle quintile	1,505 (21.2)	125 (19.7)	1,380 (21.4)
Fourth quintile	1,454 (20.5)	130 (20.4)	1,324 (20.5)
Highest quintile	1,429 (20.2)	118 (18.6)	1,311 (20.3)
Continuous variables, Mean (SD)			
Age	43.4 (12.5)	37.4 (13.3)	44.0 (12.3)
Risk aversion index	5.5 (2.4)	4.9 (2.3)	5.5 (2.3)

there is a substantially increased effect of migrating relative to the unconditional migration propensity. Cities that are larger and more diverse reduce uncertainty and enlarge the probability not only for jobs but that the diversity itself will provide greater opportunity for migrants to find a network. However, Jaeger provides only limited controls for the known impacts of family status change (33–35). We extend Jaeger by invoking prospect theory and the endowment effect, thereby enriching our understanding of migration decision-making behavior. What prospect theory coupled with the concept of loss aversion provides is a theory for why risk should matter in the mobility process.

Data Selection and Model Design

The data we used to examine the role of risk in migration come from the Household, Income and Labour Dynamics in Australia (HILDA) survey. HILDA is modeled on and is similar to the US Panel Study of Income Dynamics (PSID) and the German Socio-Economic Panel (SOEP). It is a yearly longitudinal survey begun in 2001 with ≈7,600 households and 19,900 adults and children. As the members of sample households form independent households, these new households are interviewed separately, increasing the size of the sample over time. The source of our data is HILDA Release 15 from November 2016, containing data from the first 15 waves (36).

The HILDA survey has detailed data on household composition, economic characteristics of households, mobility and migration, data on family change, and a wide range of attitudinal questions collected on a self-reported questionnaire used to gather potentially sensitive information. The 2014 self-completed questionnaire included an item on attitude toward risk, discussed further below; this response is at the heart of our analyses.* For our modeling we largely use data drawn from the 2010–2014 waves proximate to the solicitation of this response. We limit our universe to individuals in a position to make decisions about household mobility: those whose household role is either a member of a couple, a single parent, or a lone person.

With large-panel datasets, data loss from respondent attrition and skipped waves and from missing values for individual items is a matter of concern. We also contend with nonresponse to the self-completed questionnaire. These issues are discussed in HILDA documentation (36, 37). Nevertheless, the combination of high response rates, good results with recontact attempts for households missing in the previous wave, and the self-refreshing nature of the sample growing through the inclusion of households split off from existing members of the sample all combine to maintain the representativeness of the sample. While we exclude observations with missing values for any of the variables used in the modeling, these amount to about 6% of otherwise available observations in response to the self-completed questionnaire. In the end, we have 7,091 respondents' observations that meet our criteria for inclusion.

While we discuss our models in detail below, we start here at a broad summary level. The data we model are cross-sectional but are not time series, with each observation summarizing the experience of an individual respondent in the waves from 2010 to 2014. We first evaluate the simple model of migration conditioned on risk aversion. We next add conditioning variables for demographic characteristics in 2010 and for family status changes occurring in the interval from 2010 to 2014. At the third level we bring in conditioning measures of the endowment effect. Table 1 documents the HILDA variables we used for these data elements (36).

Our dependent variable is migration during the 2010–2014 period. We define migrators as having made at least one move of 70 km or more. We do this because we want to study the relationship between risk and migration rather than local mobility. By restricting our focus to moves of a substantial distance, we focus on those who leave their local community or neighborhood where there are likely to be support systems that would lower the risks of a move. Stayers remain in the same locality, either in the same house or making moves of less than 70 km.

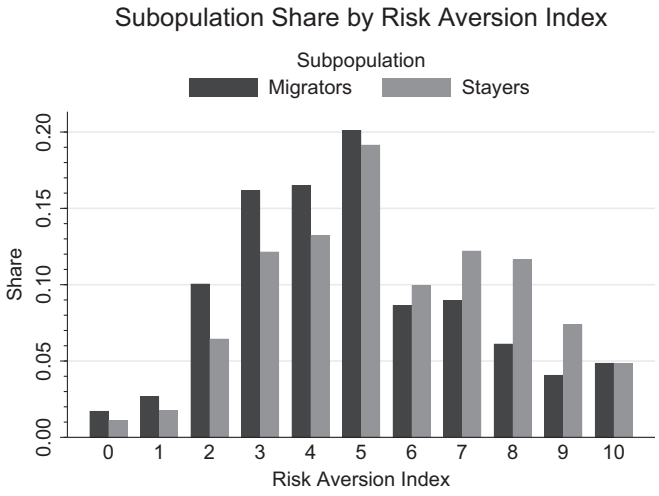

Fig. 1. Distribution of the risk-aversion index separately for migrators and stayers.

The primary independent variable is the general attitude to risk. Respondents were asked their willingness to take risks on an 11-point scale, with 0 indicating minimal willingness to take risks and 10 indicating maximal willingness to take risks.† This variable is the same as the risk variable in the German SOEP used in the Jaeger study (10). Additionally, the measure has been experimentally validated and shown to be a reliable measure of an individual's willingness to take risks (10, 38). To follow the use in the prospect theory literature, we reversed the 0–10 scale responses to create a 0–10 index of risk aversion, with 0 indicating minimal risk aversion and 10 indicating maximal risk aversion. There is a natural breakpoint between index values of 5 and 6, and, following Jaeger, we construct a threshold measure of risk aversion, where the value is 6 or greater for the risk-aversion index. The risk-aversion threshold captures the possibility of a level at which risk aversion is a critical variable, and we can compare the outcomes of the risk index and the risk threshold measures.

To further explain migration, we select a set of individual- and household-level predictor variables, taken from the 2010 wave, to parallel previous models of mobility and migration. Individual characteristics include age (and age squared), gender, marital status, ethnicity, education, and labor force status. Household characteristics include income and the household's family status, which is defined as being in a couple (married or cohabiting) with children, in a couple without children, a single parent, or a lone individual. Finally, we include an indicator of couple formation or dissolution over the 2010–2014 period based on change in the family status and partner identity.

We then add housing tenure (owner/renter), duration at the current address, and neighborhood socioeconomic status (SES),‡ all taken from the 2010 wave, as proxies for the endowment effect

*To date, this question was asked only in the 2014 survey.

†The exact wording in the questionnaire is: Are you generally a person who is willing to take risks or are you unwilling to take risks? Please indicate by crossing one box below. The more willing you are to take risks the higher the number of the box you should cross. The less willing you are to take risks, the lower the number of the box you should cross.

‡The SEIFA (Socio-Economic Indexes for Areas) decile index of relative socioeconomic advantage/disadvantage, which we recoded into quintiles (ref. 36, pp. 37–38).

Table 3. Results for models of migration using the risk-aversion index

	Risk aversion			Risk aversion and demographics			Risk aversion, demographics, and endowment		
	Odds ratio	SE	Z	Odds ratio	SE	Z	Odds ratio	SE	Z
Risk aversion index									
Risk aversion	0.885	0.017	−6.44***	0.913	0.019	−4.42***	0.922	0.019	−3.93***
Age									
Age				0.916	0.027	−3.01**	0.925	0.027	−2.63**
Age squared				1.001	0.000	1.92	1.001	0.000	2.42*
Sex (reference male)									
Female				1.120	0.074	1.71	1.178	0.080	2.43*
Family status (reference couple w/o children)									
Couple w/ children				0.697	0.103	−2.44*	0.762	0.113	−1.83
Single parent				0.383	0.234	−1.57	0.296	0.190	−1.90
Lone person				0.654	0.391	−0.71	0.517	0.326	−1.05
Marital status (reference other)									
Legally married				0.508	0.302	−1.14	0.494	0.310	−1.12
Cohabiting				0.519	0.305	−1.12	0.393	0.244	−1.50
Couple formation and dissolution (reference none)									
Formed or dissolved				1.705	0.212	4.29***	1.654	0.210	3.97***
Country of birth (reference other)									
Native born				1.406	0.262	1.83	1.444	0.267	1.99*
English-speaking immigrant				1.297	0.295	1.14	1.195	0.276	0.77
Highest education (reference less than high school)									
Bachelor's degree or more				1.463	0.203	2.74**	1.608	0.234	3.26**
Diploma				1.126	0.204	0.65	1.215	0.224	1.06
High school graduate or certificate				1.192	0.140	1.50	1.297	0.154	2.19*
Household income (reference middle quintile)									
Lowest quintile				0.926	0.169	−0.42	0.845	0.162	−0.88
Second quintile				1.042	0.172	0.25	0.982	0.168	−0.11
Fourth quintile				0.799	0.133	−1.35	0.907	0.153	−0.58
Highest quintile				0.768	0.135	−1.50	0.993	0.181	−0.04
Labor force status (reference employed)									
Unemployed				1.598	0.343	2.18*	1.403	0.300	1.58
Not in the labor force				1.234	0.154	1.69	1.157	0.147	1.15
Tenure (reference renter)									
Owner							0.439	0.059	−6.08***
Time at current address (reference <5 y)									
5–9 y							0.557	0.092	−3.53***
10+ y							0.290	0.056	−6.39***
Neighborhood SES (reference middle quintile)									
Lowest quintile							1.054	0.180	0.31
Second quintile							1.213	0.208	1.13
Fourth quintile							1.066	0.184	0.37
Highest quintile							0.917	0.168	−0.47
Model summary									
Wald χ^2	41.42			249.19			345.47		
df	1			21			28		
$P > \chi^2$	0.000			0.000			0.000		
Nagelkirke pseudo R^2	0.014			0.095			0.144		
Observations	7,091			7,091			7,091		

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

in prospect theory. In this paper we focus on the role of housing and duration as measures of the endowment effect, in part because doing so provides a needed explanation for the role of duration in mobility. It seems possible that further work could cast other measures—such as occupation and time with the current employer—as similar measures of endowment effects.

The descriptive statistics for the migrators and stayers are consistent with our established understanding about migration and mobility (Table 2). Migrators are younger and twice as likely to be renters. Stayers are almost half again more likely to be above the risk-aversion threshold. The sample reflects the composition and tenure of the Australian population as a whole; it is 70% couples with and without children and about 60% owners. Quite notably the rather high rates of mobility in Australia are reflected in the 51% of the sample who in 2010 had lived in their residences for less than 5 y, a value that is higher than the ≈35% for the United States.

The graph of the shares of migrators and stayers by the risk-aversion index provides descriptive support for the thesis that migration behavior is responsive to risk (Fig. 1). The modal value for risk aversion is 5 for both migrators and stayers, and at that value there are nearly equal numbers of persons in each group.

There are more migrators than stayers with index values below the mode, and more stayers than migrators with index values above the mode, representing those who are more risk averse. Our models examine the role of risk aversion on migration, taking into account the predictive independent variables that measure the demographic context and, crucially, how the endowment effect impacts migration behavior.

Models of Migration and Risk

As we argued in our theoretical structure, migration is a risky process, and Kahneman's discussion of moving as an illustration of the power of prospect theory and the endowment effect (ref. 14, chap. 27) is at the heart of our modeling strategy. The analysis proceeds in parallel over two measures of risk aversion—a risk index and a risk threshold. For each measure we run three logistic regression models of migration: (*i*) one unconditionally predicted by risk aversion, (*ii*) one conditioned on demographic characteristics, and (*iii*) one with the added measures of the endowment effect. In fitting the models, we use a cluster-robust estimate of the variance–covariance matrix, forming clusters at the family level (couple, single parent, or lone individual) to accommodate correlation between the members of a couple.

The results from both the risk index and the risk threshold measures are quite similar and vary only by small differences in the size of the odds ratios corresponding to the coefficients other than the risk-aversion measure. The significant variables play

Table 4. Results for models of migration using the risk aversion threshold

	Risk aversion			Risk aversion and demographics			Risk aversion, demographics, and endowment		
	Odds ratio	SE	Z	Odds ratio	SE	Z	Odds ratio	SE	Z
Risk aversion ≥6	0.569	0.050	−6.44***	0.655	0.060	−4.65***	0.682	0.063	−4.15***
Age									
Age				0.914	0.027	−3.09**	0.923	0.027	−2.69**
Age squared				1.001	0.000	1.99*	1.001	0.000	2.47*
Sex (reference male)									
Female				1.107	0.072	1.55	1.168	0.078	2.32*
Family status (reference couple w/o children)									
Couple w/ children				0.699	0.104	−2.42*	0.762	0.113	−1.83
Single parent				0.393	0.239	−1.54	0.302	0.192	−1.88
Lone person				0.676	0.403	−0.66	0.529	0.332	−1.01
Marital status (reference other)									
Legally married				0.524	0.311	−1.09	0.507	0.317	−1.09
Cohabiting				0.538	0.315	−1.06	0.404	0.250	−1.46
Couple formation and dissolution (reference none)									
Formed or dissolved				1.703	0.212	4.28***	1.654	0.210	3.97***
Country of birth (reference other)									
Native born				1.410	0.263	1.84	1.451	0.268	2.01*
English-speaking immigrant				1.313	0.299	1.20	1.208	0.278	0.82
Highest education (reference less than high school)									
Bachelor's degree or more				1.477	0.206	2.80**	1.619	0.236	3.30***
Diploma				1.123	0.203	0.64	1.208	0.222	1.03
High school graduate or certificate				1.196	0.140	1.53	1.298	0.155	2.18*
Household income (reference middle quintile)									
Lowest quintile				0.920	0.169	−0.45	0.843	0.162	−0.89
Second quintile				1.040	0.172	0.23	0.980	0.168	−0.12
Fourth quintile				0.801	0.133	−1.34	0.906	0.153	−0.58
Highest quintile				0.773	0.136	−1.46	0.996	0.182	−0.02
Labor force status (reference employed)									
Unemployed				1.607	0.345	2.21*	1.417	0.302	1.64
Not in the labor force				1.224	0.153	1.62	1.150	0.146	1.10
Tenure (reference renter)									
Owner							0.440	0.059	−6.08***
Time at current address (reference under 5 y)									
5–9 y							0.557	0.092	−3.53***
10+ y							0.288	0.056	−6.43***
Neighborhood SES (reference middle quintile)									
Lowest quintile							1.050	0.179	0.29
Second quintile							1.224	0.210	1.18
Fourth quintile							1.071	0.185	0.40
Highest quintile							0.924	0.169	−0.43
Model summary									
Wald χ^2	41.45			255.75			352.66		
df	1			21			28		
$P > \chi^2$	0.000			0.000			0.000		
Nagelkirke pseudo R^2	0.013			0.095			0.144		
Observations	7,091			7,091			7,091		

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

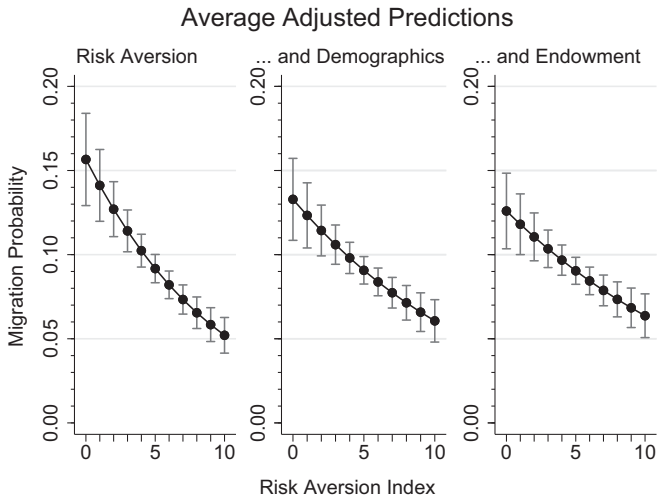

Fig. 2. Average adjusted predictions over the values of the risk-aversion index for each of the three models using the risk-aversion index.

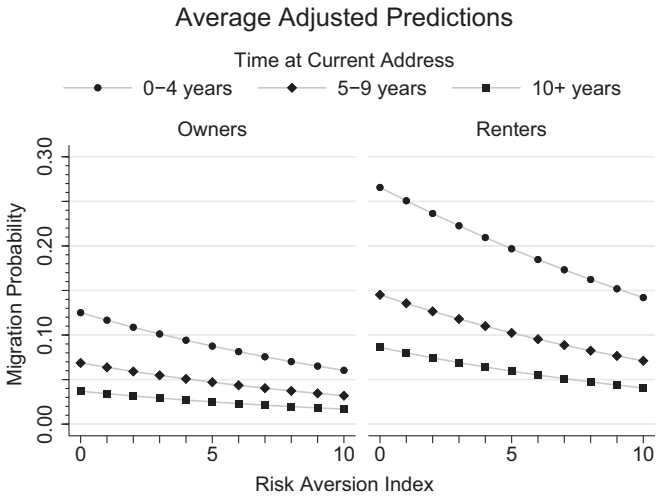

Fig. 3. Average adjusted predictions for the full model using the risk-aversion index over time at the current address and the values of the risk-aversion index separately for 4,946 owners and 2,135 renters.

similar roles in both models (Tables 3 and 4). In the unconditional models, risk aversion is significant and decreases the likelihood of moving, although the fit of the models is modest. Adding the predictor measures for demographic measures increased the explanatory power of the model significantly, and risk aversion remains a significant predictor. The overall explanation in both the risk index and the risk threshold models increased by a factor of six when the pseudo-R^2 values were compared with those for the unconditional model. Age and age squared play the expected and standard role, as they do in all models of migration—younger persons are more likely to migrate. Couples with children are less likely to migrate, and family change is significant, with a substantial effect. Higher education and education of at least high school are associated with higher probabilities of migrating, but the modest impact of income in the second model is not sustained in the model with endowment effects.

The important contribution of this research, as we have stressed already, comes from the introduction of endowment effects. We measure these effects with three variables: housing tenure (owner/renter), duration at the current address, and neighborhood SES. We hypothesized that tenure is a specific endowment effect: the measure of the location-specific capital of being embedded in the community with the stronger ties of home ownership. Duration extends the ownership effects but can have a powerful role for renters too. We also hypothesized that the level of socioeconomic advantage or disadvantage of the neighborhood would have positive endowment effects.

The model with endowment effects has significant coefficients for risk aversion, age, family status, and family status change and, among the endowment effects, large and significant measures for tenure and duration but not for neighborhood quality. The pseudo-R^2

Table 5. Wald tests of variable significance for wave 14–15 analysis

		Risk aversion		Risk aversion and demographics		Risk aversion, demographics, and endowment	
	df	χ^2	$P > \chi^2$	χ^2	$P > \chi^2$	χ^2	$P > \chi^2$
Risk aversion	1	16.11	0.000***	4.61	0.032*	2.60	0.107
Age and age squared	2			37.97	0.000***	6.61	0.037*
Sex	1			0.34	0.558	0.09	0.760
Family status	3			18.39	0.000***	17.39	0.001***
Marital status	2			2.17	0.337	6.03	0.049*
Couple formed/dissolved	1			29.71	0.000***	28.30	0.000***
Country of birth	2			1.19	0.552	2.48	0.290
Highest education	3			2.13	0.545	5.12	0.163
Household income	4			7.12	0.130	11.11	0.025*
Labor force status	2			20.38	0.000***	14.57	0.001***
Tenure	1					45.33	0.000***
Time at current address	2					5.49	0.064
Neighborhood SES	4					7.11	0.130
Model summary							
Wald χ^2		16.11		185.47		255.43	
df		1		21		28	
$P > \chi^2$		0.000		0.000		0.000	
Nagelkirke pseudo R^2		0.008		0.080		0.123	
Observations		10,263		10,263		10,263	

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

value has a 50% gain with the addition of the endowment effects. If we use the Jaeger results as a benchmark, the model we estimate has stronger explanatory variables and has a more than 40% higher pseudo-R^2 than the results in the Jaeger study (10). The results provide empirical tests of the endowment effect other than in experimental settings and in portfolio management.

To better understand the effect of risk aversion across the range of its values, we plot the population-averaged adjusted probability of moving across the values of the risk-aversion index in each of the three models (Fig. 2). We interpret the leftmost plot, for the model including risk aversion alone, as saying that if the population had been universally minimally risk averse, about 16% of the population would have migrated, while if it had been universally maximally risk averse, 5% of the population would have migrated. When both demographic and endowment effects are introduced, the magnitude of the effect diminishes slightly, but the rightmost plot, for the model including these effects, ranges from about 13 to about 6%.

We disaggregate the effect of risk aversion across two of our endowment effects by plotting, for the full model, the population-averaged adjusted probability of moving across the values of the risk-aversion index and of time at current address, doing this separately for the renter and owner subpopulations (Fig. 3). Within each subpopulation, we see that the probability of moving decreases with increasing risk aversion, as before. We also see that it is lower for owners than for renters and is lower with increasing time at the current address.

Because the migratory events occurred before the measurement of risk attitudes in wave 14, we must entertain the notion that the results could be the outcome of risk adjustment, translating successful moves into a greater willingness to take risks. Jaeger tested this possibility and found no support for reverse causality (ref. 10, p. 688). We also provide a test of reverse causality by examining the moves in the 1-y interval after the measure was gathered, that is, between waves 14 and 15. The results are consistent with the argument that risk attitudes are an important determinant of migration, although the size and significance of the coefficients differs from those in the earlier models. Direct comparison of the two sets of models is made difficult by the shorter duration and commensurate reduction in the number of migrators observed in the post hoc analyses: from 9% of the earlier population to 3% of the later population. This is likely responsible for the decline in significance of the risk-aversion index in the models that include the demographic and endowment effects. The results are summarized in Table 5.

Summary and Conclusions

This paper reports an innovative test of prospect theory and demonstrates its empirical power in predicting migration. In the heart of the paper we directly estimate endowment effects and show that they are important explanatory variables in the probability of migrating. To our knowledge there has been no previous rigorous attempt to test for endowment effects in residential mobility. We have thus been able to confirm the observation that the endowment effect is far from only a finding from experimental settings and in fact is equally relevant outside the laboratory (15, 39). In doing so we provide a theoretical basis for the empirically observed dependence of mobility on duration of residence.

When risk aversion (and endowment effects) are added to the models, the results demonstrate that these measures are important contributions to the explanation of staying. As in standard models of migration, age and age squared, family status, change in marital/cohabitation status, education, and labor force status play the expected roles in the probability of migration. The unconditional coefficient for risk aversion is reduced with the addition of demographic variables, but, for example, in the risk threshold model, the likelihood of moving is still increased by about 50%. What is established in this research is how the endowment effect improves the fit of the model while the role of risk aversion remains relatively strong. Introducing measures of the endowment effect increases the power of the explanatory model by more than 50%.

A focus on risk and specifically on loss aversion as outlined in the seminal work by Kahneman and Tversky has shown how the behavioral responses to potential mobility can be interpreted in the broader concept of behavioral economics rather than the more limited neo-classical conceptualizations of utility. The additional importance of the research reported here is that it not only allows us to show that prospect theory can be translated into empirical estimates but also provides a first step in linking moving and staying. The endowment effect in essence captures loss aversion and hence the likelihood of staying, with the effect magnified for those with higher risk aversion.

The contribution of this paper is to introduce a theoretical structure for the interrelated process of moving and staying and so integrate the studies that have focused on movers and stayers. We are able to show that while there are movers who are below the modal value of risk aversion, many more are stayers, while the opposite is true for those above the modal value, where there are many more movers than stayers. That respondents can be movers or stayers is conditioned on their demographic characteristics and the impact of life events, but the powerful role of the endowment effect helps us understand just how staying is conditioned on duration.

It may not always be possible to use measures of risk as they have not routinely been collected in studies of migration. However, the evidence from this research emphasizes that, even if risk variables are unavailable, we can now provide a theoretical rationale for our studies of the way in which duration matters in migration decisions. It is not duration per se that matters but that duration is a proxy for endowment which in turn relies on the central contribution of prospect theory, that it is gains and losses in relation to what a household already has which is the basis of the evaluative process in migration decisions.

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