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Neighbourhood selection and neighbourhood matching: Choices, outcomes and social distance

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Abstract

In this article, we ask how well Australian households are matched to their neighbourhood social environments. We broadly replicate a previous study of matching and ask to what extent households live in communities that are similar in socio-economic status to their characteristics. And, when households move, do they relocate in such a way as to increase similarity to their neighbours? The processes are at the heart of understanding the urban structure, how it changes over time and the links to urban inequality. The article uses data on household incomes from the Household, Income and Labour Dynamic (HILDA) Survey to measure the degree of similarity between households and their neighbours. We study the variation in matching for the population as a whole, and by quintiles of median neighbourhood income. We also measure how individuals that change neighbourhoods increase their similarity to the destination neighbourhood. We find that with respect to matching there is considerable diversity in the levels of matching; and that with respect to residential change, households in general do not make major shifts to increase matching when we control for housing tenure and other household characteristics. There is a need for further replications to understand the nature of matching and the outcomes.

Keywords

community, demographics, housing, migration, neighbourhood

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摘要

在本文中，我们研究澳大利亚家庭与街区社会环境的匹配程度。我们广泛再现了一项此前的匹配研究，并探寻家庭在多大程度上生活在社会经济地位与其自身特征相似的社区中。以及，当家庭搬迁时，其搬迁是否会提高这种与邻居的相似度？这些过程是理解城市结构、此等结构如何随时间变化、以及其与城市不平等的联系的核心。本文使用来自家庭、收入和劳动力动态 (HILDA) 调查的家庭收入数据来衡量家庭与其邻居之间的相似程度。我们研究了整体人口匹配的变化，并按街区收入中位数的五级分别进行了匹配研究。我们还衡量了搬迁到新街区的个人如何提高其与目标街区的相似性。我们发现，在匹配方面，匹配水平存在相当大的差异性；而在居住变化方面，在剔除住房产权形式等家庭特征后，一般家庭不会为了提高匹配度而进行大的转变。需要进一步再现以了解匹配的性质和结果。

关键词

社区、人口统计、住房、迁移、街区

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Introduction and framing

The distribution of households and individuals across neighbourhoods in cities comes about through a complex process commonly described as residential sorting (Bayer et al., 2004; Clark and Morrison, 2012; Modai-Snir and Plaut, 2015). Research has shown that neighbourhoods can be categorised by their ethnic composition and socio-economic status. At the same time, it also shows that there is increasing diversity in ethnic status and considerable status variation across neighbourhoods. The research on residential sorting asks the fundamental question, how do people select into neighbourhoods in the urban fabric? In this article, we focus on the choices by socio-economic status.

As others have observed, in democratic societies the freedom to decide where to live, and by extension who to live next to, is deeply ingrained as a right to choose where to live (Morrison, 2015). However, we also know that not all individuals and households have choices and many are constrained in their abilities to move, and even if they can move they are limited in their choices. There is also research that points to the role of urban managers and how institutions play a role in creating urban opportunities, especially with respect to social housing (Whitehead, 2012). Still, for those who can make choices, we find that on the whole they choose proximity to others like themselves, whether in terms of class or race and ethnicity (Catney, 2018; Clark and Ledwith, 2007; Coulter and Clark, 2019). The studies of ethnic and racial choices have documented the process across a wide range of urban contexts (Clark and Fossett, 2008; and others). The revealed preferences of high-income households suggest that sorting into higher priced neighbourhoods will be to their financial benefit and will enhance their social status (Clark et al., 2014; Morrison, 2015).

The literature on sorting has been more focused on the sorting process by race and ethnicity than by socio-economic status, but the growing focus on inequality across neighbourhoods in cities has stimulated a concern with the process of sorting by income. While we have a general sense that selection reflects income and status, the details are much less clear, and we do not know whether the

matching is driven by a decision to 'match' per se or is an outcome of the selection of tenure (owning or renting) and the reflection of other decisions in the housing market. In sum, we do not know whether it is an ancillary outcome or the primary motivator. Thus, we investigate the level of sorting by income with controls for family, characteristics, housing tenure and social status.[1] The article first reviews the general literature on residential sorting as well as a previous research contribution on matching, and follows this with a study of residential matching in Australian cities.

Previous research

The research on how residential sorting creates separation in the residential fabric was formalised with the work of Schelling (1971), who outlined a model of sorting for two ethnic groups in which slight differences in preferences for similar individuals led to strong residential separation in the residential fabric. As Vigdor (2003) showed, when the preferences of two groups are even slightly misaligned or incompatible with one another, the outcome patterns do not reflect the preferences of either group. Simulation studies show that the greater the correlation between status and wealth, the more the agents in the simulation tend to choose different areas either due to choice (the wealthy) or from exclusion (the poorer) (Benard and Willer, 2007). The research which explored the Schelling conceptualisation has been dominated by studies of ethnic and racial separation. That work has followed three paths. The first emphasises racial differences in resources and human capital and that higher levels of education, income and wealth increase the ability to choose more advantageous neighbourhoods (Clark and Ledwith, 2007; Crowder et al., 2006; South and Crowder, 1997). The second theme emphasises the role of differences in preferences, including choices about own group preference and out-group avoidance (Clark and Fossett, 2008). A third interpretation of separation appeals to place stratification, a structural explanation, which emphasises white avoidance of minority neighbours, supported by discriminatory practices (Krysan and Crowder, 2017).

Social distance plays a role in creating residential patterns. Although race and ethnic preference have been and continue to be important in the sorting process, there is growing evidence that social distance also includes status measures. The discussion of sorting includes how level of education, cultural contexts and government regulation can play a role in residential outcomes. Van Gent et al. (2019) show that socio-cultural factors play a role in sorting in concert with ethnicity. Similarly, Malmberg and Clark (2021) provide evidence that budget limits in association with ethnic preferences are important constraints in how sorting and clustering come about. From that perspective, it is about how growing concentrations of minority immigrant populations generate increased outflows by those with higher incomes, exactly the process of selective sorting by wealth that we would expect where those with choice can exercise their option to select out of poorer neighbourhoods.

Empirically, there is a well-documented link between incomes and the ability to move out of less advantaged neighbourhoods. Overall, the view of sorting and selection privileges the notion that the ability to *exercise tastes* depends on resources and that this exercise of choice leads to patterns of homogeneity *by class and race* – or to phrase it differently, money and status matter in terms of the outcomes of residential choices (Bolt et al., 2008; South et al., 2005, 2011). The outcomes emphasise that people with higher incomes are more likely to move out of neighbourhoods through a sorting process that reinforces the concentrations of the

haves and have-nots into selected neighbourhoods. Just to what extent some households are 'trapped', or only those who are successful can move out, as Cheshire (2012) argues, has been questioned, and the level of connection between low-income neighbourhoods and the larger urban structure is still in question (Bailey, 2012).

The research by Bailey and Livingston in the UK context has shown that the higher the SES level of a household the greater likelihood of leaving disadvantaged areas. This is another way of stressing that where you begin does have an impact on your chances of moving up, or in the focus in this study on whether you can achieve a matching. Thus, as in the case of intergenerational movement, there are links between initial and later statuses. But, at the same time, when you look at the whole distribution of neighbourhoods rather than just at poverty neighbourhoods, it seems that even the most deprived areas are not isolated within the city. About half of all migrants in and out of deprived areas come from, or go to, non-deprived areas (Bailey and Livingston, 2007). This is an outcome that will certainly affect matching.

Nevertheless, it is not only about a movement out of poor areas. The Tiebout (1956) model also predicts residential sorting by economic status. Households that can pay for amenities such as school quality, green space and protective services will likely sort together into communities with other residents who also value such amenities. Households willing to pay for such amenities are likely to have higher incomes, and the preference for these amenities further structures the sorting process. In effect, the Tiebout model predicts income segregation because households with similar preferences and ability-to-pay tend to form homogeneous communities.

Australian research also finds that individuals and households with higher social and economic status move out of lower decile areas (Ryan and Whelan, 2010). The most comprehensive recent study of spatial mobility in Australia, and an important context for the present study, examined mobility across areas of advantage and disadvantage using the Socio-Economic Indexes for Areas (SEIFAs) created by the Australia Bureau of Statistics (Black et al., 2009). The study examined how SEIFA level affected locational choice, what caused upwards and downwards movement and what were the natures of labour market outcomes from spatial mobility. Most moves are local, and naturally there was substantial movement on the diagonal of the SEIFA matrix. However, unlike the US and European research, the study did not find clear patterns in the upwards and downwards movement of individual households nor did income explain social area choices. To some extent, this creates questions about the strictness of the sorting process, and re-examining that question is central in the analysis section of this study.

Our study is not the first to look specifically at the level of matching across neighbourhoods. Hedman and Galster (2013) pose the income-sorting problem within the context of neighbourhood effects on income outcomes. Although not a matching study per se, it does raise the question of how selection plays a role in creating income homogeneity in neighbourhoods. A more specific study of matching (Musterd et al., 2016) examined the social distance of an individual and their household from the median social position (defined as income) of their neighbourhood, i.e. how many of the households were within a set percentage of all households in the neighbourhood. Their paper aimed to measure the extent to which individuals who moved increased their 'matching' in their social position to the social composition of the neighbourhood. The study found that about 45% of the sample were in neighbourhoods where they were

within ±25% of the neighbourhood median income. With respect to residential moves, the study showed that there was a general tendency to improve their 'fit' after a move and that the odds of moving were influenced by the level of fit before the move. Overall, although the study had relatively modest levels of explanation, with R^2 values of <0.08, it suggested that there is evidence for social matching from residential moves from one neighbourhood to another. We pursue some of the same issues with a sample of Australian households but with a number of important modifications to the structure of the analysis.

We expect the Australian findings, along with comparisons to the Dutch findings by Musterd et al. (2016), to contribute a greater understanding of how matching processes and associated outcomes vary under different institutional settings. Australia is one of the most residentially mobile countries across the OECD, with >40% of individuals who have moved over a five-year period leading up to 2012. The Dutch residential mobility rate over the same period was around half of Australia's at 21% (Causa and Pichelmann, 2020). This is likely attributable to sharp differences in the two countries' housing and welfare regimes. Australia's liberal welfare regime is characterised by a small role for governments and strong market orientation. Accordingly, the private rental sector in Australia is relatively large, lightly regulated and characterised by short-term rental contracts (Hulse et al., 2011). On the other hand, its social housing sector is small, making up <5% of total housing stock. In comparison, nearly 40% of the Netherlands' housing stock is social housing (Australian Institute of Health and Welfare, 2021). Overall, the Dutch housing system favours long-term renting much more than the Australian system (Hulse et al., 2011).

Data

The data for the analysis comes from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. This is a household-based panel study that collects information about economic and personal well-being, labour market dynamics and family life in Australia. The survey is a longitudinal survey of approximately 7600 households. It began in 2001 and follows over 17,000 Australians each year over their life course. The survey is modelled on and is similar to surveys in the US (e.g. the Panel Study of Income Dynamics) and the British Household Panel Survey, now the 'Understanding Society' study. In the present study, the mobility measures and variables are drawn from the adult respondent file. The restricted version of the HILDA Survey provides more detailed information on specific items already in the general version of the Survey. For the purposes of this article, the detailed geography variables available in the restricted HILDA Survey are especially helpful, as they drill down below broad state and capital city levels to present information at neighbourhood levels, including postcodes, Local Government Areas and Statistical Local Areas.[2]

We draw from the 2016 and 2017 HILDA Surveys for our analyses. Specifically, matching analyses are conducted for the year 2016. The analyses require comparisons of personal and average neighbourhood incomes. Hence, we have chosen the 2016 wave to enable comparisons of personal income in the HILDA Survey with neighbourhood median incomes from the latest 2016 Australian Census. We then uncover how matching patterns in 2016 are linked to moves between 2016 and 2017. In order to analyse levels of matching between individuals and their neighbourhoods, we need to frame our sample and determine units of

analysis from two levels – persons and neighbourhoods.

In terms of individual units of analysis, we follow Musterd et al. (2016) and restrict our sample to fully interviewed respondents aged 25–48 years who live in urban areas. As explained by Musterd et al. (2016), the rationale for the age limits is to capture the segment of the population that is most economically active both in terms of employment participation and mobility. We do not, however, exclude individuals who have marital status changes. We do this for two reasons. First, we believe that it is essential to keep those with marital status change in the sample as they are a large proportion of all those who make residential changes and thus engage in the matching decision. Second, there would be a large reduction in our sample size and this would limit the significance of our estimates. Musterd et al. (2016) further restrict their sample to residents of four major urban regions in the Netherlands, and we adopt a similar focus by restricting our sample to residents of Australia's major capital centres – Sydney, Melbourne, Brisbane, Adelaide, Perth and the Australian Capital Territory. An obvious advantage of this sample alignment is the scope for testing whether the Dutch findings are universally applicable, or whether matching trends and processes vary across different countries.

In terms of neighbourhood units of analyses, we draw on Statistical Areas Level 2 (SA2s), using the boundaries of the Australian Statistical Geography Standard (ASGS) in 2011. That is because the boundaries of SA2 in HILDA are defined using the ASGS 2011. There are 2310 SA2s in total in Australia, with average populations of 10,000 residents per SA2. Within cities, SA2s represent gazetted suburbs. Each SA2 is defined by the Australian Bureau of Statistics (ABS) as a medium-sized general-purpose area that represents a community whose residents interact together economically and socially (Australian Bureau of Statistics [ABS], 2016a).

We construct four analyses of the data from the HILDA Survey sample to address two research aims. Recall that our first research aim is to uncover to what extent individuals live in communities which are similar in socio-economic status to their own characteristics. A second aim is to shed light on whether households relocate in such a way as to increase similarity to their neighbours when they do move. To address the first aim, we begin by analysing the level of matching across the whole 2016 Australian population distribution and within quintiles of neighbourhood median income. Second, we construct a model of the probability of being matched in 2016 using explanatory variables ranging across the domains of personal, housing and area characteristics. To address the second aim, we analyse mobility patterns between 2016 and 2017 across classes of matching. We then model the likelihood of moving in response to being unmatched, across a range of explanatory variables.

Are individuals matched to their neighbourhoods?

Distributions across classes of matching

Following Musterd et al.'s (2016) previous study of matching and to provide a measure of comparability, we utilise the same structure of whether or not an individual's income is matched to the neighbourhood median income by splitting them into five classes: (i) individual income >75% higher than the neighbourhood median income, (ii) individual income 25%–75% higher than the neighbourhood median income, (iii) individual income within 25% higher and 25% lower than the neighbourhood median income, (iv) individual income 25%–75% lower than the neighbourhood median

income, (v) individual income >75% lower than the neighbourhood median income. The smallest social distances between individual income and neighbourhood median income are captured by the third class, and therefore this class comprises individuals who are 'matched' to their neighbourhoods.

The individual income measure is equivalised total annual household income reported by respondents from the 2016 HILDA Survey. The HILDA Survey reports unequivalised income measures, so these are equivalised to account for differences in income attributable to household composition and size, using the OECD modified equivalence scale which assigns a weight of 1 to the first adult, 0.5 to the second adult and 0.3 per child aged under 15 years (ABS, 2016b). To ensure comparability, to measure neighbourhood median income we draw on the SA2 equivalised total weekly household income from the ABS's 2016 Census, which is multiplied by 52 weeks to obtain annual equivalised total annual household income.

Because we believe, and the literature suggests, that mobility is income constrained, we examine matching both overall and by quintiles representing different levels of socio-economic status (SES) across the Australian neighbourhoods in our study. We draw on quintiles constructed from the Index of Relative Socio-Economic Advantage and Disadvantage (IRSAD). The IRSAD is one of several SEIFAs that has been developed and maintained by the ABS over time (ABS, 2018). We hypothesise that matching will be higher in more disadvantaged neighbourhoods where there are greater constraints on moving. If the hypothesis is sustained, then the neighbourhood deprivation gradient to matching outcomes will have implications for the design and implementation of area-based policies that seek to reduce barriers to economic opportunity for low-income households. This raises the issue of how mobility options for low-income households can be enhanced and whether experiments like the income voucher options in the US could be considered in the Australian context.

The initial question is how well matched individuals aged 25–48 are to neighbourhoods across Australian urban regions. We present the results in a table of matching using the measures above. To ensure that our estimates are representative of the cross-section of Australian population in 2016, we apply the HILDA Survey's cross-sectional population weights to adjust the sample for biases and produce population-level estimates.

With respect to the overall matching in the sample, we find that the levels of matching are lower than those in the Dutch context. Specifically, approximately one-third of the Australian individuals report having incomes that are within 25% higher or lower than their neighbourhood median income (i.e. around the median). Over 50% report being in neighbourhoods where they have higher incomes than the category of ±25% of the neighbourhood median. About <15% report being in neighbourhoods where their income is lower than that of the neighbourhood median. In contrast, there is overall a greater level of matching in the Dutch context, where 45% of the sample in Musterd et al. (2016) have incomes matched within 25% higher or lower than their neighbourhood median. One explanation for the greater level of matching in the Netherlands may revolve around the long-term Dutch urban policy of social status integration across neighbourhoods in Dutch cities (Bolt et al., 2010).

The finding that 50% report being in neighbourhoods where their income is higher than those of the neighbourhood raises intriguing questions about the neighbourhood and its characteristics. Although we do not have the data to further investigate neighbourhood characteristics, it has been

suggested that this may represent movement into affordable neighbourhoods which might then be gentrified by the new residents. This observation also reminds us that neighbourhoods are not static, though the relatively limited sample period time (2016–2017) means that we are unlikely to have associated gentrification.

When we unpack the distribution of matching by the IRSAD quintiles, we find, as hypothesised, that there is a somewhat greater level of matching in lower quintiles than there is in the top two quintiles. The Australian results show much greater similarity to the Dutch results for the lower IRSAD quintiles. In fact, the class reflecting individuals highly matched to their neighbourhoods – incomes within 25% higher or lower than the neighbourhood median income – is between 37% and 46% in the lowest three IRSAD quintiles, which approaches the 45% found in the study of matching in Dutch cities. In contrast, the share of Australian individuals who are matched to within 25% higher or lower than their neighbourhood median income is just above 20% for the top IRSAD quintile. These individuals in general are not matched to the neighbourhoods they live in and in fact 40% are in neighbourhoods where their income is >75% different from that of the neighbourhood median. Overall, what we are establishing here is that individuals in lower SES neighbourhoods in Australia are more likely to be matched or closer to being matched than those with higher incomes and living in higher SES neighbourhoods.

Predictors of matching

The obvious question to ask is who is matched and who is not matched. Can we in fact explain the level of matching beyond the observations of Table 1 which document that those living in the top IRSAD quintile are more likely to be unmatched? A logit model of matching is implemented where the dependent variable takes on a value of 1 if an individual is matched to within 25% higher or lower than neighbourhood median income, and 0 otherwise. The reference predictor categories are age <30 years (young adults), male, couple families without children, highest qualification from high school, outright owners, Sydney and highest IRSAD decile.

Midlife individuals have odds ratios which are significantly <1, all else being equal. The model suggests that younger individuals are much less likely to be matched to their neighbourhood residence. Younger people are also in the settling down process, with much lower likelihoods of moving; it is stability over mobility. Couples with children and lone parents with children have odds of being matched that are over three times as high as the odds of being matched for couples without children. Extrapolating from these findings would suggest that we are observing life course effects in the outcomes of matching, and that age in combination with household type is at least a partial explanation for the extent to which there is matching or not. The odds of being matched are much lower among those possessing university degrees relative to those who have only completed secondary school, potentially due to fewer constraints on mobility among the former group (see Table 2).

With respect to housing and neighbourhood effects, private renters are nearly 1.5 times as likely to be matched to their neighbourhoods as outright owners (the omitted category). On the other hand, those living in public housing, rent-free and other tenures are less likely to be matched to their neighbourhoods than outright owners. Among mortgagors, it is those with high loan-to-value ratios (LVRs) who appear to be unable to achieve a match with their neighbourhoods. Mortgagors with relatively low LVRs of under 60% are as likely to be matched as

Table 1. Distribution of individuals across classes of matching, by SEIFA quintile, 2016.

Classes of matching (individual to neighbourhood median income)	Population count ('000)	Share (% by column)					
		All	Lowest quintile	Second quintile	Third quintile	Fourth quintile	Highest quintile
>75% higher	1465.9	26.1	12.4	19.0	19.2	27.4	39.6
25%–75% higher	1538.3	27.4	21.5	25.1	29.6	33.3	25.9
±25% (matched)	1861.2	33.2	46.3	37.3	40.7	28.2	23.7
25%–75% lower	699.0	12.5	19.0	16.5	10.0	10.0	10.3
>75% lower	50.4	0.9	0.7	2.2	0.5	1.0	0.5
Total	5614.8	100.0	100.0	100.0	100.0	100.0	100.0

Note: Estimates are population weighted.
Source: Authors' own calculations using the 2016 HILDA Survey.

outright owners. Turning next to neighbourhood SES, the odds ratios attached to the first to ninth IRSAD deciles are all >1. In fact, those in the six lowest deciles are more than twice as likely to be matched to their neighbourhoods as those in the highest decile. In the seventh to ninth deciles, the odds ratios are somewhat lower but still greater than 1. These findings confirm our earlier hypothesis that, all else being equal, those in low-SES neighbourhoods are more likely to be matched to their neighbourhoods than those in high-SES neighbourhoods.

The model diagnostics show a likelihood ratio χ^2 statistic of 444.6, which is statistically significant at the 1% level. However, the model pseudo R^2 is relatively modest at 0.078.

Do individuals move to match?

We evaluated the level of actual matching in an attempt to provide a more complete picture of the sorting and matching process. However, the principal issue in the analysis is the extent to which the behavioural outcome of a move leads to increased matching, and whether we can add to the picture which has been developed by the study of matching in the Netherlands. In this section, we take up the question of who moves out of their SA2 between 2016 and 2017 and whether those SA2 moves replicate the findings of the Dutch analysis. To ensure that our estimates are representative of the Australian population in these years, we apply the HILDA Survey's paired 2016–2017 population weights to produce population-level estimates.

The first question in this replication is whether a greater social distance between the individual and the neighbourhood leads to a higher probability of moving. We first provide results without controls and explore results with controls later in the article. In the analysis of change in urban areas in the Netherlands, the research showed that the larger the social difference, either at negative or positive levels, the greater the probability of a move (see Figure 1 in Musterd et al., 2016). Those results were true whether the move was within the urban region or between urban regions.

The data for Australia tells a generally different story, although the results are consistent with the Netherlands in high levels of mobility for those who are in neighbourhoods below 75% of the neighbourhood median income when a move is within the urban region (see Figure 1). Beyond that

Table 2. Logistic regression of the probability of matching, odds ratios, 2016.

Predictors	Odds ratios	
Age (reference: <30 years – young adults)		
30–40 years – family formation and development	0.865	(0.0790)
40–48 years – midlife	0.725***	(0.0724)
Female	1.098	(0.0756)
Household type (reference: couples with no children)		
Couple family with children	3.243***	(0.332)
Lone parent with children	3.373***	(0.501)
Lone person	1.617***	(0.210)
Group household	1.527	(0.533)
Other (multi-family, etc.)	2.688***	(0.528)
Education (reference: completed secondary school)		
University degree	0.522***	(0.0541)
Other post-secondary school qualification	0.874	(0.0888)
Did not complete secondary school	0.802*	(0.107)
Housing tenure (reference: outright owner)		
Mortgagors with LVRs >0% and ⩽60%	0.970	(0.157)
Mortgagors with LVR >60%	0.784**	(0.0831)
Private renters	1.476**	(0.237)
Public renters	0.389***	(0.118)
Rent-free	0.625**	(0.125)
Other tenures	0.562**	(0.149)
Region reference: Sydney		
Melbourne	1.124	(0.103)
Brisbane	1.269**	(0.133)
Adelaide	1.179	(0.147)
Perth	1.144	(0.139)
Australian Capital Territory	1.641**	(0.316)
Neighbourhood SES (reference: highest IRSAD decile)		
Lowest IRSAD decile	2.458***	(0.440)
Second IRSAD decile	3.092***	(0.485)
Third IRSAD decile	2.176***	(0.353)
Fourth IRSAD decile	2.807***	(0.435)
Fifth IRSAD decile	2.464***	(0.378)
Sixth IRSAD decile	2.570***	(0.375)
Seventh IRSAD decile	1.701***	(0.253)
Eighth IRSAD decile	2.155***	(0.302)
Ninth IRSAD decile	1.760***	(0.245)
Constant	0.131***	(0.0300)
Observations	4535	
Log-likelihood	−2617	
Pseudo-R^2	0.0783	
Likelihood ratio χ^2	444.6***	

Notes: Standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.
Source: Authors' own calculations from the 2016 HILDA Survey.

finding, the results do not parallel those in the Netherlands. There is clearly greater mobility across Australia than the Netherlands. For moves within the urban Australian regions, the most matched neighbourhoods have the second lowest mobility rates (13%). For moves between urban regions, the most matched neighbourhoods

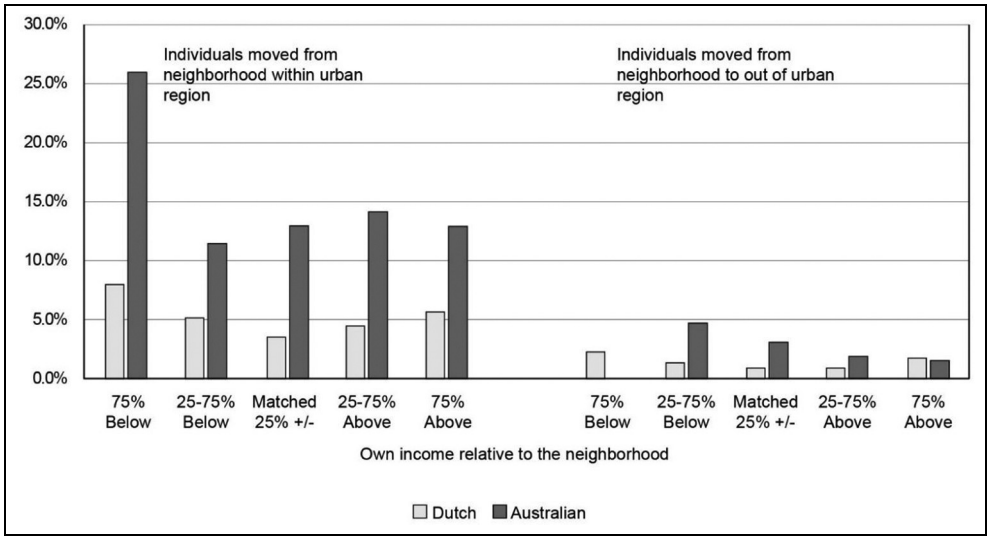

Figure 1. Percent of individuals who moved out of their neighbourhood, by classes of matching, 2008–2009 for the Netherlands and 2016–2017 for Australia.

Notes: The Australian estimates are weighted using paired 2016–2017 population weights. The estimates for the Netherlands were taken from Musterd et al. (2016).

Source: Australian estimates are authors' calculations using the 2016–2017 HILDA Survey.

have the second highest mobility rates (3%). The distinct U-shaped curve for the Dutch data is not replicated in the Australian data. There is little difference across the other levels of matching, and in fact matched individuals were just as likely to move as those who were 'overmatched'.

The second question with respect to matching is whether individuals reduce social distance when they move. In the Dutch context, Musterd et al. (2016) suggested that in addition to moving from neighbourhoods where they do not fit well socially, households seem to reduce social distance. That is, they become more matched after the move. We examine this question with Australian data on the shares and numbers of movers who change between matched and unmatched contexts. As shown in Table 3, among Australian neighbourhood movers, the majority moved from unmatched to unmatched (58%), followed by matched to matched (28%). Thus, the group that move from unmatched to matched is very small (10%). We will explore this in our models of matching later in the article.

We further elaborate these findings by replicating the table of neighbourhood moves between categorisation in 2016 and 2017. The overall finding in Table 4 shows that moves on the diagonal predominate, a finding in many studies of sorting and selection. Overall, people generally move into another neighbourhood in the same matched or unmatched category in 2017. For instance, between 2016 and 2017, 89% of SA2 movers in the matched category in 2016 moved and stayed matched. In terms of those who moved up into a matched class, about 9% of those in the '25%–75% lower' class and 13% of those in the '25%–75%

Table 3. Shares and numbers of movers moving between matched and unmatched.

Moved SA2 between 2016 and 2017	*N* ('000s)	%
Matched to matched	284.4	28.3
Matched to unmatched	41.0	4.1
Unmatched to matched	95.0	9.5
Unmatched to unmatched	583.8	58.1
Total	1004.1	100.0

Note: The estimates are weighted using paired 2016–2017 population weights.
Source: Authors' own calculations from the 2016–2017 HILDA Survey.

higher' class did so, by moving into another SA2. Nearly all those in the ' >75%' categories in 2016 remained in the same categories in 2017 while moving to a different neighbourhood. Of course, this reflects short-distance moves, but it also reflects the reality of the hold of the initial locational choice.

The third issue we address is whether individuals replicate the Dutch finding that more households move to neighbourhoods where the median is somewhat higher than their own income than to neighbourhoods where the median is lower. The results again do not support this finding. Only 14% move to neighbourhoods where their personal income is lower than the neighbourhood median. This is not a finding which supports the idea of upwards aspirations. However, 34% do move to neighbourhoods where their personal income is similar to the destination neighbourhood median. We argue that this is, in fact, what we would expect, and is a reiteration of the actual sorting that takes place. Individuals move to and within neighbourhoods that are like themselves even if they are not actively seeking to match their social distance to the neighbourhood itself. When we examine the explanatory model of choice below, we elaborate on this process and how the role of housing tenure plays a major role in the sorting outcome.

Finally, we compute explanatory logit models of the probability of moving to another SA2 (neighbourhood) with reference to being in the matched category (see Table 5). The models proceed from a model with relatively few controls (model 1) to increasing controls for other socio-demographic, human capital and housing predictors (model 2). Model 2 broadly follows the model outlined by Musterd et al. (2016). However, we make several important adjustments related to sample issues and to our conception of the matching process. As our sample size is considerably smaller than that of the Dutch study, we do not distinguish between moves into another neighbourhood within the urban region and moves out of the urban region. As the main issue is about matching, we do not believe this change affects the ability to capture how much matching is occurring. The models in their most complete form have relatively good levels of fit for social science explanations.[3]

With respect to the range of variables used in the Dutch formulation, we include almost all the variables used in the Dutch analysis. However, we do not include a variable representing a mismatch of household income and housing value, which is captured in the Dutch model. We exclude this variable due to concerns over collinearity with the matching classes, that is, high housing values

Table 4. Spatial mobility matrix of SA2 movers by SA2 of origin and destination, percent by row, population numbers in '000s in parentheses.

		2017: Destination					
		>75% higher	(25%, 75%) higher	±25%	(25%, 75%) lower	>75% lower	Total
2016: Origin	>75% higher	92.6 (1349.3)	7.4 (108.2)	–	–	–	100.0 (1457.5)
	(25%, 75%) higher	4.9 (75.1)	82.6 (1269.9)	12.5 (192.1)	–	–	100.0 (1537.1)
	±25%	0.1 (1.8)	5.0 (89.7)	88.9 (1611.2)	6.0 (109.5)	–	100.0 (1812.2)
	(25%, 75%) lower	–	–	9.0 (62.4)	90.4 (627.8)	0.6 (4.1)	100.0 (694.4)
	>75% lower	–	–	–	18.1 (9.2)	81.9 (41.6)	100.0 (50.8)
	Total	25.7 (1426.3)	26.4 (1467.8)	33.6 (1865.8)	13.5 (746.5)	0.8 (45.7)	100.0 (5552.1)

Note: The estimates are weighted using paired 2016–2017 population weights.
Source: Authors' own calculations using the 2016–2017 HILDA survey.

are strongly correlated with high median neighbourhood incomes. Although not a perfect replication, we believe the modelling strategy is a reasonable approximation of the Dutch formulation.

The questions at the heart of the Dutch study and of this study are to what extent people are matched, and if people move to match. The models which we report in this section follow the same process as the Dutch study and examine the extent to which we can predict the likelihood of matching. The initial model – model 1 – focuses on the likelihood of choice as a function of matching with one's neighbourhood, with controls only for age and sex. In other words, if someone moves, to what extent do they match. In this model, the odds of moving from neighbourhoods where one's income is >75% higher and 25%–75% higher than the neighbourhood median income is just 70% of the odds of moving from a neighbourhood where individual income is matched to the neighbourhood median income. In other words, there is little evidence of matching. As we expect, the age variables are significant, with the odds of moving falling the older the age group. As would be expected from a model with few controls, the goodness-of-fit measure is quite low at 0.04.

Model 2 is a relatively close replication of the variables used in the Dutch analysis. However, recall that we include those who have a marital status change in the sample. When we add in the full range of socio-demographic, human capital and housing tenure variables, all the classes of matching become insignificant. Tenure in effect absorbs the effect of matching. Clearly the tenure characteristics play an important role in the choices that are being made within neighbourhoods in Australian towns and cities. In fact, private renting has the greatest impact on the choices that are made. The odds of choosing another neighbourhood among private renters is nearly five times the odds of making a new choice of a neighbourhood by outright owners, holding other factors constant.

As in the Dutch study, changes in family composition, namely the addition of children, are significant. The odds of moving associated with a reduction in the number of children is three times the odds of moving associated with having no children or no change in the number of children. An increase in the number of children also

Table 5. Logistic regression of the probability of moving into another SA2, 2016–2017.

Predictors	Model 1 odds ratios	Model 2 odds ratios	Model 3 odds ratios
Classes of matching (reference: ±25%)			
>75% higher	0.742 (0.0869)**	0.726 (0.146)	0.731 (0.147)
25%–75% higher	0.702 (0.0827)***	0.822 (0.112)	0.821 (0.112)
25%–75% lower	1.169 (0.168)	0.853 (0.142)	0.859 (0.143)
>75% lower	1.804 (0.717)	1.267 (0.544)	1.272 (0.546)
Age group (reference: <30 – young adults)			
30–40 years – family formation and development	0.558 (0.0571)***	0.699 (0.0799)***	0.694 (0.0794)***
40–55 years – midlife	0.276 (0.0337)***	0.417 (0.0592)***	0.419 (0.0594)***
Female	0.897 (0.0806)	0.847 (0.0844)*	0.851 (0.0849)
Ethnicity (reference: Australian-born)			
Main English-speaking countries		0.655 (0.131)**	0.646 (0.130)**
Other		1.009 (0.132)	1.009 (0.132)
Household type (reference: couple family without children)			
Couple family with children		0.868 (0.174)	0.862 (0.173)
Lone parent with children		1.288 (0.300)	1.300 (0.303)
Lone person		1.508 (0.233)***	1.514 (0.234)***
Group household		0.210 (0.157)**	0.210 (0.157)**
Other (multi-family, etc.)		1.141 (0.310)	1.145 (0.311)
Number of children (reference: no children)			
No additional children in 2017		1.018 (0.201)	1.018 (0.201)
Fewer children in the household in 2017		3.398 (1.018)***	3.087 (0.936)***
More children in the household in 2017		1.563 (0.296)**	1.576 (0.299)**
Education (reference: completed secondary school)			
University degree		1.139 (0.171)	1.142 (0.172)
Other post-secondary school qualification		1.021 (0.151)	1.025 (0.152)
Did not complete secondary school		0.674 (0.138)*	0.666 (0.136)**
Change in employment status (reference: employed in 2016 and employed in 2017)			
Employed in 2016 and not employed in 2017		0.953 (0.229)	0.956 (0.230)
Not employed in 2016 and employed in 2017		1.685 (0.308)***	1.671 (0.306)***
Not employed in both 2016 and 2017		1.453 (0.230)**	1.463 (0.231)**
Total household equivalised gross income in 2016 (AUD'000s)		1.004 (0.00171)**	1.004 (0.00171)**
Tenure type (reference: outright owners)			
Mortgagor owners		0.955 (0.285)	0.940 (0.280)
Private renters		4.934 (1.448)***	4.897 (1.436)***
Public renters		1.898 (0.883)	1.855 (0.863)
Rent-free		2.974 (1.014)***	2.959 (1.008)***
Other tenure		2.159 (0.935)*	2.158 (0.934)*
Change in marital status from married in 2016 to divorced/separated/widowed in 2017			4.165 (2.257)***
Constant	0.430 (0.047)***	0.094 (0.034)***	0.094 (0.034)***

(continued)

Table 5. Continued

Predictors	Model 1 odds ratios	Model 2 odds ratios	Model 3 odds ratios
Observations	3840	3840	3840
Log-likelihood	−1617	−1455	−1452
Pseudo-R^2	0.0430	0.139	0.140
Likelihood ratio χ^2	145.3***	468.2***	474.3***

Notes: Standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.
Source: Authors' own calculations from the 2016–2017 HILDA Survey.

prompts moves, though the odds are more muted at 1.6 times the reference category. As much of the Australian housing market comprises three- and four-bedroom homes that are suitable for family occupation, it is unlikely that supply is a constraint in moves. Changes in employment are also important predictors linked to higher odds of moving. Specifically, becoming employed between 2016 and 2017 increases the odds of moving relative to remaining employed across the two years. Those who remain out of work between 2016 and 2017 also have heightened odds of moving, holding other factors constant, perhaps due to the need to relocate into areas with greater job opportunities or lower housing costs.

Although the major issue is the level of explanation about matching, we also report the level of fit of the model, which, in fact, is a relatively close replication of the Dutch model. Unlike the results from the Dutch analysis, we do not find that the social distance between the individual and the neighbourhood is significantly related to the odds of moving once we control for tenure, life-course variables and changes in employment and family composition. If we think of this in the context of the housing ladder, it is a reflection not that matching is irrelevant but that individuals are selecting into neighbourhoods they can afford as they make housing tenure and employment decisions and as their family composition changes. The greater social distance alone does not seem to be a reason to leave the neighbourhood. From our perspective, the results reiterate that it is the life course that is the powerful force in both moving and leaving the neighbourhood.

A question was raised about controlling for the fact that we include households with status change in the sample. We added an additional variable that captures the impact of marital change, including dissolution on choice outcomes. To control for this status change, we now report those results in Table 5 (model 3). Although the variable does not change the fit of the model, it is clear that the measure of status change is a factor in changing neighbourhoods. But to reiterate, while the model is showing the powerful force of life course decisions of which matching is a part, it does not alter the conclusions of the lower tendency to match in the Australian data.

Discussion and conclusion

The focus in this article was on replicating an earlier study of the extent of social matching in Dutch cities. That study and the analysis in this article were designed to increase our knowledge about the 'social fit' between individuals and their neighbourhoods as they leave and enter, a topic which is of considerable interest in understanding how residential sorting comes about. Using the same categorical framework as the Dutch study, we investigated the extent to which

individuals engaged in matching their economic status to the status of the neighbourhood. Specifically, we explored the extent to which individuals were matched to their neighbourhoods, whether they moved in response to being unmatched and whether they increased the outcome of being matched after they moved. In the Dutch study, there was modest confirmation (relatively low R^2 values) of moving in response to being more socially distant in their neighbourhood. Those who were unmatched either negatively or positively were more likely to move.

We know that sorting and selection across neighbourhoods create the patterns of residential differentiation we see in our cities, and there is a sense that when people move they select neighbourhoods which reflect their preferences for the social mix in the neighbourhood, and a selection which reflects budget constraints. We also know that there is considerable 'stickiness' in the mobility process – people move nearby and to locations that are similar to the one they are already in. In this context, the study is about how much matching drives residential choices.

From our analysis, we can make four important findings about the process of matching as individuals select from amongst the neighbourhoods in major urban regions in Australia.

First, as we would expect, there is matching across neighbourhoods in Australian cities, although it appears there is greater heterogeneity overall in Australian neighbourhoods than in Dutch urban areas. Matching in the Australian context reveals that about a third are matched overall. When we unpack the nature of matching, we find that the level of matching is higher in lower-cost neighbourhoods, where nearly 50% of all individuals have a similar status to the median for the neighbourhood. This is also true, though at a lower matching rate, for the next lowest quintiles. For the highest quintile, the matching falls to less than a quarter of all respondents. Families with children are more likely to be matched and those with tertiary education are less likely to be matched. Private renters, who have the greatest mobility, are most likely to be matched among all the housing tenures. However, social housing tenants and highly leveraged mortgagors less likely to be matched than outright owners and low-LVR owners. Clearly, tenure is a critical dimension of the matching process. These findings also potentially reflect the special characteristics of Australia's housing system. As noted earlier in the article, Australia is one of the most residentially mobile countries in the OECD. This has clearly been supported by a relatively large private rental sector, which supports geographic mobility by private renters seeking to locate themselves in well-matched neighbourhoods.

Second, on the whole, we do not find strong evidence of moving in response to being un-matched per se. It is correct that individuals with incomes below their neighbourhood median do have higher probabilities of moving in response to their mismatch (although not significantly in the decision to move model). Overall, as in other studies of mobility, the 'stickiness' of mobility plays a major role in the overall choices. We do not find the U-shaped curve of lower mobility in the match category and higher mobility in the negatively and positively matched categories found in the Musterd et al. (2016) study.

Third, our models of choosing to change neighbourhood reiterate the powerful role of age, family status and changes in household composition (increases or decreases in the number of children and changes in employment, as is true in the Dutch study). Of course, tenure choice plays a major role, and private renters are much more likely to make changes in the urban mosaic than are owners. As we noted above, people generally

move into another neighbourhood in the same unmatched category in 2017. For instance, between 2016 and 2017, 89% of movers in the matched category in 2016 moved neighbourhoods but stayed matched. We argue that this is, in fact, what we would expect from the life cycle process and is a reiteration of the actual sorting that takes place. Individuals and households move to and move within neighbourhoods that are like themselves but they also move between neighbourhoods where they are unlike, in social distance, their neighbours. We find that the explanatory power at matching motivation in the decision to move is subsumed in tenure decisions and the stage in the life course. Employment and tenure play major roles in the sorting outcome too.

That the Dutch study found somewhat higher overall levels of matching (though not as high as the lowest quintile in this study) may reflect the national housing context (a housing market with about 40% social subsidised housing). Now the issue is to replicate this study in additional national contexts to further examine the sorting and matching process. There are two other reasons for differences which we also acknowledge. First, the sample size is smaller, and except for the unusual case of full register data, it is difficult to find test cases of matching which will have larger samples and we concede this may influence the results. Second, the size of the units in the Dutch case and the Australia case are different. On average, SA2s have populations in the range of 10,000 persons (ABS, 2016a). The Dutch neighbourhoods are smaller. However, the effects of scale are unclear. It is entirely possible that the larger units might generate greater matching, but in any event this is an empirical question which requires further research.

Fourth, although there is only modest evidence of aspiration mobility in the analysis of Australian residential moves, we can say that it is likely to be an underpinning if unstated logic in the move for some movers. The empirical evidence is that about 14% move to neighbourhoods where their personal income is lower than the neighbourhood median.

Finally, we recognise that matching occurs not in a static context but in a changing world in which the choices change and are changed by the selection process. It is a dynamic process, and there is much to be unpacked in that process. Specifically, future research will need to confront the way in which gentrification is a process which affects the matching outcomes.

At this point, the analysis demonstrates a combination of two powerful choice processes in the urban housing market. The first is buying into ownership in neighbourhoods which are similar to the ones they currently reside in, and the second is the power of the life course in the process of moving up the housing ladder and that matching is an ancillary but not a driving force once we control for tenure choice and family composition.

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Notes

1. As a reviewer pointed out, there is also a literature, some of it published in *Urban Studies*, which investigates matching by religion and sexual orientation. Space limits preclude discussing this literature here.
2. For more information regarding the restricted version of the HILDA Survey, please refer to https://dataverse.ada.edu.au/dataverse.xhtml?alias=hilda.
3. The analysis is computed for all neighbourhood changes in Australian major cities. We also estimated the model for moves across all of Australia and for the total population, not restricted by age. The results are comparable and are available from the authors on request.

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