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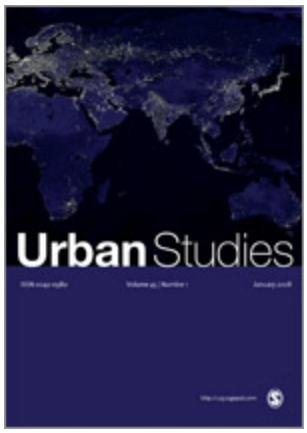


# Not so Welcome Here? Modelling the Impact of Ethnic In-movers on the Length of Stay of Home-owners in Micro-Neighbourhoods

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# Not so Welcome Here? Modelling the Impact of Ethnic In-movers on the Length of Stay of Home-owners in Micro-Neighbourhoods


## Abstract

This paper considers the length of stay of home-owners with white British names in the 40% most deprived census areas of Glasgow, Scotland. We estimate the impact of ethnically 'other' name-group inflows through property purchases at the micro-neighbourhood level. We use a novel longitudinal dataset, constructed from the population of home-buyers recorded in all property transaction records from 2003 to 2014, from which we impute ethnicity using name-matching software. We estimate how the survival time (length of ownership) of homeowners with white British names is affected by in-migration of house-buyers from different ethnic name-groups into the micro-neighbourhood, defined as a 50m radius around each home. Results suggest a complex set of associations between ethnically "other" purchasers/inmovers (based on name groups) and duration of home-ownership. The most consistent finding is for in-moving purchasers with Pakistani (primarily Muslim) names, which tend to have a relatively large accelerant effect on the moving propensity of homeowners that have white British names. This was true in areas of both high and low non-white ethnic population share. We also find evidence of nonlinearity in this relationship: the accelerant effect diminishes with each additional in-move from purchasers with Pakistani names. The name group with the largest overall accelerant effect was for inmovers with non-white Other names, which were also primarily Muslim in origin, though this effect was less consistent across models.



## Keywords

Neighbourhood, Housing, Diversity, Cohesion, Segregation, Migration, Race, Ethnicity, White Flight

## 1. Introduction

The surge in anti-immigration and xenophobic sentiment in the UK in the run-up to, and aftermath of, the 2016 Brexit Referendum (Jeory, 2016) exemplified wider concerns in Western democracies about migration, social cohesion and the socio-spatial segregation of minority ethnic populations.

These macro-political developments affect, and are affected by, micro-level processes that shape the geographical patterns of ethnicity and social characteristics in towns and cities. Dynamics of household mobility and local neighbourhood choice, whether motivated by racism or upward social mobility, underpin the (re)production of residential segregation and socio-spatial inequalities over time (Hedman, 2011), which in turn impact the potential for inter-group contact (Allport, 1954).

One mechanism of ethnic-social sorting, which has received particular attention from both researchers and the media, is the phenomenon of so-called 'white flight'. Originating in 1970's USA, the term refers to the outmigration of pre-existing white residents in response to the changing ethnic mix of their neighbourhood (Galster, 1987). Studies in the European context (Nordvik and Turner 2015; Finney and Simpson, 2009) have shown such outflows to be largely the result of 'aspirational' moves linked to age and stage of life.

Existing research, however, has tended to overlook the issue of "duration dependence"—where the probability of moving is affected by the duration of stay up to that point. This is a potentially important omission. There is also been a dearth of spatially fine-grained analysis of sub-neighbourhood migration flows, with much of the research being at the level of US census tracts[1] or similarly sized areas comprising several thousand residents (see for example, Magi et al., 2016).

With regard to duration dependence, it is likely to be a critical factor in estimating a person's likelihood of moving in any given period (Thomas et al., 2016) because length of stay reflects cumulative personal investment in, and commitment to, local people and place. The appropriate way to model events characterised by duration dependence is to apply "survival" modelling techniques which are designed to capture the relationship between behaviour and duration of stay. Such methods, however, have been under-utilised in the 'white-flight' literature, probably due to a lack of

[1] US census tracts contain between 1,000 – 8,000, (optimally 4,000) US Census Bureau. (2017) *Geographic Terms and Concepts - Census Tract* Available at: https://www.census.gov/geo/reference/gtc/gtc_ct.html.

longitudinal microdata and perhaps also a lack of awareness of the methodological importance of duration dependence (Crowder et al., 2011). With regards to those who live in relatively settled communities, the "hazard rate" of moving has been shown to be non-monotonic (Thomas et al., 2016), which requires the selection of a model that allows for this type of distribution in order to avoid misleading results (Pryce and Gibb, 2006).

The spatial unit of study is also important, as demonstrated by the Festinger et al. (1950), who highlighted the importance of "functional" distance in determining the emergence of social networks in housing projects. More recently Mollenhorst et al. (2014) have shown how stable relationships with neighbours are built up through long-term frequent contacts in terms of practical help and social support. Hipp (2010) also finds that "micro-neighbourhoods" comprising clusters of 10 housing units, have strong effects on neighbourhood (dis)satisfaction which may be missed at US census tract level. This supports our view that social connections and interactions are more likely to occur in close proximity—residents' awareness of other households is likely to be greatest with respect to those who live the closest. One might therefore expect the effect of inmovers on the moving decisions of existing residents to decay with distance—the impact of changes in close neighbours will likely be much greater than changes a block or two away. Studies measuring population migration or segregation, however, typically use meso-level administrative units such as census tracts which cover comparatively large areas[2] (Östh et al., 2015; Nordvik and Turner, 2015), and which potentially average-out important variation at smaller spatial scales (Reardon et al., 2008). Greater attention is warranted regarding the dynamics of micro-neighbourhoods that surround individual housing units (Hipp, 2010; Sager, 2011; Schmid et al., 2008).

This leads us to our core research question: controlling for duration dependence, is there native flight in micro-neighbourhoods in Glasgow? Our focus is on the impact of inflows of people from particular name groups on the moving decisions of residents from other name groups. More precisely, we want to know whether the likelihood of homeowners with white-British names selling up and moving on, is affected by the in-migration of ethnically 'other' name-group home-buyers into nearby properties?

To the best of our knowledge, no previous study has rigorously analysed the duration dynamics of home-owner migration at the micro-neighbourhood level. We aim to address this gap through the

[2] US census tracts contain between 1,000 – 8,000, (optimally 4,000) ibid.

novel use of property registration data, which enables us to compute the cumulative number of inmovers from different ethnic name groups within micro-neighbourhoods, defined here using a proxy of the 50 metre radius around the dwelling of interest. This fine-grained analysis is made possible because our data includes the address point location of all recorded property purchases in the owner-occupied sector in Glasgow, on a monthly basis from 2003-2014, and thus affords a high degree of granularity in both space and time.

The paper is organised as follows. Section 2 summarizes the existing literature in the field. Registers of Scotland data are introduced in Section 3 where the meaning and accuracy of the ethnic name-matching process is discussed. Our study methods are outlined in Section 4. In Section 5 we discuss the results and in Section 6 we offer a brief conclusion. Further details of our methods, data and results are provided in Supplementary Material.

## 2. Existing Literature

Numerous studies on socio-spatial sorting, particularly in the US literature, have noted the outflow of majority-white residents from areas when ethnic "others" (people of colour) move in; a process that has become known as "white flight" (Galster, 1987). Several explanations for this "ethnic flight" phenomenon have been posited, including "the mobility-related characteristics of native-born [white] individuals" (Crowder et al., 2011). Examples include: young childless singles or couples upscaling from city centre tenement flats to more spacious (family) housing in the suburbs, or older retired empty-nesters moving out of the city centre to quieter areas.

Boustan (2010) notes the potential endogeneity of residential location choice. Environmental blight, such as a new motorway or waste disposal plant, may cause existing nearby residents to migrate out. Meanwhile other groups move in, attracted by the fall in local property prices (Depro et al., 2015). Both of these scenarios entail differences in neighbourhood choice and financial constraints by ethnic group (Ibraimovic and Masiero, 2014).

Concerns about the lower socioeconomic position of in-migrating ethnic others may also be a driving factor that explains the response of existing white residents. Ethnic others with a history of immigration are often socioeconomically disadvantaged and pre-existing residents may fear socioeconomic decline in the local neighbourhood (Boustan, 2010; Crowder et al., 2011). Home-buyers from in-migrating ethnically "other" groups, however, may be constrained in their choice of residential location due to lower incomes associated with their disadvantaged socioeconomic

position, or as a result of discriminatory practices in the housing market (Ibraimovic and Masiero, 2014).

Another important potential driver underpinning the decision to move is "homophily"—a preference for living among, and interacting with people socially similar to oneself. Systematic variation in the level of contact by social characteristics such as class, ethnicity, gender, age, education, religion and so on, translates into differential patterns of closeness in social ties, thereby ordering social network distance (McPherson et al., 2001). Ethnicity is a potential source of homophily, intertwined in a complex way with other important dimensions of socio-structural attributes, including education, religion and socioeconomic position (McPherson et al., 2001). Even when homophily is fairly weak, such as the desire to be in the majority among immediate neighbours, very high levels of overall segregation can emerge as a result (Schelling, 1971).

Heterophobia or xenophobia, the fear or dislike of people socially "other" or 'foreign' to oneself, may also play a significant role, for example through racist discriminatory behaviour on the basis of observed ethnicity. Names potentially constitute an important aspect of this aversion. Kyriakides et al. (2009) explore the notion of a racialised Scottish nationalism rooted in the white ethnic phenotype. They elicit interviewee responses to a vignette about inmoving neighbours with stereotypically English or Muslim names and find that neighbours are initially racialized and identified negatively (p.295). Worries are expressed about stereotypical 'foreign' Muslim 'extremism'. They also find negative stereotypes of 'foreign' Asians linked to overcrowding, loudness and household privacy, held among both Scottish Asian and white interviewees. Although Kyriades *et al*. discover challenges to the whiteness of national Scottish identity once a Scots accent is revealed, this, requires interaction – moving beyond the superficial visual appearance. The ethnic origin of names, therefore, may have an important direct impact as a signal of "otherness".

Negative attitudes towards ethnic "others" may be rooted in perceived competition for material resources such as jobs, housing, and welfare state benefits (Bowes et al., 1990). The majority population may also perceive a threat to its mainstream culture and societal cohesion from an influx of people with different ethnic, linguistic and religious backgrounds and cultural values. According to social identity theory membership of the "in-group" can be a source of positive self-esteem and status (Ben-Nun Bloom et al., 2015). The majority "indigenous" population displays a marked preference for its own ethnic "in-group" which can lead to favouritism, while perceiving cultural threats from a variety of "out-groups" (Turper et al., 2015). Balibar, cited by Kyriakides et al. (2009) argued that: 'the 'new racism' in the 'era of decolonisation' (1991a: 21) presents a 'need to purify the social body

to preserve ‘‘one’s own’’ or ‘‘our’’ identity from all forms of mixing, interbreeding or invasion’. Such representations are ‘articulated around stigmata of otherness (name, skin colour, religious practices)’ (1991a: 1718).’ p.292.

Thus, residents with white British names in largely white British neighbourhoods may interpret the inflow of movers with names denoting “otherness” as source of threat and potential disruption to their sense of identity and prestige (Schuermans et al., 2015). This in turn may act as a push factor in incumbents’ decisions about whether stay or move. Note, however, that irrespective of ethnicity, outmoves of long-standing neighbours may loosen the sense of neighbourhood-attachment for remaining households – i.e. it may not be the ethnicity of in-movers that matters, but the loss of well-established friendships with those they displace, and the unravelening of shared memories and local relationship networks.

## 3. Data and Study Area

### Background to the Study Area

There is a historically rooted (white) Irish Catholic population in Glasgow, as well as a long tradition of Sectarian division between Protestants and (primarily Irish) Catholics. Although many Asian maritime workers (‘Lascars’) had migrated to work in Glasgow’s ship-building industry in the 18th and 19th centuries (Scottish Government, 2011), (white) Irish Catholics comprised the largest immigrant group to Glasgow in the 19th to early 20th century. Irish migrants came initially for seasonal work, then fleeing the potato famine of 1846-1847 (John Gray Centre, 2014), following which the pace of immigration and anti-Catholic discrimination escalated. There was also substantial economic migration from Europe to Glasgow in the late 19th and early 20th centuries, particularly from Italy, and an influx of migrants from Pakistan following the partition of India in the 1950s. More recently there have been significant increases in the number of overseas students, particularly from China, and a significant inflow of (primarily white) migrants following the accession of eastern European countries such as Poland to the European Union in 2004 and 2007.

By 2011, Glasgow’s population comprised, among others: 4% Pakistani descent, 4% white English/Welsh, 3.9% white other (up from 1.5% in 2001), 2% Chinese, 2% Black African (Kelly and

Ashe, 2014) as well as 2% white Irish. The age profile of white British and Irish people is considerably older. Polish people were youngest on average (Scottish Government, 2014).[3]

**Registers of Scotland (RoS) Data**

Our data consist of records on private property transactions (sales/purchases) collated by the Registers of Scotland (RoS) for the 2003-2014 period in the Glasgow City council area. RoS data[4] was combined to form a longitudinal database on all property and land transactions, including details of the purchaser and seller. Registration of property transactions with RoS is a legal requirement and so our data represents the most comprehensive source of information on transactions available. Nevertheless, we only have data for those home-owners who have transacted i.e. sold or bought properties during the study period. This excludes home-owners who remained resident and did not buy or sell their properties during the 2003-2014 period.

The presence of full names in the data enabled the imputation of the probable ethnic group of property owners using name-matching software (Onomap, 2010). Further advantages of this dataset is that it is updated regularly and has full address details of properties transacted, thereby permiting a much more up-to-date and fine-grained analysis than is usually feasible in this literature (Rathelot and Safi, 2014).

From 2003-2014 there were 87,187 records located in Glasgow City council area once properties bought and sold by organisations and commercial businesses were filtered out (it was not possible to determine whether these were purchased for residential or business use). For the purposes of our analysis, we assume that the majority of sellers and buyers are, respectively, home-owners and purchasers who live or plan to live in their property, but it's worth noting that we have no way of checking whether an individual owner is actually living in the property, or whether they have let it to private tenants, for example.

**Name Classification by Ethno-Cultural Linguistic Group**

There is a growing literature on combining forenames and surnames to impute ethnicity (Mateos, 2014; Lakha et al., 2011). We used Onomap® software which is based on a cultural-ethnic-linguistic classification system to match ethnicity into the dataset (Mateos, 2014). Lakha et al. (2011) found this software performed best with British names (positive predictive value 99%), quite well for

[3] See Supplementary Material for more detail on the study area and its demographic make-up.

[4] https://www.ros.gov.uk/property-data

Eastern European (Polish) and Chinese names (71%), less well for South Asian names (59%) and poorly for African names (17%). Results for Muslim names were also poorer – see below.

Our own visual inspection of the names also suggested that the Onomap categorisation worked better for some groups than others. For example, those names categorised as Asian Pakistani and Indian looked reasonable based on the authors'[5] knowledge, but the presence of some white British forenames in the Indian category could indicate intermarriage, mixed ethnic background or personal choice. Further exploration of the Onomap "non-white other" 2001 census category showed this group to consist primarily of names of Islamic origin (almost 79%) - which does not tell us where people are from, but may indicate a middle-eastern (or Black African) appearance in many cases. A further 10.5% were labelled as East Asian e.g. Thai, Korean etc, and 9.5% as Turkish. Further errors are likely to arise for particular groups, such as women who have taken their husband's name; and Caribbean Black people who may have European plantation owner surnames through a heritage of slavery – many of which are Scots/Celtic in origin (National Records of Scotland, 2016).

Among white British home-owners in Glasgow, over 55% of names were classified as "English", as opposed to (white) Scottish (21.4%) or "Celtic"(22%), for example.[6] Having a name of English origin does not, of course, mean that a person perceives themselves to be English – only 4% of Glaswegians self-identified as white English in the 2011 census. So, it's important not to confuse Onomap classifications with self-reported ethnicity, such as that reported in the Census. Rather, we interpret Onomap classifications as an approximation of the historical origin of *name groups*, which acts as a signal to indigenous homeowners of perceived association with particular racial/ethnic groups (eg Asian/Black) or of speaking a different language (eg Polish). Our interest in this paper is in whether there is evidence of variation in accelerant effects associated with inmovers from different ethnic name groups in terms of the impact on the probability incumbent homeowners from white British name groups moving out. Further discussion of classification accuracy and links between ethnicity and name groups can be found in Mateos (2014) and in Supplementary Material.

[5] One of the authors was born and raised in a largely Asian multi-ethnic community in London, and has a long-term interest in ethnicity.

[6] A high proportion of traditional Irish-celtic names, such as those beginning with "O'……." (meaning "son of"), were also found to be classified as (white) Scottish rather than Irish.

## 4. Methods

Our primary interest is in modelling the time elapsed between a home-owner purchasing and selling a property. This is the dependent variable in our model. We assume duration of ownership is, on average, a good proxy for duration of residence (stay) in that property. The appropriate way to model duration – or time to a particular "event" -- is to use "survival analysis". In our case, the "event" occurs when a home-owner sells (date of sale) their property. We assume that when a home-owner sells, they do so in order to move to another neighbourhood, though the reason for moving from a property can in reality be multi-faceted[7]. We estimate an Accelerated Failure Time (AFT) model, where the duration of ownership/residence in the property—known as "survival time" ($S_t$)—is estimated as a function of covariates (as opposed to *hazard* models which estimate the degree of "risk" or the likelihood of an event occurring). Further details of our choice of model (loglogistic estimation) are set out in the Supplemental Material.

**Focus on Deprived Areas**

There is considerable evidence of the interaction between poverty/deprivation and ethnic group – particularly among those of Asian Pakistani ethnic origin (Jivraj and Khan, 2013; Finney and Simpson, 2009; Scottish Government, 2011). To avoid incumbering the model with numerous complex interactions between ethnic groups and multiple deprivation (which we found made the model difficult to interpret) we present a model in Table 1 that controls for this interaction by restricting the study to the 40% most deprived output areas of Glasgow City – output areas in quintiles 4 & 5 of the Scottish Index of Multiple Deprivation 2016 (The Scottish Government, 2016).

Core variables used in the models include:

**Property-level attributes and Individual buyer/seller variables:**

- Ethnic name-group of resident owner-occupier – imputed using name-matching;
- Ethnic name-group of inmoving property purchaser – imputed using name-matching;
- Relative property purchase price = original purchase price as a proportion of all sales in the wider Glasgow postcode area for the financial year in which the purchase was made. In the absence of data on household income and occupational class, we included *relative* property

[7] Relationship breakdown, job change, stage of life, family connections, financial change of circumstance etc etc

price at the time of purchase as a proxy for socioeconomic position of the home-owner/purchaser. Although the measure does not capture short term fluctuations in income, it may be a better measure of permanent income and the accumulated wealth over the lifecourse.

- Property type (flat versus house/other) – constructed from Register of Scotland address data.

**Spatial Units**

- Inflows of homeowners are measured at the *micro-neighbourhood* level, defined as the 50 metre radius around each individual property.
- Neighbourhood attribute variables (proportions of different ethnic groups, and proportions in age ranges: 25-34; 35-49; 50-64 & 65+) are included using data from the 2011 Scottish Census at *output area* (OA) level. OAs typically comprise around 105 people in Glasgow City Local Authority, the boundaries of which delineate our overall study area.
- We also include information from the Scottish Index of Multiple Deprivation (Scottish Government, 2016), which is available at the level of *datazone*. Datazones have 500-1,000 people.[8]

**Time-varying variables**

- *Market buoyancy* – computed as the monthly change in mean property price by council area based of register of Scotland residential property data[9] (Registers of Scotland, 2016). Each mean was calculated from the previous 12-months data from that specific month in that council area.[10]
- *Time-lagged Cumulative in-moves by imputed ethnic name-group* – computed as the number of in-movers who purchased properties at addresses within 50 metres of each owner-occupied property, summed over time (month and year). This variable was lagged for a 12 month period to allow for the fact that any related property sale by the pre-existing home-owner may take time to arrange. Separate cumulative indicators were created for each ethnic name-group, and the proportion of inmovers by ethnic name-group as a proportion of all home-buyers

[8] http://www.gov.scot/Publications/2005/02/20697/52626

[9] https://www.ros.gov.uk/property-data/property-statistics/quarterly-house-price-statistics

[10] Average rolling mean prices could not be estimated for properties bought in 2003 as RoS monthly property price statistics are only available from April 2003 and no substitute was found from 2002-3.

within 50 metres of the incumbent home-owner. We also included squared versions of these variables to take into account the possibility of non-linearity—we are particularly interested in whether the effect of inmovers may have a dimminishing or increasing effect as the number of inmovers from a particular ethnic group increases.

There is no indication of landlord status in the RoS data. Therefore in order to try and control for change in tenure from ownership to private-renting following the global recession at the small area level the following two variables were created. As this model could only be run on data up to 2011 it is presented in Supplementary Material.

- Annual change in the *proportion of owner-occupied housing* at output area level was estimated in equal increments from the difference in rates between the 2001 and 2011 census using spatially harmonised units. This was added as a control variable and was found to be positively correlated with the area rates of 25-34 year olds and 50-64 year olds.

- The annual *change from owner-occupation to private-rental tenure* at output area level was also estimated for the same period to try and allow for the significant amount of tenurial change that occurred during this period due to changes in housing finance.

**Control Variables**

Different parts of the city will serve different functions and so, even in the absence of homophily/heterophobia, we are likely to see different rates of turnover and average lengths of stay across neighbourhoods. To control for these effects, we include variables to account for (1) geographical variation in market buoyancy (defined above); (2) the affluence of the household which, given the absence of income data, is based on the purchase price of the house relative to average house prices at that time in our study area; and (3) the fact that particular types of dwellings (such as flats) are associated with particular life phases and lifestyles which mean that some dwelling types will tend to have shorter residencies and higher turnover than others. Market buoyancy may be particularly important in determining length of stay as a number of studies have shown that homeowners are less likely to sell when prices have been falling due to loss aversion (Genesove and Mayer 2001) and negative equity (Stein 1995). We also include x and y co-ordinates of all properties in order to attempt to control for unobserved spatial fixed effects (after Wu, 2012). Interactions with x and y coordinates were also tested but were not found to be significant.

**Ethnic Shares at the Output Area Level**

Some studies have suggested that while some people prefer to live among co-nationals of similar ethnicity (e.g. majority white Scot/British neighbourhoods), others may prefer to live in more ethnically diverse neighbourhoods (Finney and Simpson, 2009). We are therefore interested in whether there are different responses to inflows of ethnic "others" by white British owner-occupiers within varying contexts of ethnic diversity. Glasgow does not have a high proportion of diversity with regards to BME communities compared with, say, many North American cities. Only a handful of output areas in Glasgow City have non-white rates of 50% or more. Due to the small sample sizes for separate ethnic groups/communities, separate regressions were run for output areas according to the proportion of (all) non-white residents using the following thresholds: < 1%; 1-5%; 5-10%; 10-20%; > 20% and > 27% non-white population. By running separate models on each of these neighbourhood types, we are able to see whether coefficients vary according to the degree of white predominance.

## 5. Results

Table 1 presents the exponentiated coefficients from all 5 models—we refer to these as "coefficients" in the commentary below. We use exponentiated coefficients because, in Accelerated Failure Time (AFT) models, they can be interpreted as time ratios, which measure the degree to which time to the event is speeded up (accelerated) or slowed down (decelerated) by a particular explanatory variable. Our interest is in the length of stay of property-owners, which we assume comes to an end when the property is sold. Suppose, for example, the exponentiated coefficient for variable *X* has a value of 0.2. This means that a unit increase in X leads to the length of stay being just 20% of what it was before the unit increase in X.

Due to the large number of control variables included in the models, Table 1 does not show results for all of the coefficients from the estimations. Rather, we report those of most interest and those that have consistently significant coefficients across three or more of the models. A complete set of results and commentary are provided in the Supplementary Material, which also includes a "linear" version of the model (i.e. one which omits the squared terms) and a version which includes variables capturing neighbourhood tenure mix.

**Results for Control variables – market buoyancy, relative price, house type**

We find that the length of stay in a particular property plays an important role in a home-owner's decision to sell their property. The constant term in Table 1 represents the mean length of home-ownership spell among white British sellers from 2003-2014. The strongest effect of duration of stay for white British Glaswegian property-owners in these more deprived areas is estimated at 395 months for neighbourhoods with the highest proportion of white residents (>99% white; <1% non-white, Model 1), see Table 1. This long-term estimate includes cases where buyers did not sell their property within the study period (right-hand censored). Note that the effect of the intercept can be largely offset once multiplied by the coefficients.

The coefficient on relative purchase price is significantly greater than one in models 2 to 5 suggesting that home-owners remained longer in their properties the higher the price originally paid for the property relative to average prices at the time. This likely reflects greater financial investment – which may be related to age and stage of the life cycle - potentially indicating an intention to remain in the property for longer (e.g. by buying into a more desirable area). It is also possible that higher purchase price reflects investment in larger, multi-roomed properties, which may then be rented out to families or multiple households. Landlords making a profit from the growing private rented sector may own for longer durations. It may also capture the impact of paying over the odds which would heighten the effect of loss aversion (Genesove and Mayer 2001). Note that the coefficient on the squared value of the relative price variable was less than one, indicating that the effect diminishes for higher relative house prices. The coefficient on the market buoyancy variable is always less than one, which suggests that people are more likely to move when prices are rising, which is consistent with the mortgage lock-in (Stein 1995) and loss aversion (Genesove and Mayer 2001) literatures.

The coefficient on flats ranged between 0.8 and 0.92. This suggests that homeowner length of stay in flats tends to be around 80% to 90% of that in houses, regardless of neighbourhood ethnic mix (see Models 1, 3 and 6). Variation in property type across areas is likely to be associated with age and stage of life (younger single people and childless couples purchasing flats versus families with children in houses for example).

**Impact of Inmovers from Different Ethnic Name Categories**

As discussed above, it should be noted that the ethnic name categorisation is better for some ethnic-cultural-linguistic groups than for others. For the purpose of interpretation it is assumed here that the majority-core name-group classification for the most populous broad categories in Glasgow Central hold good – i.e. white British including Scots, white Irish, white other e.g. European, Indian, Pakistani, Chinese and "non-white other" (primarily Muslim).

In terms of the impact of different ethnic groups on length of stay, it's worth repeating that we would expect any source of neighbourhood churn – change to the residents due to either in-moves or out-moves – to increase the probability of moving of the remaining residents, other things being equal. In-moves typically displace existing residents, and these outmoves potentially represent the loss of close contact with a longstanding neighbour and loosening of attachment to the neighbourhood. Hipp (2010), for example, found unit turnover at the sub-neighbourhood micro-level to be associated with neighbourhood dissatisfaction. As such, we would expect in-moves from white British name groups to have an accelerant effect even in neighbourhoods that are predominantly white British.

And this is what we find. Inmoves by white British named purchasers are found to be associated with some acceleration of outmoves (coefficient of 0.6-0.75 suggesting a significant reduction in time to sale in models 1 to 5). Some of this "churn" may be associated with the change in tenure from ownership to private-rented tenure to 2011. When we include the rate of ownership at output area level and the rate of change from owned to private-rented tenure to account for this (see Table S4 in Supplementary Material), the coefficient has a similar value (0.62 and 0.73) but is only significant in models 2 and 5.

The most consistent name group effect in Table 1 is with respect to in-movers who have Pakistani names who have a large and statistically significant acceleration effect – shortening the length of stay of incumbent owners with white British names – across all 6 neighbourhood types (Models 1 to 6). However, the coefficient on the squared term is significantly greater than one in Models 1, 2, 4 and 6, which suggests the acceleration effect on white British owners diminishes quite rapidly as more movers with Pakistani names enter the micro-neighbourhood. Inmovers from Indian name-groups also seem to accelerate out-moves from white British owners, but the effect is less pronounced and only statistically significant in models 1, 4 and 6.

A high accelerant coefficient (0.05 * ownership length) was found for the 'non-white other' name group, 79% of whom have Muslim names, in areas with low rates (1-5%) of non-white residents. However, these areas were also characterised by high rates of younger people who move more

frequently, with evidence of change from owner-occupation to the rental sector. The accelerant factor associated with in-movers from non-white other name-groups was far lower in areas with the higher proportions of non-white residents. Note that when we remove quadratic terms to simplify comparison of the overall effect of each variable (Table S6 in Supplementary Material) we find that the inmovers with 'non-white other' names tended to have the largest accelerant effect of any ethnic name group (average coefficient across models = 0.46), followed by inmovers with white Irish names (average coefficient across models = 0.57), and Pakistani names (average coefficient across models =0.62).

## 6. Conclusion

We have reported results from a survival model of the length of stay of home-owners with names classified as white British in the 40% most deprived output areas in the Glasgow City local authority area. The analysis was based on properties which were transacted (bought or sold) during the study period 2003 to 2014. Our goal was to understand the drivers of ownership duration for owners who had white British (including Scots) names. We included control variables to account for homeowner affluence (using relative original purchase price as a proxy), housing type and market buoyancy. Our primary aim was to estimate the potential impact of buyers from particular ethnic name-groups moving within a 50 metre radius of existing white British home-owners during the previous year. Controlling for housing market variables and area-level tenure, we found the most consistent increase in the propensity of owners with white British names to sell was associated with in-moving purchasers that had names of Pakistani origin. This may indicate negative attitudes to this—primarily Muslim—ethnic group. We also found evidence of non-linearity in this relationship: the acceleration effect of the Pakistani name group on white British/Scottish homeowners diminishes with each additional inmover from the Pakistani name group. Although less consistent across neighbourhood types, the largest overall accelerant effects[11] were associated with inmovers with 'non-white other' names, which are again, of mainly Muslim origin.

It should be noted that these findings apply only to *outmigrating* home-owners who *sold* properties during the study period. Homeowners who purchased before 2003 and did not sell until after 2011 are

[11] Based on a "linear" version of the model – i.e. with quadratic terms omitted—to simplify estimation of the "overall" effect.

not included in our data. Note also that we have assumed that property owners are owner occupiers. While for the majority of cases this is likely to true (we excluded properties identified in the data as commercial landlords), it is possible that a minority of transactions reflect landlord sales or purchases.[12] It is conceivable, therefore, that our results are also picking up on the impact of landlord purchases rather than inmoves from owner occupiers. Although the private rental sector in Scotland remains small by international standards, it doubled in relative size during the course of our study period, from 7.6% in 20013 to 14.8% in 2014.[13] So, it is possible that property purchases by landlords from particular ethnic name groups have an accelerant (decelerant) effect that has caused us to overestimate (underestimate) the impact of *owneroccupiers* from those name groups. Finding ways to isolate landlord effects would therefore be a useful avenue for future work, particularly given the growing importance of the private rented sector.

There are various other ways our research could be extended. Having a more complete picture in every time period of the proportion of owner-occupiers in each neighbourhood and micro-neighbourhood would help contextualise the proportion of those selling within the whole area. Data on the age and stage of life of buyers and sellers would also be valuable in helping to distinguish homophily effects from other factors. Similarly, knowing country of birth of inmovers would help researchers identify whether there is a different effect for first vs second generation migrants. Data permitting, it would be worthwhile extending the analysis to other tenures and income groups. We have focussed on the impact of inmovers on white British homeowners but what about the impact on other homeowners and renters? While Wallace (2016) found that half of all people living in poverty were homeowners, owner occupiers may nevertheless be atypical of those living in deprived neighbourhoods. We would be interested, therefore, in learning how the effects vary across income groups and across different ethnicities. We have focussed on deprived neighbourhoods but what about more affluent areas? And how typical are our results of other cities and time periods? Most of these questions are beyond the scope of our current dataset, and so alternative data solutions would need to be found.

One of the novel contributions of our work has been to develop a dataset that permits estimation of a spatially fine-grained survival model with time-varying covariates. Whilst the data has limitations, it

[12] This is because of the predominance of small private landlords in Scotland which are less likely to be flagged up in our data as commercial companies.

[13] https://www.gov.scot/Topics/Statistics/Browse/Housing-Regeneration/TrendDatat

potentially opens up many new avenues for further research and methodological innovation that would broaden and enrich our understanding of ethnic mover dynamics. For example, it may be possible to exploit recent innovations in Bayesian estimation to develop a spatial-multilevel survival model of duration of stay (e.g. extending the Bayesian spatial-multilevel modelling approach of Dong *et al.* 2016). This would allow researchers to estimate a survival model that allows both for the hierarchical spatial structure of the data and for spatial correlation within and between areal units. A spatial-multilevel approach could also estimate spatial variation in the relationship between the proportion of neighbouring in-movers around individual households and the output area rate of the same ethnic group. It would also be useful to test the impact on the results of adjusting this threshold, though given the complexity of computing cumulative inflows of different ethnic name groups in each micro-neighbourhood this would not be a trivial task. It might also be possible to use linkage to older house transaction records to estimate the ethnicity of previous occupants, which would allow us to examine the impact of the *change* in ethnicity of the occupier of individual dwellings in the micro neighbourhood. It would also be worthwhile following up a sample of out-migrants to find out where they've moved to—do they move to less diverse neighbourhoods, for example? However, such analysis would only be feasible for those who stayed in Scotland and immediately purchased another property (matches could then be made on the basis of names and dates of sale/purchase).

Unobserved heterogeneity of individual characteristics such as age, gender, country of birth etc is another limitation of the current model. However, our novel dataset offers the possibility of imputing gender for many names using name-matching lists for some, but not all ethnicities. Using ethnically diverse British birth registration data could also be explored. A much wider range of variables could be added through data linkage with Census based data, such as the Scottish Longitudinal Study, which would yeild further information about individual and household characteristics. Further research with additional data on individual home-owner age and family type would also be required to identify population replacement and other factors such as "aspirational" moves and the role of other tenures.

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**Table 1.** Survival Model for Homeowners with White British Names in Deprived Neighbourhoods (Quintiles 4 & 5) by 2011 Share of Non-white Population

| | 0 - 1% non-white | 1 – 5% non-white | 5 – 10% non-white | 10-20% non-white | >20% non-white | >27% non-white |
|---|---|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
| **Variables in the Model:** | Time ratio | Time ratio | Time ratio | Time ratio | Time ratio | Time ratio |
| Market buoyancy | 0.62*** | 0.65*** | | | | 0.48** |
| Relative price | | 1.97*** | 1.29*** | 1.68*** | 1.16*** | 1.65*** |
| Relative price$^2$ | | 0.85*** | | 0.88*** | | 0.91*** |
| Flat (ref = house) | 0.83*** | | 0.92* | | | 0.8** |
| Cumulative inmoves: | | | | | | |
| Proportion white Brits | 0.63*** | 0.603*** | 0.63*** | 0.60*** | 0.75*** | |
| Prop'n white Irish desc't | 0.72** | 0.630*** | 0.56*** | 0.23*** | 0.49*** | 0.5*** |
| Prop'n Indian descent | 0.38*** | | | 0.42*** | | 4.7** |
| Prop'n Pakistani descent | 0.17** | 0.2*** | 0.58*** | 0.12*** | 0.15*** | 0.16*** |
| Propotion Pakistani$^2$ | 5.75* | 6.02*** | | 25.6*** | | 5.82*** |
| Prop'n non-white other | | 0.04*** | | 0.52*** | 0.50*** | 0.17*** |
| Prop'n non-white other$^2$ | | 26.5*** | | | | 5.4** |
| 2011 OA Share of: | | | | | | |
| • white other | | | | 0.26** | | |
| • Chinese | | | | 4.35* | | |
| Constant term | 395*** | 443*** | 205*** | 205*** | 235*** | 298*** |
| Model Statistics: | | | | | | |
| Constant | 1.32*** | 1.34*** | 1.37*** | 1.42*** | 1.41*** | 1.40*** |
| Nr of months in model | 396366 | 624987 | 452979 | 432978 | 291338 | 139571 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Nr of Property Sales | 1277 | 2316 | 1702 | 1710 | 1237 | 603 |