Status Discrepancy as a Driver of Residential Mobility: Evidence from Oslo

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Abstract

Planners have long advocated for "social mix" in neighborhoods without clear evidence that such mixing is stable over time. Indeed, if some groups perceive an intolerable discrepancy between their own economic status and that of their neighbors they may be leave the neighborhood, thereby frustrating planners' goals. We conduct a longitudinal analysis of Oslo household intra-metropolitan residential mobility employing a panel model with fixed effects for both households and neighborhoods and interactions for status groups, which provides estimates of plausibly causal effects. We theoretically and empirically identify two dimensions of intra-neighborhood status discrepancy that prove important predictors of leaving a neighborhood, though impacts differ strongly depending on household income status as defined by Oslo-wide standards. More extreme relative standing above the neighborhood median income promotes exit (especially for low- and middle-status households), suggesting a status signaling motive. For high-status households, being below the median neighborhood income proves influential for out-mobility, suggesting a relative deprivation motive. The overall status composition of the neighborhood is a powerful mobility influence for both low- and high-status households, suggesting a strong preference for homophily. Results imply that policy-generated introduction of low-status households will encourage the exit of high- and, to a lesser degree, middle-status neighbors.

Abstract: 200 words

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The residential locations of different groups of households distinguished by economic status have been of longstanding interest, given their centrality in shaping a wide range of phenomena including segregation, social mobility, economic development, neighborhood effects and local fiscal capacity (Magnusson Turner and Wessel, 2013; Galster and Hedman, 2014). The market and non-market forces that lead people to leave certain locations and end up in others—the determinants of residential mobility—have thus been salient foci of research by many disciplines (Clark and Dieleman, 1996).

Scholarly interest in the determinants of residential mobility has in recent decades been augmented with the interest of policymakers who see neighborhood economic diversity as desirable. This goal of "social mix" undergirds a rich international palette of planning initiatives that have generated considerable controversy (see the reviews in Galster, 2013 and Galster and Friedrichs, 2015) and we do not engage with this debate here. Rather, we investigate empirically an implicit question at the heart of most social mix strategies: Will particular economic classes of residents tolerate this mix or will they move out, thereby frustrating policy makers' intentions?[i]

In particular, we investigate the degree to which *status discrepancies*—differences between an individual household's own economic position ("status" hereafter) and the aggregate economic characteristics of the neighborhood—strongly predict whether the household will move out of the neighborhood. We employ an annual longitudinal panel of social register data for individual households in Oslo, Norway for the period 2010-2013 for estimating our fixed-effect model of mobility, which controls for a wide variety of other household and contextual characteristics that may influence mobility. Oslo is a particularly apt venue for our analysis since social housing plays a relatively minor role in household allocations; rather,

mobility is primarily governed by preferences and incomes playing out in a market context. Our research questions are:

1. To what degree does status discrepancy affect the propensity of a household to move out of the neighborhood, independent of changes in their own household?
2. Are the impacts different depending on whether the household is above or below the median status of the neighborhood?
3. Does the answer to (1) depend on whether status discrepancy is measured as relative differences between household status and neighborhood median status or as absolute concentrations of other status groups in the neighborhood?
4. Do the answers to (1), (2) and (3) depend on the status of the household?

Theories of Intra-Urban Residential Mobility and Status Discrepancy

Four theories of voluntary intra-urban residential mobility have competed in the scholarly literature for decades, though they typically share many features in common. The first, which we label "life course" theory, posits that households often move in a predictable pattern across their lifetimes (Rossi, 1955; Clark and Dieleman, 1996). Households are seen as evaluating their current residential situations in light of their current needs associated with their particular stages in life: single; married without children; married with young children; etc. The *status quo* is typically deemed no longer suitable when a new life stage emerges or "trigger events" (such as change in job location) occur, whereupon mobility transpires. Features and size of the dwelling are typically seen as crucial in these situations, neighborhood socioeconomic context less so.

The second, which we label "stress" theory, takes the view that households assess whether to move after comparing the relative satisfaction associated with current and potential residential environments (Wolpert, 1966; Brown and Moore, 1970). Stress is defined as the

difference between current and potential residential satisfaction, and is seen as being directly related to the probability of moving.

The third, which we label the "dissatisfaction" theory, posits that mobility is a two-stage process triggered by absolute dissatisfaction (Speare, Goldstein and Frey, 1975). During the initial stage, households evaluate salient aspects of the current residential environment in light of their needs and aspirations, yielding a certain absolute degree of "residential dissatisfaction." If sufficient dissatisfaction is registered the household develops a desire to move and enters into the second stage of the process, which involves actively gathering information to assess alternative residential locations. They will make the decision to move if they can find a financially feasible alternative that prospectively offers relief from their dissatisfaction.

The fourth, which we label "disequilibrium," posits that households attempt to maximize their well-being by consuming an "optimal" bundle of residential (dwelling and neighborhood) attributes (Quigley and Weinberg, 1977).[ii] Households may not currently reside in their optimal bundle (i.e., be in disequilibrium) because family or residential circumstances may have changed since the original point of in-moving and/or other, superior market opportunities may have arisen subsequently. The probability of moving out is seen as being directly related to the degree of such disequilibrium between their current and prospective feasible residential options, and inversely related to housing market search and moving costs.

Only from the perspective of the life-course theory should status discrepancy matter little for mobility once intra-household changes are controlled. From the perspectives of the other three theories, a household is more likely to move out if it finds itself in a stressful, dissatisfying, disequilibrium context due to status discrepancies.

Of course, none of these mobility theories provide any guidance about which contexts relating individual and neighborhood socioeconomic status (SES) are likely to produce these mobility-inducing reactions. Three potential (and contradictory) preferences can be identified in the theoretical literature. First, from a neoclassical consumption perspective, households wish

to have an ever-larger share of their own SES group as neighbors, a preference for *homophily* (McPherson, Smith-Lovin and Cook, 2001). Second, from a behavioral economics perspective of reference consumption, households may wish to be in the upper tail of the neighborhood's income distribution so that they do not feel *relative deprivation* (Runciman, 1966). Third, an alternative reference consumption perspective is that households may wish to *signal* their achieved status by living in the most expensive neighborhood they can afford, even if it means being in the lower tail of the neighborhood's income distribution (Marsh and Gibb, 2011). As for constraints, all mobility theories imply that lower-income households may be less likely to move in response to a stressful, dissatisfying, disequilibrium context produced by status discrepancies because their options for finding superior accommodations will be more financially circumscribed.

The foregoing theoretical discussion provides two clear implications for empirical modeling: alternative measures of status discrepancy and group-contingent relationships (i.e., interaction effects). Homophily preferences should respond to the percentage of one's own SES group residing in the neighborhood, whereas both relative deprivation and status signaling preferences should respond to the individual household's position in the neighborhood income distribution, with asymmetric reactions to being above- and below-median. Finally, the ability to move in response to whatever form of status discrepancy is present will differ by household income. All of these implications will inform our model below.

Four hypotheses follow from this theoretical discussion. A greater probability of a household moving out of a neighborhood will be observed when:

H_{O1}: There are higher percentages of neighbors in different income classes from one's own

H_{O2}: Household income exceeds neighborhood median income by a greater amount

H_{O3}: Household income falls short of neighborhood median income by a greater amount

and

H_{O4}: The relationships in H_{O1}, H_{O2} and H_{O3} will be weaker for lower-income households

Neighborhood Economic Status Characteristics and Household Out-Migration: The Empirical Literature

Despite the large body of international empirical scholarship related to why people move, there have been few multivariate statistical studies that address the potential role played by the economic composition of the neighborhood and their conclusions are inconsistent.[iii] Some studies suggested that neighborhood characteristics as a group explained a relatively small proportion of mobility, e.g., Newman and Duncan (1979), Clark and Onaka (1983), Böheim and Taylor (2002), Kearns and Parkes (2005) and Clark and Ledwith (2006). Yet, other studies found that greater shares of lower- status neighbors intensified outmigration (Harris, 1999; Quillian, 1999; Feijten and van Ham, 2009; Nordvik and Osland, 2016). Unfortunately, direct measures of individual household's status discrepancies were not employed,[iv] nor were models tested that allowed different-status households to react differently to status discrepancies. Moreover, this literature raises serious methodological concerns (Clark and Onaka, 1983; Winstanley, Thorns and Perkins, 2002), as we amplify below.

In sum, past empirical literature has provided at best only weak, inconsistent indications that economic status discrepancies in a neighborhood would generate much out-mobility. This conclusion recently changed, however, with the publication of Musterd et al.'s (2016) analysis based on Dutch panel data for four major cities, the one statistically rigorous mobility study to our knowledge that has measured economic dissimilarities among neighbors directly. Musterd et al.'s (2016) well-controlled analysis of mobility by those aged 25-48 demonstrated that absolute differences between one's own income and the median income of the neighborhood were associated with a greatly enhanced probability of moving out, regardless of whether the individual was above or below the median, though such status discrepancies were more

powerful predictors for the latter. Taken at face value, these results do not bode well for the stability of economically mixed neighborhoods.

As provocative and important as the Musterd et al.'s (2016) results are for planners, the specter of geographic selection bias lurks as a threat to causal inference. Their model may not completely control for uncontrolled individual characteristics (such as preferences for neighborhood diversity) that may affect both what sorts of neighborhoods they will be observed residing in and what their mobility response may be to any status discrepancies, thereby potentially yielding biased coefficients. As illustration, if those strongly preferring diversity and those strongly preferring homogeneity sort themselves into diverse and homogenous neighborhoods before the period of analysis, their observed subsequent out-mobility behavior may appear unrelated to the cross-sectional variation in neighborhood diversity. Moreover, important questions for planners remain regarding the generality, homogeneity and robustness of Musterd et al.'s results. Do they persist outside of the tightly-regulated, social-housing dominated market context of the Netherlands? Is the mobility response to status discrepancy consistent across status groups? Is the predictive power of status discrepancy similar when it is measured as differences between household status and neighborhood median status or as concentrations of other status groups in the neighborhood? Answering these questions is vital if efficacious plans for neighborhood social mix are to be instituted.

By answering these questions, our work contributes to the literature on residential mobility and planning for social mix in three ways. First, we test the generality of the Musterd et al.'s results by analyzing social register data from Oslo, Norway for the period 2010 to 2013. Unlike the Netherlands, Norway is a much less regulated housing market wherein over 80% of the households are owner-occupants. Second, we assess the degree to which different income groups respond differently to status discrepancies through the use of interaction effects. Third, we provide estimates that more convincingly reflect causal relationships. We address potential geographic selection bias with a household fixed effect analysis of mobility that is longitudinal in

nature. Analogously, we employ neighborhood fixed effects to reduce the chances of omitted variables bias.

Data and Empirical Approach

Data about Oslo Households and Neighborhoods

Our study is focused on Oslo, the capital of Norway, which has experienced increasing amounts of economic and ethnic segregation (Magnusson Turner and Wessel, 2013; Wessel, 2015). We use a unique and comprehensive longitudinal database with annual economic, demographic and geographic information for all individuals who lived consistently in Oslo during the period January 1, 2011 to December 31, 2013. The data are gathered from several national registers under the control of Statistics Norway (Statistisk sentralbyrå), the Directorate of Taxes (Skatteetaten) and the Norwegian Labor and Welfare Administration (NAV).

We identified all households residing in the Oslo Municipality during the entire three-year period of our analysis, excluding any who moved into or out of Oslo during the period, so we could focus upon intra-metropolitan mobility. We distinguished single adults (both with and without children), married couples, cohabiting couples and those living in partnerships, and selected the oldest person in each multi-person household as head of household and reference person for the analyses. We limit the sample to households with (one or both) adults in the age range of 25 to 66 years for the entire 2011-2013 period to focus our analysis on those who have likely finished their formal education and are in the labor force. We exclude multi-family and multi-adult households due to the lack of opportunities to identify the household members' interrelationships. We are aware that we are thus excluding some households with immigrant background and youths in collective households.[v] We also exclude households living in institutions.[vi] The resulting dataset is structured as a balanced three-year panel of 146,210 households.

We employ census tracts as our operational definition of neighborhood. The number of tracts in the Municipality of Oslo is 549 but to reduce noise associated with small tracts we merged those with less than 100 households with its nearest neighbor(s) until a minimum size of 100 households was reached.[vii] The final number of neighborhoods in the panel is 485, with 672 households in each, on average.[viii]

Analytical Methods

We model the probability that household i will move out of neighborhood j during year t, $Pr(M)_{it}$, (1=yes; 0=no) as a linear function of both time variant and invariant household and neighborhood characteristics, measured at the end of the prior year t-1 (where t= 2011, 2012, 2013):

$$Pr(M)_{it} = \alpha + \beta[H_{it-1}] + \gamma[H_i] + \theta[N_{jt-1}] + \zeta[N_j] + \chi M_{it-1} \quad \varepsilon \qquad [1]$$

where:

$[H_{it-1}]$ = household i characteristics that can vary over time (e.g., change in income during year t-1; change in coupling status since end t-1)

$[H_i]$ = household i characteristics that do not vary over 2010-2013 (fixed effects) (e.g., country of birth of household head)

$[N_{jt-1}]$ = characteristics of neighborhood j where household resides at end of year t-1 that can vary over time (e.g., status discrepancy)

$[N_j]$ = characteristics of neighborhood j where household resides at end of t-1 that do not vary over time (fixed effects); (e.g., topography)

M_{it-1} = dummy variable indicating household i moved neighborhoods during t-1

ε = a random error term with assumed i.i.d. statistical properties;

Greek letters represent parameters to be estimated.

As noted above, our specification of a longitudinal panel model of mobility offers several statistical advantages. The dual fixed effects $[H_i]$ and $[N_j]$ reduce the chances that our causal

inferences will be weakened by geographic selection based on unobserved household characteristics and omitted variables bias based on unobserved neighborhood characteristics, respectively. In this specification, the key parameters β and θ are identified by within-household and within-neighborhood variations over time in $[H_i]$ and $[N_j]$, respectively, which are substantial given our large sample size. Because we control for changes in household disposable income we can interpret θ as the impact of *exogenously* generated changes in the status of neighbors on the household's probability of moving out, analogous to what might be generated by a social mix policy.

We estimate the parameters of [1] using Stata's XTREG routine, with standard errors clustered at the neighborhood level since we have multiple household observations from the same neighborhood. Preliminary tests using cross-sectional regressions for each year indicated that multicollinearity was not present in our model.

Operationalizing Status Discrepancy

Our mobility predictor of central focus is *status discrepancy:* the difference between an individual household's own economic status and aggregate measures of the neighborhood's status. As our measure of status we employ household disposable income, defined in the Norwegian social registers as earnings, income from self-employment and capital, and cash transfers, summed over all household members, less taxes paid.[ix] For each year in our panel we observe each household's disposable income and simply aggregate such incomes for *all* households for each neighborhood to obtain the neighborhood-wide statistics, which we employ as our measure of neighborhood status.[x]

Recall from theory that homophily preferences should respond to the percentage of one's own SES group residing in the neighborhood, whereas both relative deprivation and status signaling preferences should respond to the individual household's position in the neighborhood income distribution, with asymmetric reactions to being above- and below-

median. We therefore employ two measures of status discrepancy: (1) the arithmetic difference between household and neighborhood median disposable incomes and (2) concentrations of other income groups besides one's own residing in the neighborhood. In the latter formulation, we specify three income groups based on deciles of the Oslo municipality's income distribution in each analysis year: lowest three deciles ("low status"); middle four deciles ("middle status"); and highest three deciles ("high status").[xi]

On average across our panel, households with disposable incomes above their neighborhood's median have a mean status discrepancy of 150,000 Norwegian *krone* (1 NOK = $.12 US and Euro .09); households with disposable incomes below their neighborhood's median have a mean status discrepancy of 53,000 NOK; see Appendix Table A for details. Each relative status group resides in neighborhoods that have disproportionate shares of their own group, on average. The average low- status (bottom 30% in disposable income) household lives in a neighborhood with 34% low-, 41% middle- and 25% high-status households. By contrast, the average high- status (top 30% in disposable income) household lives in a neighborhood with 26% low-, 39% middle- and 35% high-status households; see Appendix Table B.

Our two formulations of discrepancy are distinct conceptually and empirically. The first considers the individual household's status position relative to the neighborhood, regardless of how absolutely low- or high-status the neighborhood is. The second considers the individual household's status in the neighborhood relative to groups determined by their standing in the Oslo status hierarchy. The bivariate correlations between the two formulations range from -.44 to +.48, depending on whether low, middle or high status households are being considered, suggesting that they indeed measure distinctive dimensions of status discrepancies in Oslo.

Our measures of status discrepancy are related to but distinct from the well-known concept of *social distance*. The latter is a concept related to the neighborhood composition as a whole, and measures the diversity among neighbors on a number of demographic, economic

and other domains; the larger the differences across a larger number of domains, the greater the social distance in the neighborhood (Hipp, 2010; Hipp and Boessen, 2012). By contrast, our measures are constructed for individual households, not aggregated for the entire neighborhood, and focus on only one, socio-economic domain of difference.

Operationalizing Residential Mobility

In our study we model whether between January 1 of one year and the next the household's neighborhood location is different, as recorded in the population register (i.e., dummy dependent variable =1 if moved). We do not consider intra-neighborhood moves here, nor those that take households out of the Oslo municipality (including international). We will model over a three-year panel the probability that the household changes Oslo neighborhoods during the subsequent year, based on personal and neighborhood characteristics measured during the prior year. In any given year, 10% of sample households changed neighborhoods within Oslo, on average, but this varied substantially across status groups: 13.9%, 10.6% and 8.0% of low-, middle- and high-income households, respectively, changed neighborhoods in any given year. The probabilities of moving at least once during our panel were 27% overall and 32%, 27% and 23% of low-, middle-and high-income households, respectively, so we are confident we have adequate variation to model.

Operationalizing other Covariates of Residential Mobility

Additional covariates in our mobility model are presented in Appendix Table C; they correspond to demographic, economic and contextual characteristics that prior literature has found predictive. Note many are measured as changes in employment or household conditions during the prior year, since we expect such changes (as opposed to states) to be more predictive of subsequent mobility. Moreover, because we employ fixed effects (see below), it is redundant to control for household head characteristics that are time-invariant, like gender,

national background, etc. Time-varying demographic characteristics include age of head, changes in the number and age distribution of children and changes in coupling status. Economic characteristics include educational credentials, changes in employment status and income changes during the prior year (distinguished by amount of positive or negative changes since we expect asymmetric mobility responses). Housing characteristics include tenure and structure type. We include a series of terms that interacts income changes with tenure and structure type since we again expect variations in how income changes will affect moving depending on these other dimensions; for example, a drop in income might force a renter to move to cheaper accommodation but not an owner-occupant. We follow Musterd et al. (2016) in operationalizing a housing cost burden variable measuring the ratio of household income to dwelling value. Finally, we include a dummy denoting whether the household moved during the prior year, as a control for other, time-varying household characteristics that we cannot observe directly. Appendix Table C presents descriptive statistics.

Besides the above covariates, we also include in our model individual household fixed effects and neighborhood fixed effects. The former control for unobserved household characteristics that may lead to geographic selection bias of certain types of households into the observed neighborhoods at the 2010 start of our analysis. The latter control for time invariant (during 2010-2013) aspects of each neighborhood (beyond the time-varying status discrepancies), such as topography, parks, metro stops, reputation, etc. that may affect mobility for everyone in that neighborhood. Their inclusion minimizes the possibility of omitted neighborhood variables biases in our estimates of status discrepancy effects.

Results

Core Model

Results for our core model of annual out-mobility from the neighborhood are presented in the left panel of Table 1. We note that, while virtually all predictors are statistically significant,

the r-squared of the model is low, suggesting that many idiosyncratic variables also affect mobility that we were unable to measure. In interpreting the magnitude of the coefficients recall that sample mean annual mobility probability is 0.10, so a coefficient of 0.0XX represents a XX% change from the mean for a unit change of the predictor in the core model.

The covariates perform in intuitive ways that comport with extant literature. Demographic factors play a vital role. Compared to consistently coupled households, singles are .05 more likely to move, but heads who uncouple and singles who become coupled are .10 and .05 less likely to move during that year. Compared to those with no children, those with children (of any age) are .01 less likely to move and those transitioning from some to no children in the household or vice versa are .03-.04 less likely to move, respectively, but those with a newborn are .02 more likely to move. Household economic circumstances also exhibit strong effects on mobility. Compared to those consistently working during the year, those who consistently do not are .01 more likely to move; those transitioning into or out of work are .07 and .08 more likely to move, respectively. Growth in disposable income increases the probability of moving the following year, whereas income decline has the opposite impact. These effects are mediated somewhat by tenure and dwelling type, however. Households in multifamily dwellings are more likely to move out in response to a gain in income than those residing in other dwelling types. Owner-occupiers are somewhat more likely to move than renters, though we attribute this result to the social rented sector in Oslo. Those living in homes with higher values relative to household income are more likely to move. Those residing in multifamily housing were considerably more likely to move than those living in two-family flats, but were less likely to move than residents in single-family or terraced structures. Finally, a move in the prior year raised the probability of moving again in the given year by a substantial .43, suggesting that this variable indeed is serving as a proxy for unmeasured characteristics of highly unstable households.

[Table 1 here]

Of more relevance to our study, both measures of status discrepancy consistently predict more mobility from the neighborhood.[xii] Table 1 shows that, controlling for the overall status composition of the neighborhood, greater discrepancy (in either direction) between one's individual disposable income relative to the neighborhood median disposable income is a nontrivial predictor of their leaving the neighborhood during the next year, thus supporting H_{O2} and H_{O3}. The magnitude of the relationship is half as strong when a household is below the neighborhood median compared to an equivalent distance above the median.[xiii] Compared to a household whose income equals the neighborhood median, one whose income is one standard deviation below the median is predicted to have only a .007 higher probability of moving out during the year (representing a 7% increase from sample mean of .10).[xiv] The corresponding estimate for a household with income one standard deviation above the neighborhood median is a more substantial .033 higher probability (33% increase from sample mean).

Relative status in the neighborhood is not the only important aspect of status discrepancy, however. Table 1 shows that higher concentrations of households in the lowest 30% of the Oslo disposable income distribution more strongly predict more out-mobility. A standard-deviation increase in the percentage of low-status households in the neighborhood is predicted to increase the probability of any household leaving the neighborhood during the year by .01, representing a 10% increase from sample mean.[xv] Though the concentration of high status (upper 30% of the Oslo disposable income distribution) households bore no statistically significant relationship to out-mobility in the aggregate, these results are to be treated cautiously since theory strongly indicates that the effects of the concentrations of both low- and high-status neighbors should depend on the status of the household in question. We now turn to that analysis.

Status Interaction Models

We investigate distinct effects across groups by adding interaction variables consisting of the original status discrepancy terms multiplied by dummy variables denoting whether the observed household is low-status or high-status; middle status becomes the excluded reference category. In such a specification, the coefficients of the main effects may be interpreted as the results for the middle-status households; for the other groups the effect is the sum of the coefficients of the main effect and the appropriate interaction term for the group. Results are presented in the right-hand panel of Table 1. To aid in interpreting results we provide graphs plotting separately for low- and high-status groups the varying predicted probabilities of a household moving from the neighborhood (and associated confidence intervals) associated with a variation in the given status discrepancy measure of two standard deviations below and above its mean (see Appendix A); see Figures 1-4.[xvi]

What is immediately apparent is that different status groups do not respond similarly to the same status discrepancy, however measured. Not only the magnitudes but sometimes the directions of implied effects on mobility are distinct across groups.

Consider first mobility responses to household income being above the neighborhood median: for all groups greater discrepancies lead to higher rates of out-migration, thus strongly supporting H_{o2}. Neither low-status nor middle-status households can be statistically distinguished, but high-status households exhibit a distinctive mobility response. Using standard deviation differences observed for each group as a common basis for comparison, results are portrayed in Figure 1. A difference in being two standard deviations greater than the mean discrepancy above neighborhood median and two standard deviations less than this amount is associated with a .05 difference in out-mobility rates for high-status households, representing a substantial 63% change from their mean annual mobility rate of .08. By contrast, the equivalent standardized estimated for low-status households is only .02, representing 14% of their group mean annual mobility rate of .14.[xvii]

[Figure 1 here]

Mobility responses to having one's household income below the neighborhood's median are comparatively weaker for all groups except high-status. There are no statistically significant responses observed for low- or middle-status households, but high-status ones are substantially more likely to move away under these circumstances. Only these results for high-status households support H_{o3}. The comparison in terms of standard deviation differences is portrayed in Figure 2. A difference in being two standard deviations less than the mean discrepancy below neighborhood median and two standard deviations greater than this amount is associated with a .02 difference in out-mobility rates for high-status households, representing a 25% change from their mean annual mobility rate of .08.

[Figure 2 here]

As predicted by theory, greater neighborhood shares of one's own status group predicts less mobility, and greater shares of the most dissimilar status group predict more mobility, for both low- and high-status groups, thus strongly supporting H_{o1}. Recall in interpreting the interaction term coefficients in Table 1 that they indicate the marginal change in the probability of moving out of the neighborhood during the year that is associated with a percentage point increase in the given (low- or high-) status group residing in the neighborhood, and a corresponding percentage point decrease in the middle-status group. Since there are no statistically significant main effects it suggests that only low- and high-status groups are influenced by neighborhood status composition. The comparative degree of influence on a standardized basis is shown in Figures 3 and 4. Figure 3 shows the variation in the probability of moving out of the neighborhood associated with living a neighborhood with a percentage of low-status neighbors two standard deviations below the mean and one with this percentage two standard deviations above the mean; Figure 4 show the equivalent for variations in the percentage of high-status neighbors. Comparing the two Figures it is clear that higher-status households are .13 less likely to move out with the higher of the two shares of their own group hypothetically portrayed, and .17 more likely to move out with the higher of the two shares of the

low-status group, both substantial variations given the group mean mobility rate of .08. Though similar qualitatively, low-status households exhibit somewhat weaker mobility responses here: the comparable differences are .03 and .14, compared to the group mean mobility rate of .14.

[Figures 3, 4 here]

Mobility responses to status discrepancies, however measured, appear weaker for low-status households than for high-status ones. The comparative standardized effects in Figures 1-4 consistently support H_{o4}.[xviii]

Robustness and Heterogeneity Tests

We conducted tests to ensure that our main conclusions were insensitive to a variety of alternative empirical specifications. First, we constrained our analysis sample to households who had stable incomes consistently throughout the panel. Second, we constrained our analysis sample to households who had been owner-occupiers consistently throughout the panel. These tests added additional richness to our analysis and overall strongly confirmed the findings reported above.

Stable Incomes. Even though our models control for prior-year changes in household disposable income and employment status, we wish to test further the degree to which we have indeed isolated mobility in response to *exogenous* changes in the neighborhood potentially producing status discrepancies, not discrepancies produced by household income change. To do so we re-estimate our models for the subsample excluding the 20% of households exhibiting the largest coefficients of variation in disposable income over the 2011-2013 period; see Appendix Table F. We were gratified to observe that for the stable-income subsample, where we can be most confident that we are measuring mobility responses to exogenous changes in neighborhood status composition, the estimates closely parallel those for the full sample reported in Table 1.[xix]

Owner-Occupiers. Mobility responses to status discrepancies may differ on the basis of tenure. Owner-occupiers may be less likely to be forced into a move by rising rents associated with increasing shares of higher-status neighbors, but on the other hand may find it more difficult to sell their homes and move out in situations involving increasing shares of lower-status neighbors. Replication of our core and interactive models for the 47% of our sample who were owner-occupiers consistently during 2011-2013 are presented in Appendix Table G. Comparison of the interactive models for the full sample and for owners reveals some differences but does not alter any main conclusions. Owner-occupiers (of all statuses) are less likely than renters to leave a neighborhood with increasing shares of low-status households, consistent with their higher transaction costs. However, low-status owner-occupiers are more likely than renters to move out when their incomes are above the neighborhood's median, implying that their preferences for status signaling can be sufficient to overcome these transaction costs. Significantly, there is no support for the notion that our results are being driven by renters' involuntary moves, i.e., being priced out of neighborhoods with larger shares of high-status households. On the contrary, low-status renters are less likely to leave such neighborhoods than are low-status homeowners.

Discussion

Homophily, Relative Deprivation, Status Signaling and Moving

Our theoretical discussion earlier indicated that there were three competing hypotheses about how the economic composition of neighborhoods might influence the household's perceived stress/dissatisfaction/disequilibrium: homophily, relative deprivation and status signaling. Homophily implied that a household's probability of moving from the neighborhood would be inversely related to the percentage of neighbors who shared a similar economic status. Relative deprivation implied that a household would be more likely to move the greater the degree to which the household's income was below the median income of the

neighborhood; in the opposite circumstance there would be no effect on mobility. Status signaling implied that a household would be more likely to move the greater the household's income exceeded the median income of the neighborhood, but would be less likely to move to the degree that its income was below the median. Our longitudinal investigation of mobility patterns of Oslo households has provided unqualified support for the homophily claim, but qualified support as well to the relative deprivation and status signaling claims.

Our results provide the strongest support for the homophily hypothesis H_{o1}. Both low- and high-status Oslo households are less likely to move out of neighborhoods where their own group represents a larger share and more likely to move out when larger shares of the extremely different class group are present. These apparent effects are substantively large, especially for high-status households; see Figures 3 and 4. Such clustering by advantaged households is understandable, given that it has been observed in another Oslo-based study to perpetuate class advantages across the generations (Toft and Ljunggren 2015). The basis for homophily among low-status households may be more related to local networks of social, economic, cultural, psychological and institutional support.

By contrast, the relative deprivation hypothesis H_{o3} receives only contingent support from our analysis. Neither low- nor middle-status households exhibited a propensity to leave the neighborhood when their incomes were below the neighborhood median, only high-status ones did. Moreover, the latter relationship clearly is manifested in atypical circumstances: only in extremely well-off neighborhoods can households in the upper 30% of the Oslo income distribution be considered below the median. Nevertheless, it is interesting that our findings counter a conventional wisdom (e.g., Baum, Arthurson and Rickson, 2010) that households prefer to live among relatively higher-status neighbors because it redounds positively on others' perceptions of their own achieved status.

Similarly, the status signaling theory receives only partial support from our analysis. As predicted, as one's income increasingly exceeds the median of one's neighbors the propensity

to leave the neighborhood increases, regardless of status, thereby supporting hypothesis H_{o2}; see Figure 1. Oslo households may believe that their achieved status is degraded in the view of society when the incomes of their neighbors are considerably lower than theirs. They may also believe that their future property value appreciation may be lower in such circumstances, which would explain why this force is even more powerful for owner-occupiers, especially low-status ones (cf. Tables 1 and G). However, the predicted symmetric aspect of this theory—reduced mobility when below median—was not observed, as noted above.

Finally, our analysis provided support for hypothesis H_{o4}; low-status households evince less mobility sensitivity to status discrepancies (however measured; cf. Figures 1-4) than high-status ones. We have taken pains to rule out alternative, spurious explanations for this result, including controlling for housing cost/income burdens, rental status, and unstable incomes. We think the most plausible explanation is that households in the lower 30% of the Oslo income distribution face more binding constraints in securing superior accommodations in neighborhoods in which they would face smaller status discrepancies. Several, not mutually exclusive reasons include: (1) more limited information about alternative dwelling/neighborhood combinations; (2) unwillingness or inability to bear transaction and moving costs; (3) perceived hostility in potential destination neighborhoods; (4) stronger local networks and idiosyncratic institutions that bind them to their current neighborhood; (5) circumscribed locations for social rented housing.

Households' Assessment of their Neighbors' Status

The consistent power of status discrepancy (when measured by disposable income) in our models implies that households possess the ability to assess systematically (if not necessarily without error) the economic status of their neighbors. Our study cannot identify the information they use in forming their assessments, but we presume that they observe how their

neighbors look, behave individually and via social interactions, and what they visibly consume, especially items like clothing, cars, and homes.

Implications for Planning Social Mix

This study was designed to contribute to the aforementioned policy debate about developing neighborhoods with a greater mix of income groups. Ironically for this purpose, Oslo is a city without a longstanding social mix policy; instead, market forces overwhelmingly govern patterns of residential development and occupancy. The only hint of a social mix policy is the municipal intention to spread the limited supply of social housing (approximately four percent of the stock) more evenly across Oslo neighborhoods.

To put one key programmatic concern bluntly: will non-poor households move out in large numbers within a few years if more poor households are introduced into their neighborhoods (presumably by social housing schemes)? Our results provide a cautionary answer. On an encouraging note, we find no evidence that the introduction of low-status households into a neighborhood, all else equal, should lead to the "flight" of middle-status ones (including those who are owner-occupiers and have stable incomes), although such is more likely for high-status households. Less encouragingly, as the median disposable income of the neighborhood was exogenously reduced by the introduction of low-status households, there would be an increase in both middle- and high-status households' out-mobility rates insofar as progressively more of such households would find themselves at greater distances above the neighborhood's median. More specifically, our model suggests that the higher-status residents would be most likely to leave in response to social mixing, all else equal, since they would have the greatest relative status discrepancies and are the most sensitive to a rising share of low-status neighbors.

Of course, a holistic analysis of social mixing implications would require information about in-moving propensities as well. Nevertheless, our findings unambiguously suggest that the exogenous introduction of more low-status households into an average Oslo neighborhood likely will alter its composition via differential out-mobility in such a way that the share of high-status households declines substantially over time. This may be a felicitous outcome from the perspective of less-advantaged households, however. Other Scandinavian-based research (Galster, Andersson and Musterd, 2015) indicates that future income-earning prospects of lower-income individuals are enhanced by greater shares of middle- (but not higher-) income neighbors, perhaps due to the reduced "social distance" between them.

Conclusions, Caveats and Future Directions

Status discrepancy among neighbors' disposable incomes has been a little-explored aspect of the vast literature on intra-metropolitan mobility, despite its central importance to planners who wish to encourage a stable economic mix in neighborhoods. Importance in contemporary public policy discussions. Our longitudinal study of Oslo household mobility suggests that this oversight is unfortunate. We have identified two dimensions of intra-neighborhood status discrepancy that are important predictors of leaving a neighborhood, though the impacts differ strongly depending on the individual household's status as defined by Oslo-wide standards. More extreme relative standing above the neighborhood median promotes exit, suggesting a status signaling motive. For high-status households, being below the median status proves influential for out-mobility, suggesting a relative deprivation motive. The overall status composition of the neighborhood is a powerful mobility influence for both low- and high-status households, suggesting a strong preference for homophily.

We believe that our specification of a panel model with fixed effects for both households and neighborhoods, combined with status-interaction effects, offers an important advance in the

study of residential mobility and provides estimates of plausibly causal effects from status discrepancies. We cannot be certain that all unobserved attributes of neighborhoods and households remain constant from 2010 to 2013, of course, but must assume that those that vary are uncorrelated with status discrepancy. Although our findings are generally consistent with those observed by Musterd et al. (2016) in the Dutch context where social housing is a more significant share of the housing stock than in Oslo, we think it important that comparable tests be conducted in locales with a variety of housing market regimes to insure the generality of our results.

Moreover, the source(s) of why different classes respond differently to status discrepancies warrants further study. We cannot definitively disentangle the sources of our observed inter-class heterogeneity of results, inasmuch as they could be produced by non-mutually exclusive differences in: (1) assessments of neighbors' status; (2) evaluations of those assessments; (3) weights given to preferences for homophily, relative deprivation and status signaling; and/or (4) constraints on mobility.

Our study has focused on status as measured by disposable income, not national origin or immigrant background. Given the complexity of our investigations reported here, we have not delved into the possibility of distinctive mobility reactions to status discrepancy according to ethnic background of the household.[xx] Nor have we investigated the potential for independent or interactive effects on mobility arising from changes in the ethnic composition of neighborhoods, which others have investigated in the Scandinavian context (Schaake, Burgers and Mulder, 2010; Nordvik and Magnusson Turner, 2015). Instead, in the current models we have assumed that the aggregate ethnic composition of the neighborhood remains essentially constant over our three-year panel and thus its influence on mobility is subsumed in the neighborhood fixed effect. Our plan is to extend our panel as newer data become available, thus permitting a richer exploration of these dynamic income-ethnicity interactions on mobility.

Finally, a more complete picture of the role of status discrepancy in shaping intra-metropolitan flows of households can only be painted by consideration of residential destinations, along with origins. Our next phase of research will investigate the degree to which not only leaving one neighborhood but choosing another is influenced by status discrepancy.

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Table 1: Linear Probability Models of Effect of Status Discrepancy on Annual Out-Mobility from Neighborhood

Predictors	Core Model		Interaction Model	
	Coefficient	Std. Error	Coefficient	Std. Error
Difference between Household's Disposable Income and NH median HH disposable income				
Above median	0.0144***	0.0014	0.0459***	0.0029
Below median	0.0079**	0.0024	0.0039	0.0035
Interaction low status HH * difference between HH DI and NH median HH disposable income				
Above median			-0.0333	0.0445
Below median			-0.0090	0.0054
Interaction high status HH * difference between HH DI and NH median HH disposable income				
Above median			-0.0404***	0.0029
Below median			0.0628**	0.0189
Percentage low/high status HH in NH (defined by HH disposable income) – Middle (ref)				
Low status households in the neighborhood (%)	0.0010*	0.0004	-0.0005	0.0005
High status households in the neighborhood (%)	-0.0003	0.0005	0.0007	0.0005
Interaction low status HH * percentage low/high status HH in NH (defined by HH DI) – Middle (ref)				
Low status households in the neighborhood (%)			-0.0006***	0.0002
High status households in the neighborhood (%)			0.0010**	0.0004
Interaction high status HH * percentage low/high status HH in NH (defined by HH DI) – Middle (ref)				
Low status households in the neighborhood (%)			0.0052***	0.0003
High status households in the neighborhood (%)			-0.0026***	0.0002
Age of household head	-0.0008	0.0026	-0.0047	0.0026
Age^2	0.0000	0.0000	0.0000	0.0000
Household type (during a year) - Couple throughout (ref)				
Single throughout	0.0497***	0.0067	0.0693***	0.0066
Single to couple	-0.0468***	0.0060	-0.0453***	0.0059
Couple to single	-0.0961***	0.0076	-0.0741***	0.0075

Household composition (during a year) - No children throughout (ref)				
Children throughout	-0.0111	0.0064	-0.0113	0.0064
No children to children	-0.0361***	0.0075	-0.0359***	0.0075
Children to no children	-0.0260***	0.0067	-0.0241***	0.0068
Children (at end of year) - No children 0 -17 years old (ref)				
Children <= 5 years old	0.0020	0.0057	0.0043	0.0057
Children 6-17 years old	-0.0010	0.0046	0.0005	0.0046
New born child (during a year) - No (ref)				
Yes	0.0137*	0.0057	0.0118*	0.0057
Labor activity (wage earnings during a year) - Active throughout (ref)				
Inactive throughout	0.0064	0.0057	0.0023	0.0057
Inactive to active	0.0666***	0.0063	0.0628***	0.0062
Active to inactive	0.0842***	0.0058	0.0842***	0.0058
Housing tenure (at end of year) - Rental (ref)				
Owner occupiers and co-ops	0.0151***	0.0024	0.0151***	0.0025
Building type (at end of year) - Multifamily (ref)				
Single family	0.0355*	0.0156	0.0349*	0.0156
Two family	-0.1129***	0.0130	-0.1026***	0.0129
Terraced house	0.0345*	0.0146	0.0358*	0.0145
Highest completed education (at the end of year) - Upper secondary school (ref)				
University/ university college <= 3 years	-0.0117	0.0149	-0.0090	0.0148
University/ university college >= 4 years	0.0195	0.0202	0.0183	0.0201
No data	0.0418	0.0224	0.0415	0.0224
Moved during prior year				
Yes	0.4268***	0.0047	0.4227***	0.0047
Change in disposable household income during year prior to move				
Positive change	0.0303***	0.0031	0.0328***	0.0034
Negative change	-0.0218***	0.0038	-0.0206***	0.0032

Income change and tenure type (at end of the year) – Rental (ref)				
Positive change * owner occupiers and co-ops	-0.0014	0.0030	-0.0036	0.0032
Negative change * owner occupiers and co-ops	0.0072	0.0037	0.0043	0.0032
Income change and building type (at end of the year) – Multifamily (ref)				
Positive change * single family	-0.0202***	0.0025	-0.0219***	0.0025
Negative change * single family	0.0070*	0.0033	0.0002	0.0032
Positive change * two family	-0.0219***	0.0024	-0.0243***	0.0024
Negative change * two family	0.0019	0.0032	-0.0040	0.0030
Positive change * terraced house	-0.0129***	0.0030	-0.0150***	0.0031
Negative change * terraced house	0.0050	0.0038	-0.0006	0.0036
Mismatch in relative disposable household income/housing value- Decile 5 (ref)				
Decile 1 (lowest income/housing value ratio)	0.0769***	0.0058	0.0905***	0.0059
Decile 2	0.0690***	0.0046	0.0768***	0.0046
Decile 3	0.0470***	0.0038	0.0515***	0.0038
Decile 4	0.0231***	0.0030	0.0252***	0.0030
Decile 6	-0.0271***	0.0029	-0.0298***	0.0029
Decile 7	-0.0544***	0.0036	-0.0599***	0.0036
Decile 8	-0.0824***	0.0041	-0.0905***	0.0041
Decile 9	-0.1043***	0.0046	-0.1151***	0.0046
Decile 10 (highest income/ housing value ratio)	-0.1134***	0.0053	-0.1216***	0.0052
Rental housing	0.0253***	0.0060	0.0258***	0.0059
Constant	0.4475**	0.1480	0.5601***	0.1491
N observations	436 361		436 361	
N households	146 210		146 210	
R^2	0.0813		0.0817	
F	34.33		35.44	

Notes: OLS model parameters and robust standard errors adjusted for clustering in 485 neighborhoods are shown. DI = disposable income; NH=neighborhood; HH = household; Low (High) = bottom (top) 30% in Oslo disposable income distribution. Model includes household and census tract fixed effects (not shown). N observations is less than three times N households due to missing data.

***p<0.001. **p<0.01. * p<0.05

Figure 1. Effect on probability of moving out of the neighborhood of household's disposable income being above neighborhood median disposable income, mean and 95% confidence interval, by household status

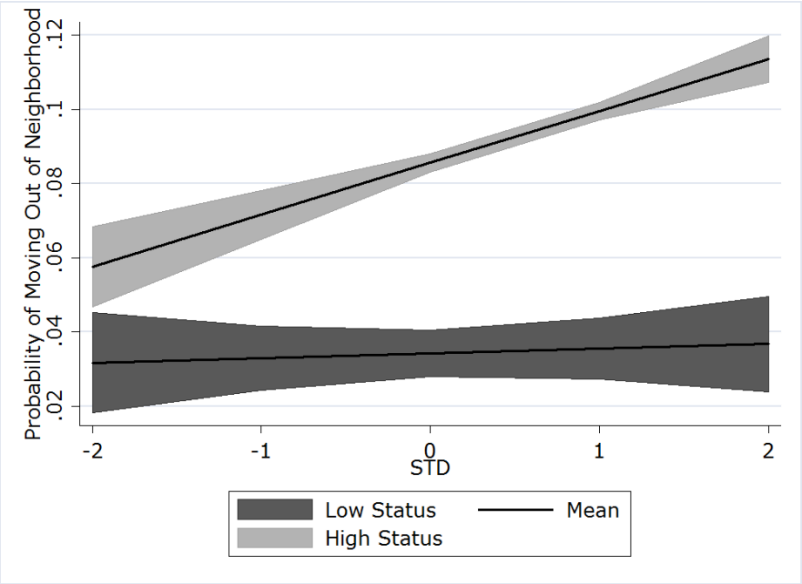


Figure 2. Effect on probability of moving out of the neighborhood of household's disposable income being below neighborhood median disposable income, mean and 95% confidence interval, by household status

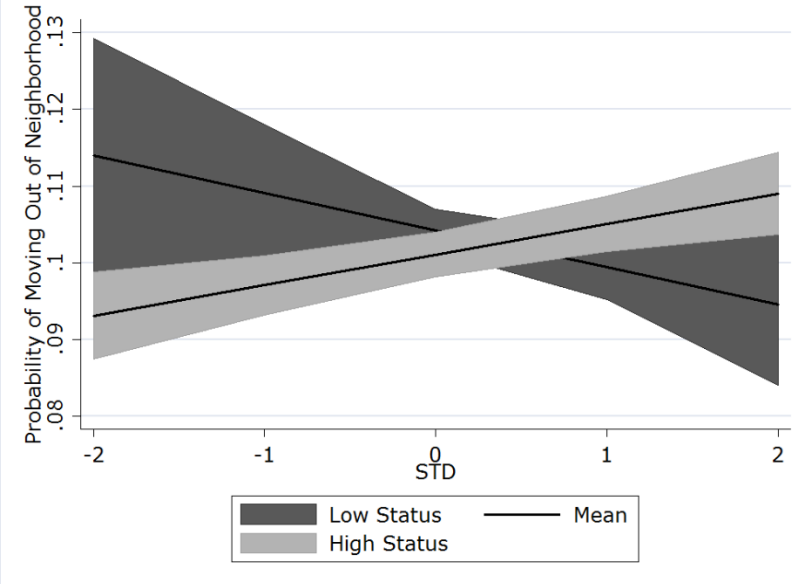


Figure 3. Effect on probability of moving out of the neighborhood of percentage low-status neighbors, mean and 95% confidence interval, by household status

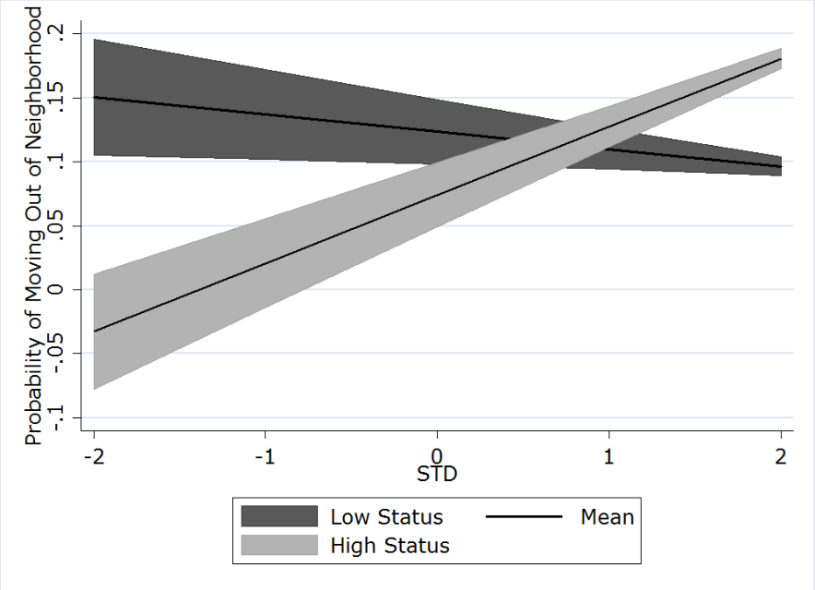
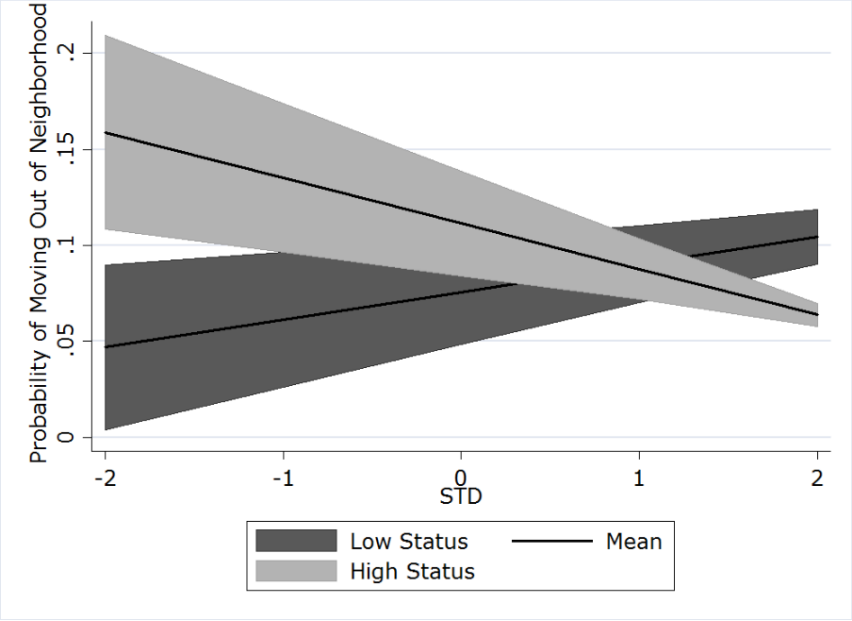


Figure 4. Effect on probability of moving out of the neighborhood of percentage high-status neighbors, mean and 95% confidence interval, by household status



Endnotes

[i] We recognize that social mix policy often considers more than economic diversity.

[ii] For a version of this theory that relaxes neoclassical optimization assumptions and substitutes behavioral and institutional economics insights, see Marsh and Gibb (2011).

[iii] Due to space constraints we do not address: (1) surveys of households' rationales for moving (see Hipp, 2009 for review) and (2) literature on mobility related to changes in neighborhood racial-ethnic composition (see Nordvik and Magnusson Turner, 2015 for review). For a comprehensive review of mobility theories, see Dieleman (2001).

[iv] The one exception is Ellen (2000: ch. 6), who found that white homeowners in the U.S. were more likely to leave their neighborhood the higher their income relative to the neighborhood's median income, though black homeowners exhibited the opposite relationship.

[v] By excluding households of three or more independent adults (primarily students) or multiple families, we lose about 2,500 households.

[vi] We also exclude households with extreme values on disposable income, gross wealth and market income. Households in the panel have a disposable income between 100,000 and 10 million NOK, a market income between 0 and 10 million NOK and a gross wealth between 0 and 10 million NOK.

[vii] When there were options for merging, the nearest neighbor was chosen randomly.

[viii] After sample restrictions are imposed, the average number of households per neighborhood in our analysis panel is 301.5.

[ix] Using disposable income as a measure of status was also suggested by Wessel (2015).

[x] When computing neighborhood median disposable income each year during our panel we used *all* resident households, not just those who resided in the city of Oslo consistently in the

2011-2013 period. In this calculation we included only households with positive values for disposable income.

[xi] See Appendix Table D for details.

[xii] In preliminary investigations we determined that our two measures of status discrepancy: (1) were not multi-collinear; (2) provided distinct explanatory contributions; and (3) were insensitive in estimated magnitude to the inclusion of the other measure in the same model; see Appendix Table E.

[xiii] This is opposite to the findings of Musterd et al. (2016).

[xiv] These estimates are generated by multiplying the coefficient in Table 1 by the appropriate standard deviation in Appendix Table A and then dividing by the appropriate mean group mobility rate as reported earlier in text.

[xv] These estimates are generated by multiplying the coefficient in Table 1 by the appropriate standard deviation in Appendix Table B and then dividing by the appropriate mean group mobility rate as reported earlier in text.

[xvi] The standard deviation used is that appropriate for the given status group and status discrepancy variable. In producing these graphs we used the STATA procedure “margins,” which employs the estimated coefficients regardless of whether they were statistically significant or not.

[xvii] Minor discrepancies in the numbers reported in the text and portrayed in the figures are due to our reporting textual results only using statistically significant coefficients, which is more conservative.

[xviii] The marginal effects (net coefficients) shown in Table 1 also reaffirm this conclusion in the case of share of low-income neighbors and having income below the neighborhood median.

[xix] The one notable difference is that the significant main effects suggested that mobility of the middle-status group was influenced by neighborhood status composition.

[xx] For a recent study of the determinants of immigrants' mobility patterns in Sweden, see Magnusson Turner and Hedman (2014).

[APPENDICES: INTENDED FOR REVIEWERS & ONLINE VERSION ONLY]

Table A: Means and Standard Deviations of Status Discrepancy Measured by Differences in Household and Neighborhood Median Disposable Income, by Household Disposable Income Group, in 100,000 NOK

	Mean	STD
All Households		
Above neighborhood median	1.50	2.26
Below neighborhood median	0.53	0.87
Low-Status Households		
Above neighborhood median	0.01	0.10
Below neighborhood median	1.65	0.96
Middle- Status Households		
Above neighborhood median	0.50	0.68
Below neighborhood median	0.39	0.66
High- Status Households		
Above neighborhood median	3.87	2.55
Below neighborhood median	0.00	0.06

Table B: Means and Standard Deviations of Status Discrepancy Measured by Concentrations of Disposable Income Groups, by Household Disposable Income Group, in Percentages

	Mean	STD
All Households		
Neighborhood – low status (%)	29.8	9.6
Neighborhood – middle status (%)	40.8	7.2
Neighborhood – high status (%)	29.4	12.2
Low-SES Households		
Neighborhood – low status (%)	34.0	11.5
Neighborhood – middle status (%)	40.7	7.3
Neighborhood – high status (%)	25.3	11.4

Middle-SES Households		
Neighborhood – low status (%)	30.4	8.8
Neighborhood – middle status (%)	42.4	6.7
Neighborhood – high status (%)	27.3	10.9
High-SES Households		
Neighborhood – low status (%)	26.3	8.2
Neighborhood – middle status (%)	38.8	7.4
Neighborhood – high status (%)	35.0	12.6

Table C: Means (annual) and Standard Deviations of Sample Characteristics

	Mean	Std. Dev.	Min	Max
Moved Neighborhoods (during a year t) All Households	0.1045	0.3059	0	1
Low-Status households	0.1390	0.3459	0	1
Middle-Status households	0.1059	0.3077	0	1
High-Status households	0.0800	0.2713	0	1
Age of Household Head (end of year t)	43.9612	10.82	25	66
Age^2	2049.654	985.5224	625	4356
Household type - Couple throughout t-1 and t (ref)				
Single throughout (t-1, t)	0.5440	0.4981	0	1
Single (t-1) to couple (t)	0.0244	0.1542	0	1
Couple (t-1) to single (t)	0.0111	0.10462	0	1
Household composition - No children throughout t-1 and t (ref)				
Children throughout (t-1, t)	0.3633	0.4809	0	1
No children (t-1) to children (t)	0.0177	0.1317	0	1
Children (t-1) to no children (t)	0.0122	0.1096	0	1
Children (at end of year t) - No children 0 - 17 years (ref)				
Children <= 5 years (1=yes)	0.1683	0.3741	0	1

Children 6-17 years (1=yes)	0.1533	0.3603	0	1
New born child (during a year) - No (ref)				
Yes	0.0237	0.1521	0	1
Labor activity (any wage earnings during year t) - Active throughout t-1 and t (ref)				
Inactive throughout t-1 and t	0.1276	0.3336	0	1
Inactive (t-1) to active (t)	0.0145	0.1196	0	1
Active (t-1)to inactive (t)	0.0199	0.1398	0	1
Housing tenure (at end of year) - Rental (ref)				
Owner occupier or co-op	0.6962	0.4599	0	1
Building type (at end of year t) - Multifamily (ref)				
Single family	0.0718	0.2581	0	1
Two family	0.1157	0.3199	0	1
Terraced house	0.0645	0.2457	0	1
Highest completed education (at the end of year t) – Upper secondary school (ref)				
University/ university college <= 3 years	0.3108	0.4628	0	1
University/ university college >= 4 years	0.1852	0.3885	0	1
No data	0.0353	0.1846	0	1
Moved (during prior year t-1)	0.0113	0.1057	0	1
Change in disposable household income during year prior to move (in 100 000 NOK)				
Positive change from t-1 to t	0.7614	1.3394	0.0001	120.767
Negative change from t-1 to t	0.8662	1.6253	97.7054	0.0001
Mismatch disposable household income/housing (end of year t)				
Deciles, decile 5 (ref)	5.5000	2.8723	1	10

Table D: Disposable Income Distribution Breakpoints of Households in the Oslo municipality, by Year (in NOK)

Household Group by Disposable Income	2011	2012	2013

Low (1st – 30th decile)	1 - 240 978	1 – 281 057	1 -289 952
Middle (31st – 69th decile)	270 979 – 564 579	281 058 – 589 268	289 953 – 609 427
High (70th – 99th decile)	564 580 -	589 269 -	609 428 -

Table E: Robustness Test of Including / Excluding Alternative Measures of Status Discrepancy

	Model I		**Model II**		**Model III**	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Difference between Household's Disposable Income and NH median HH disposable income						
Above median	0.0033***	0.0006	0.0050***	0.0006		
Below median	0.0326***	0.0016	0.0167***	0.0015		
Percentage HH low/high in NH (defined by disposable HH income) – Middle (ref)						
Low-status %	0.0062***	0.0002			0.0059***	0.0002
High-status %	-0.0005	0.0002			0.0004	0.0002

Notes: OLS model parameters, with robust standard errors adjusted for clustering in 485 neighborhoods, are shown. NH=neighborhood; HH = household; Low (High) = bottom (top) 30% in Oslo disposable income distribution. Models include household and census tract fixed effects and all covariates shown in Table 1.

***p<0.001, **p<0.01, * p<0.05

Table F: Status Discrepancy Effects on Mobility, Core model and Interactions with SES Groups

Using only Households with Stable* Incomes

Covariates	**Core Model**		**Interaction Model**	
	Coefficient	Std. Error	Coefficient	Std. Error
Difference between Household's Disposable Income and NH median HH disposable income				
Above median	0.0183***	0.0018	0.0497***	0.0031
Below median	-0.0009	0.0029	0.0005	0.0040
Interaction low status HH * difference between HH DI and NH median HH disposable income				
Above median			-0.0542	0.0535

Below median			-0.0135*	0.0061
Interaction high status HH * difference between HH DI and NH median HH disposable income				
Above median			-0.0426**	0.0033
Below median			0.0525*	0.0267
Percentage low/high status HH in NH (defined by disposable HH income) – Middle (ref)				
Low status households in the neighborhood (%)	0.0000*	0.0005	-0.0014**	0.0005
High status households in the neighborhood (%)	0.0003	0.0005	0.0012*	0.0005
Interaction low status HH * percentage low/high status HH in NH (defined by disposable HH income) – Middle (ref)				
Low status households in the neighborhood (%)			-0.0006**	0.0002
High status households in the neighborhood (%)			0.0012**	0.0004
Interaction high status HH * percentage low/high status HH in NH (defined by disposable HH income) – Middle (ref)				
Low status households in the neighborhood (%)			0.0052***	0.0003
High status households in the neighborhood (%)			-0.0024***	0.0002
N observations	378 496		378 496	
N households	137 184		137 184	
R^2	0.1027		0.1063	
F	31.85		32.95	

Notes: * stable income group excludes 20% with highest coefficient of variation in disposable income 2011-2013;
OLS model parameters, with robust standard errors adjusted for clustering in 485 neighborhoods, are shown.
NH=neighborhood; HH = household; Low (High) = bottom (top) 30% in Oslo disposable income distribution.
Models include household and census tract fixed effects and all covariates shown in Table 1.

***p<0.001, **p<0.01, * p<0.05

Table G: Status Discrepancy Effects on Mobility, Core Model and Interactions with Status Groups

Using only Owner-Occupiers*

Covariates	Core Model	Interaction Model

	Coefficient	Std. Error	Coefficient	Std. Error
Difference between Household's Disposable Income and NH median HH disposable income				
Above median	0.0104***	0.0008	0.0468***	0.0026
Below median	-0.0016	0.0025	-0.0020	0.0035
Interaction low status HH * difference between HH DI and NH median HH disposable income				
Above median			0.2613*	0.1116
Below median			-0.0333***	0.0066
Interaction high status HH * difference between HH DI and NH median HH disposable income				
Above median			-0.0416***	0.0026
Below median			0.0626**	0.0204
Percentage low/high status HH in NH (defined by disposable HH income) – Middle (ref)				
Low status households in the neighborhood (%)	0.0002	0.0005	-0.0023***	0.0005
High status households in the neighborhood (%)	0.0002	0.0005	0.0009	0.0005
Interaction low status HH * percentage low/high status HH in NH (defined by disposable HH income) – Middle (ref)				
Low status households in the neighborhood (%)			-0.0013***	0.0002
High status households in the neighborhood (%)			0.0030***	0.0005
Interaction high status HH * percentage low/high status HH in NH (defined by disposable HH income) – Middle (ref)				
Low status households in the neighborhood (%)			0.0047***	0.0002
High status households in the neighborhood (%)			-0.0022***	0.0002
N observations	203 908		203 908	
N households	68 062		68 062	
R^2	0.1713		17.71	
F	54.36		55.07	

Notes: * Owner-occupants consistently 2011-2013; OLS model parameters, with robust standard errors adjusted for clustering in 485 neighborhoods, are shown. NH=neighborhood; HH = household; Low (High) = bottom (top) 30% in Oslo disposable income distribution. Models include household and census tract fixed effects and all covariates shown in Table 1.

***p<0.001, **p<0.01, * p<0.05