The migration pathway to economic mobility: does gender matter?

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ABSTRACT

Inter-regional migration is conventionally seen as an important path to economic mobility. We investigate this proposition for Norway, focusing on earnings rank in the 1974 birth cohort. Our data include migrations and educational achievements between 1990 and 2009, with added information for parental background from 1988 to 1992. We measure annual earnings between 1990 and 2014, with measures that capture static effects, dynamic effects and long-term outcomes. Using a structural equation model and fixed-effects regression, we show that upward spatial migration across three geographical levels has different impacts for men and women. The benefit compared to peers who stay at lower levels, or peers who move in the opposite direction, is larger for women. This difference is due to migration before finished education, and is linked to employment opportunities in origin locations. Female migrants obtain higher upward economic mobility through increased work hours and shift of industrial sector, i.e., women do *not* obtain higher wage for the same type of work. Much of the difference materializes *immediately* after relocation ("static effect"); it also depends on destination: Oslo is relatively more favourable to women, possibly because this region has a quintessential post-industrial structure and a well-developed transport system.

Key words: economic mobility, migration, agglomeration economies, gender, cities

1 INTRODUCTION

Cities are famously viewed as places of opportunity and improvement. Numerous stories feature poor migrants who rose through the social ranks to become prosperous members of society, with similar arguments appearing in academic research (e.g., Blau & Duncan, 1967; Fielding, 1992; Sjaastad, 1962). The crux of the matter is that migration, on balance, improves the likelihood of upward social mobility.

Despite this extensive attention, there are still numerous issues that remain poorly understood. *One* such theme concerns the timing and sequencing of migration across stages of life. Recent scholarship emphasizes an increasing frequency of time-linked events, including temporary movements, lagged movements and oscillatory movements, which typically occur in early adulthood (Findlay et al., 2015; Sage, Evandrou, & Falkingham, 2013). It is therefore important to explore economic impacts of place and migration on a longer-term basis, allowing for multiple movements. It is also important to recognize a larger backdrop of demographic and economic changes, with rising age at marriage (Lesthaeghe, 2010), female catch-up in employment (Goldin, 2006) and a reversed "gender gap" in education (Buchmann, DiPrete, & McDaniel, 2008). These large-scale trends may affect the gender composition of rural-urban migration flows, with subsequent effects on economic mobility. *One* obvious possibility is that men and women face different opportunities in the local labour market. Women who want to pursue a professional career, or simply engage in work, may have to leave peripheral areas at young age. If that happens, and if male peers have easier access to local work, some long-term differences are bound to emerge. The upshot is that women may gain more from upward migration than male peers.

Our aim in this paper is to explore the sketched migration-achievement-gender theme in a context, Norway, that prioritizes economic and gender equality. Is the economic impact of upward migration, i.e., migration from smaller to larger places, different for men and women? If such differences exist, at what life stage(s) do they emerge? A key part of our investigation concerns selection of individuals with specific skills and resources into upward spatial migration. Those who migrate to larger cities tend to have more initial resources than the remaining population (Blau & Duncan, 1967; Duranton & Puga, 2004; Glaeser & Maré, 2001), and this difference may distort our impression of migration impacts.

The data we employ cover the entire population, and allow us to track individuals over several decades, from youth to age 40. We study the 1974 birth cohort, and trace migration across three levels of geographical centrality. The dependent variable is *earnings rank,* i.e., location in the earnings distribution of the 1974 cohort.

We base our study on a theoretical framework that includes two types of effects that accrue to rural-urban migrants. "Static effects" are immediate gains that derive from concentration of economic activities, whereas "dynamic effects" emerge through accumulation of urban experience. Both advantages appear in the production system, with

important links to technical infrastructure, higher education institutions, social networks and organisations (Storper & Scott, 2009).

We thus conceive urban advantage in a broad and inclusive sense. By implication, when youths with rural backgrounds move to university cities to improve their skills, they also obtain some other advantages, e.g., through work during studies, formation of social networks, or subsequent spatial migration. One of our contributions to existing research is that we capture earnings effects emerging from this phase, which tend to disappear in studies of rural-urban wage gaps. What is important for us is the *sum* of economic advantages, including changes in work hours and switches to different types of activity.

The empirical analysis begins with a broad exploration of long-term outcomes, measured for *all* individuals, whether they are migrants or not, during 2010-2014. We separate between migration that takes place before and after completed education, counting all single years in the period 1990-2009. That is, if someone quit school at age 16, or if someone studied until 2009, there is only *one* potential stage. We further include terms for parents' education and earnings, own education and employment opportunities (full-time employment) at all places of residence in the same period. Our first analytical tool is a structural equation model (SEM) that allows us to explore migration as a mediator variable that intervenes between background characteristics and earnings rank. We then turn to static/immediate effects of upward migration during 1990-2009, comparing earnings before and after migration. Our final step is to look at dynamic effects of urban residence during the same period. We control in both cases for selection among migrants, using fixed-effects estimation. In brief, we confirm our suspicion regarding gender. Both men and women gain from upward migration, but the jump in annual earnings is larger for women. The difference in outcomes is due to static effects, and emerges in the first stage of migration. Women seem to be pushed away from regions with low full-time employment, whereas men face a more even landscape of opportunities. The most rewarding destination location is Oslo, particularly for women. Regions at the next highest level appear to have labour markets that benefit men more than women. Finally, we also show that female migrants obtain higher earnings due to increased work hours and the opportunity to exploit a large and heterogeneous labour market.

2 MOVING UP THROUGH MIGRATION

The association between migration and economic mobility can be driven by two principal sources – either externalities connected to specific environments or subtle differences in the characteristics of migrants and non-migrants (Glaeser & Maré, 2001). Externalities, in turn, cover a combination of static and dynamic impacts that facilitate upward economic mobility. We will try to separate between these factors, using a theoretical framework that traces individual gains from linked stages of migration and settlement. Throughout the discussion, we refer to economic mobility as an imperfect correlation between origins and destinations,

measured in economic terms (Hout, 2015). We use this concept as a *subtype* of social mobility.

2.1 Migration and work

Most working men and women face decisions that involve "double biographies", relating partly to family events and partly to employment and occupational career (Fielding, 2007). The complex nature of these decisions implies that individual trajectories vary a lot, depending on preferences, lifestyles, skills, social background and time-space contexts. There are nevertheless some broader patterns of adjustment, one of which is to settle in a region with better employment opportunities than the current one (Blau & Duncan, 1967; Fielding, 2007; Gordon, 2015).

Standard economic theory proposes in this context that rural-urban flows of workers and urban-rural flows of capital will converge towards equilibrium, so that individuals are indifferent across different packages of wage, costs, job opportunities and amenities (Sjaastad, 1962;). If the two flows fail to balance in the longer run, a different explanation suggests itself: migrants must be selected from a narrow subset of the population. Alternatively, if cities attract a broad spectrum of skill groups, and if firms remain in the same cities, some other explanation must be sought. The most classic suggestion, provided by Marshall (1890), points at *three* sources of urban advantage: customer-supplier interactions, supplier linkages and knowledge spill-overs. Current theory, while building on Marshall, pays more attention to specific forms of activity. A useful classification, suggested by Duranton & Puga (2004), separates between *sharing, matching* and *learning*. Sharing conforms to Marshall's conception of linkages, and refers to common utilization of expensive goods and facilities, plus common access to market places and labour-market pools. A spin-off argument is that rural-urban migrants receive *instantaneous* rewards, with no further rewards in the subsequent period (Combes & Gobillon, 2015). Matching refers to the process of pairing workers and firms, either as a one-off reward to labour-market entrants or as a continuous reward to urban experience. The underlying logic is that large labour markets allow workers to increase their skill-specific productivity, and to continue job searching as long as available vacancies offer a higher wage net of transaction costs (ibid.). Learning refers to social interaction, information flows and human capital accumulation in dense environments. A central point here is that workers moving into a city must exercise some patience before they can profit from interaction and learning (Duranton & Puga, 2004; Glaeser & Mare, 2001; Yankov, 2006).

Importantly, much of the same logic appears in the "escalator region" model associated with the ideas of Fielding (1992). This model subscribes to the notion of a metropolitan "escalator" which offers a portal for upward social mobility and as a result attract migrants from lower-order regions. Those who are most likely to "step on the escalator" are individuals with "promotion potential", whereas others are more likely to move elsewhere (Champion, Fielding & Gordon, 2014; Fielding, 1992; Gordon, 2015; Gordon, Champion & Combes,

2015; van Ham et al., 2012). Economic rewards are distributed along the same lines, with larger dynamic/escalator rewards for ambitious and highly skilled individuals. Tentatively, we may therefore link matching and learning to escalator rewards. Sharing, by contrast, corresponds to one-off "elevator" rewards (Gordon, 2015). Notable as well, this perspective includes activities that take place *outside* of the labour market – what Gordon, Champion, & Combes (2015: 591-592) identify as "pre-labour market socialization" and "informal learning opportunities".

Studies of regional escalators have become more sophisticated over time, but part of this scholarship does not control effectively for selection effects. Selection, on the other hand, is a key issue in the urban wage premium (UWP) literature. A few scholars argue that selection of initially more productive workers is insignificant in the larger picture, when industrial sector, age and urban experience are taken into account (Baum-Snow & Pavan, 2012; De La Roca & Puga, 2017). The dominating tendency, however, is to observe substantial sorting across central and less central labour markets (we cannot cite all the literature, but see Carlsen, Rattsø, & Stokke, 2016; Combes, Duranton, & Gobillon, 2008; Eeckhout, Pinheiro, & Schmidheiny, 2014; Korpi & Clark, 2019). There is also agreement that rural-urban migrants receive a combination of static and dynamic rewards, usually with larger dynamic premiums for high-skilled individuals (Carlsen, Rattsø, & Stokke, 2016; Gordon, 2015). More distinct efforts to capture changes between and within jobs tend to confirm the importance of labour-market matching (Carlsen, Rattsø, & Stokke, 2016; Korpi & Clark, 2019; Yankow, 2006,), but learning as well is a preferred explanation in several studies (Baum-Snow & Pavan, 2012; Costa & Overman, 2016; De La Roca & Puga, 2017; Glaeser & Maré, 2001).

Gender does not figure prominently in studies of urban-rural wage gaps. A common practice, in fact, is to *exclude* women, in order to reduce sample heterogeneity (Baum-Snow & Pavan, 2012; Costa & Overman, 2014; De La Roca & Puga, 2017; Glaeser & Maré, 2001; Yankov, 2006). Research that *includes* gender tends to show one out of two: either small differences or a slight advantage to men (Carlsen, Rattsø, & Stokke, 2016; Korpi & Clark, 2019). Important to note, what scholars in this tradition attempt to do is to quantify wage gaps as precisely as possible, taking into account sector-specific, occupation-specific and time-specific differences in productivity (Combes & Gobillon, 2015). It is not surprising that gender disappears as an important dimension when most factors that distinguish working men from working women are held constant. Important as well, *all* of these studies neglect migration during the phase of education. The same applies to studies of migration and occupational achievement, but this strand pays more attention to gender. Fielding, for instance, concludes that "both men and women gain by migrating to the London/South East region, but this is much more clearly the case for women" (Fielding, 2007, pp. 111-112). Others emphasize the importance of "primary" and "secondary movers", where women often pay a price for men's occupational mobility. Interestingly, at least one study finds that negative impacts for women fade away in the longer run (Mulder & van Ham, 2005).

2.2 Migration and education

Abundant research shows that human capital acquisition and labour migration are tightly connected phenomena. Migration from a domicile region to a place of study increases the likelihood of subsequent migration, both during studies and after completed education (Faggian, Rajbhandari, & Dotzel, 2017). The actual strength of these effects, and their potential impact on wages, are likely to vary by many factors, one of which is gender. Unfortunately, we cannot easily foresee whether female graduates are more mobile than male graduates or oppositely. Some studies (e.g., Faggian, McCann, & Sheppard, 2007) find higher mobility among females, others (e.g., Haussen & Uebelmesser, 2018) observe the opposite. What both groups can agree on is that employment opportunities play a role.

Employment opportunities may also influence education investments and the choice of higher education institution. Research on this topic supports both a *general* effect (Bozick, 2009) and a *gendered* effect (Buchmann, DiPrete, & McDaniel, 2008; Goldin, 2006; Rye, 2006a), where the latter revolves around women who pursue higher education as a gateway into the labour market.

2.3 Other factors

Own education and social origin (parental background) are self-evident sources of economic success. Social origin, obviously, is the more fundamental of these two factors, given that social origin strongly affects education (Hout, 2015). Educational attainment, on the other hand, is the single most important channel for upward social mobility, at least in Western societies (Breen, 2010). And, of course, education becomes particularly important in a study that targets migration, since migration is a supplementing mediator between origins and destinations.

The social and economic environment that young people experience represents a complementary source of stratification and mobility. There are undeniably many types of advantaged/disadvantaged environments, but the most important one in our study concerns the structure of the labour market. A common finding in migration research is that young people move from regions with high levels of unemployment to regions with low levels of unemployment (Blau & Duncan, 1967; Fielding, 1992). At this stage of life, it is also easier to identify a gender dimension. A Norwegian study (Rye, 2006a) discusses this aspect with reference to motives and experiences, emphasizing that employment reasons alone, independent of education, pushes young women away from the countryside. We may add, as a curiosity, that a similar proposition appears in Ravenstein's "laws of migration" (1885).

2.4 Summary and implications

The existence of urban wage premiums is well documented, with evidence from a large number of countries and cities. UWP estimates tend to range between 2 and 6%, after control for observable and unobservable characteristics. Education as well is an important

determinant, along with city-size, housing costs and industrial composition. Gender, on the other hand, plays either a marginal role or no role at all in the UWP literature. Research that traces migration prior to labour-market entry, by contrast, observes a more gendered pattern. Women are more likely than men to leave the countryside and smaller towns in search of education and employment opportunities. This further suggests that gender may affect earnings rewards in the longer term. Taking all factors into account, what we expect is: 1) a fairly equal migration premium for men and women after finished education, 2) a larger premium for women from the phase prior to graduation, 3) a significant impact of labour-market opportunities for women, with no corresponding impact for men, 4) a specific Oslo premium that applies both to men and women.

The two migration stages vary widely in timing, extension and complexity. It is likely that education migration dominates in the first stage and labour migration in the second stage, but the range of potential influences and adjustments cannot be reduced to "education" and "work". We therefore use a more neutral vocabulary – "stage-1" and "stage-2".

3 ANALYTICAL APPROACH

Our decision to explore the gender dimension of upward migration evolved as a result of several initial analyses. To give an example, using upward migration as the only independent variable raised the earnings rank, measured during 2010-2014, by 13.1% for women and 9.3% for men (p difference < 0.001). Additional analyses revealed a confounded pattern, where some effects were direct and others indirect, and some effects instant and others continuous. We also detected distinct lag effects, where former in-migration to a city-region impinged on later outcomes. The likely presence of ability sorting complicated the task further, and steered us towards a differentiated strategy. We ended up with three different models, which *in sum* cope with the inherent complexities. The first model adheres to long-term outcomes, with detailed exploration of direct and indirect pathways. The second model measures static benefits from each of the two migration stages, whereas the third model measures joint dynamic benefits from both stages. All models include the same set of factors, but we drop own education in the estimation of static effects during stage 1.

We start with long-term impacts (2010-2014) of previous migration experiences (1990-2009). The model we employ is a subtype of SEM ("path model") where all variables are directly observed.[1] A graphic illustration (Figure 1) shows how we separate indirect effects through mediator variables in stages 1 and 2. *One* set of relationships starts from parental background and goes through education and further to earnings rank. Previous research suggests that this route matters a lot in the Norwegian context (Mastekaasa, 2011), but it plays

[1] Such models go far back in time, and were introduced to social research through Blau & Duncan's study of occupational mobility in the United States (1967). New statistical software has improved the methodology in terms of accuracy, efficiency and testing opportunities.

a subordinate role in our study. We *control* for it, just like we control for the direct effects of education and parental background. Our attention is devoted to paths that involve migration, given a certain effect on earnings rank[2]:

1) Parental background → migration in stage 1 → education → migration in stage 2 → earnings rank
2) Parental background → migration in stage 1 → education → earnings rank
3) Education → migration in stage 2 → earnings rank
4) Employment opportunities at age 16 → migration in stage 1→ education → migration in stage 2 → earnings rank
5) Employment opportunities at age 16 → migration in stage 1→ education → earnings rank
6) Employment opportunities at age 16 → migration in stage 1→ migration in stage 2 → earnings rank.

The latter three sequences represent a tailor-made adjustment to the gender theme: we want to measure whether young females have a higher propensity to move from thin to thick labour markets (see sections 2.2 and 2.3). The rest of the model, i.e., the lower chain of employment variables, is a control for secular trends in growth.

Figure 1 departs from our empirical model in two respects. First, we measure parental background by *two* measures – parents' earnings and education. Second, we strengthen the model by adding correlations between 1) background characteristics (measured during 1988-92), 2) employment in stage 1 and migration in stage 1, and 3) employment in stage 2 and migration in stage 2.[3] We do not, on the other hand, employ correlated error terms.[4] Note also that we ease the interpretation in the results section by aggregating migration paths 1 and 2, plus paths 4 to 6.

FIGURE 1 APPROXIMATELY HERE

An alternative to SEM would be to compare coefficients from single-equation models with and without the mediator variables. We discarded this option because, as pointed out by Iacobucci (2008), it produces less consistent estimates; requires several operations; and fails to deliver relevant fit statistics. A more attractive alternative would be to improve the prediction of problematic estimates through multi-stage regression. Such analysis, e.g., 2SLS, is a viable alternative to SEM, but we did not test it in the current study. SEM, in our opinion,

[2] We sacrifice some potential paths in order to increase the degrees of freedom.
[3] It is common practice to exclude these terms in the illustration and results section of SEM.
[4] Correlated error terms are normally used to compensate for omitted variables that have a potential variable impact on different mediator variables. We had no suspicion in this direction, and the model obtained satisfactory fit with standard, independent residuals.

is a more convenient approach, since it produces consistent estimates in *one* operation. A second reason is that we could not identify appropriate variables ("instrumental variables") that would improve initial predictions.

Choosing SEM, while beneficial in several respects, limits our ability to handle spatial sorting. We partly compensate for this deficiency through the inclusion of parental socioeconomic resources (see Ahlin, Andersson, & Thulin, 2018), and also through a detailed evaluation of subgroups. Our main strategy, however, is to apply fixed-effects estimation, where we compare outcomes for the same individuals before and after upward migration, and between migrants who end up in the larger cities and stayers at lower levels. Given our interest in education, employment opportunities and parental background, we do not use a standard specification that removes all time-invariant components. What we choose instead is a within-estimator (demeaned variables), which we include in a panel model:

$$inc_{ict} = \mu_i + \delta_1 inc_{irt} + \delta_2 M_{ict} + \delta_3 Ed_{it} + \delta_4 Emp_{1-3} + X_i + \gamma_i + \varepsilon_i \quad (1)$$

where inc_{ict} is the earnings rank of migrant i in city-region c at time t; μ_i is an individual fixed effect; inc_{irt} is earnings prior to migration; M_{ict} is migration to a city-region during stage 1 or stage 2; Ed_{it} is education at time t; Emp_{1-3} is full-time employment in the initial location and all subsequent locations during 1990 to 2009 (stages 1 and 2); X_i is a vector of parental characteristics; γ_i is a time fixed effect that controls for business fluctuations and δ_1 to δ_4 are the parameters to be estimated.

We then, as our final step, assess dynamic benefits that arise through learning and/or sequential job shifts:

$$inc_{icp} = \mu_i + \delta_1 Exp_{icp} + \delta_2 \varphi_{icp} + \delta_3 Ed_i + \delta_4 Emp_{\Delta} + \delta_5 Exp_{irp} + \delta_6 \varphi_{irp} + X_i + \gamma_i + \varepsilon_i \quad (2)$$

where Exp_{icp} is accumulated urban/higher-level experience over the period p; φ_{icp} is a decay/growth function of Exp_{icp}, Emp_{Δ} is annual employment change (full-time employment) over the period, Exp_{irp} is experience at the origin level (before migration); and φ_{irp} is a decay/growth function of Exp_{irp}. We include μ_i even here, since in-migrants may be sorted out of the region at a later stage. We further neutralize the importance of short-term variations through γ_i.

Our strategy for detection of selection bias is to compare outcomes before and after inclusion of μ_i, using a pooled OLS regression model in the former cases (for a similar approach, see Carlsen, Rattsø, & Stokke, 2016; Costa & Overman, 2014; De La Roca & Puga, 2017; Glaeser & Maré, 2001).

We estimate all models separately for men and women, with further splits according to migration stage (equation 1) and destination level (equation 2). We further employ robust standard errors, since individuals are clustered in geographical space.

Our choice of a rank-based dependent variable implies that estimated effects should be interpreted as percent change for one unit's change in the independent variable.

4 DATA AND SUMMARY STATISTICS

The data set derives from numerous administrative registers, including the Norwegian population register, and consists of 53,079 individuals who fulfill three criteria: i) born in Norway 1974 to parents aged 18-43, ii) still alive and settled in Norway throughout 2014, iii) registered education and earnings for at least one parent. The rate of attrition in the sample is small: we lose 0.3 % through lack of information about parents and a further 2.9% through lack of geographical or socioeconomic information.

4.1 Economic mobility

Our dependent variable is earnings rank (percentile) within the birth cohort. We employ three specifications of the variable: 1) rank over the period 2010 to 2014, which we use in the SEM model, 2) rank one year before and after migration, which we use in the estimation of static benefits, and 3) one to 20 years which we use in the estimation of dynamic benefits.

Earnings include pre-tax wages, pre-tax self-employment incomes, sickness benefits and work assessment allowances.

4.2 Migration, location and experience

The underlying logic in our study is that regions of different accessibility and centrality offer different opportunities for upward earnings mobility. Some initial trials indicated that finer divisions based on labour-market size, number of service functions and distance to the centre are less appropriate, since there are tiny functional differences in the middle and lower parts of the national urban system. What we needed was a division that pays due attention to the largest cities, possibly because these cities are nodes in the national economy research (see Carlsen, Rattsø, & Stokke, 2016; Galster & Wessel, 2019). As a result, we ended up with three geographical levels: the Oslo region ("Oslo"/"level 3"), five tier-2 cities/regions: Bergen, Trondheim, Stavanger, Kristiansand and Tromsø ("Tier-2 regions"/"level 2"), and the remaining part of Norway ("Rest of country"/"level 1").[5] Upward migration includes movements from level 1 to level 2 or 3, plus from level 2 to level 3. Downward migration is defined oppositely.

We allow for several movements within each migration stage, and measure upward and downward movements in relation to the previous stage, with detailed information for each year. Stage-1 migration is mean level over the period between 1990 and the year of finished education (up to 2009) minus the level in 1990. Stage-2 migration is mean level after finished education minus mean level during stage 1. Our analysis of static benefits compares *one* year at levels 3 or 2 to *one* year at lower levels.

[5] The three levels are coded as follows in a national index of centrality: 1) 32 and 33, given a location in Oslo, 2) 32 and 33, given a location in Bergen, Trondheim, Stavanger, Kristiansand or Tromsø, 3) 0, 1, 2 and 31 (Statistics Norway, 2019a).

Higher-level experience is the number of years at level 3 or 2, after migration from a lower level, whereas lower-level experience is the number of years at the origin level (1 or 2. We use these terms in the empirical analysis since we explore movements across *three* geographical levels.

4.3 Employment

Several aspects of the local labour market have the potential to push individuals out of the region. A simple indicator in this respect is the full-time employment rate in travel-to-work areas (NUTS-4 regions), which we employ in all analyses. We calculate the rate on an annual basis for men and women between 30 and 49 years of age, with four separate measures: 1) the 1990-rate (the SEM model + the static model, stage 1), 2) mean rate during the first stage (the SEM model + the static model, stage 1), 3) mean rate during the second stage (the SEM model + the static model, stage 2), and 4) annual change of full-time employment, measured for in-migrants to level 2 or 3 plus stayers at lower levels (the dynamic model). In addition, we also conduct an extended analysis of long-term outcomes (the SEM model) with added control for working time and industrial sector. Working time contains three categories: 0–19.9 hours, 20–29.9 hours and 30 hours +, which we average over 2010-2014. Industrial sector contains 86 categories (two-digit NACE codes) over the same years. Here we employ the most common code.

4.4 Other variables

We measure education on a continuous scale between 1 and 4, where 1 is primary school, 2 is upper secondary school, 3 is bachelor's degree at the university, and 4 is master's degree or PhD at the university. The registration stretches from 1990 to 2009.[6]

Our measure for parental earnings rank stretches over five years, from 1988 to 1992. Formally, we first add fathers' earnings to mothers' earnings. We adjust these figures to the number of parents present in each year. Next, we estimate rank (percentile) over the entire period.

We define parents' education as the parent with the highest education on a scale ranging from 1 to 4, similar to the measure for sampled individuals. The recorded value is from 1990.

Finally, we also include a set of year-dummies in the estimation of equations 1 and 2.

4.5 Descriptive statistics

Table 1 reports summary statistics for the whole sample and the subsample of migrants. We note that women are better educated than men; that women *migrate* more than men; and that men earn substantially more than women. The main direction of movement is from lower to higher geographical levels, with Oslo as the dominant destination. Individuals who migrate

[6] Some individuals (4%) had not completed their education at age 35. In these cases, we employ information from 2009.

are better educated and earn more than the entire 1974 cohort, with further distinctions according to destination location. Our expectation regarding gender is loosely supported through the employment indicator, which increases from level to level for women but not for men.

To get a better sense of nuances in the sample, Table 2 shows both outcome (earnings rank) and key determinants across nine mover and stayer groups. We readily see that women who move from lower levels to Oslo obtain higher relative earnings than similar groups of men. Another point is that individuals of both genders who engage in upward migration have parents with larger socioeconomic resources than peers who stay at lower levels. Those who move down from level 3 or 2 to level 1, on the other hand, obtain earnings that are marginally higher than stayers at level 1. The former groups appear to be *negatively* selected compared to stayers at higher levels – the difference in parental earnings rank is over 9 percentage points, for instance. There are some socioeconomic differences between migrants who end up at the lowest level and stayers at the same level, but it is a question whether these differences in favour of the former group are substantially important. Stayers, after all, may tap into local knowledge and networks. Beyond that, we do not observe large differences between aggregates of stayers and movers. The weighted difference in education, for instance, is just 0.25 for men and 0.18 for women (not shown). In sum: the main task ahead of us is to tackle selection into upward migration (for a similar conclusion in Swedish research, see Ahlin, Andersson, & Thulin, 2018).

TABLES 1 AND 2 + FIGURE 2 APPROXIMATELY HERE

Figure 2 provides two frequency plots for the two migration stages. The plot to the left includes all movements, and shows that women are more mobile than men in the first ten years of each stage. After that, men become slightly more mobile than women. The extent of stage-1 migration at this point, around 2002, is very small, and fades out to zero in the following years. The plot to the right exposes an almost identical pattern for *upward* migration. The probability to move from lower geographical levels to a larger city is substantially higher for women in the early phase of adulthood.

The obvious next question is whether young women, compared to male peers, have stronger economic reasons to leave the smaller places, and additionally, whether the rationale changes over time.

5 RESULTS

5.1 Long-term aggregate effects

Our SEM model includes both migrants and non-migrants, and allows migrants to utilize acquired experiences regardless of their current location. That is, migrants may enjoy big-city

advantages *after* they have left the big city. The results (Table 3) are split between direct and indirect effects, which add up to total effects. Direct effects conform closely to partial regression coefficients, which represent marginal impacts when other impacts are fixed. Indirect effects capture intervening variable effects, e.g., the effect of parental background that arises through own education.

TABE 3 APPROXIMATELY HERE

There are, as a first impression, sizable rewards for upward migration. The aggregate average effect for migrants who move *one* step up, either before or after finished education, is 7.3% for women and 5.6% for men. All but one standard indices in SEM indicate good levels of model fit. The exception is RMSEA, which lies just above the recommended threshold (0.08). The most probable reason for the latter deviation is that we only have 8 degrees of freedom. It is well documented that RMSEA performs poorly under such conditions (Kenny, Kaniskan, & McCoach, 2014).

The difference between men and women is quite complex, and illustrates the utility of SEM regression. Women gain much more from upward migration in the first stage, 5.8% compared to 1.7% for men (rows 1 and 8, column 1) (p difference < 0.001). The pattern is *opposite* in the second stage (rows 3 and 10, column 1), although the difference in favour of men (2.4) is moderate (p < 0.001). Looking more closely at the first stage, we note that women gain 4% from the indirect paths that go through education (row 1, column 4), compared to 3.3% for men (row 8, column 4) (p difference < 0.05). It is clear, therefore, that both genders benefit greatly from upward migration that involves education achievements. But women, contrary to men, also gain from upward spatial migration if they *retain* their previous level of education – i.e. they are systematically better off at higher geographical levels (see the estimate 1.9 in row 1, column 2). Men who move to a larger city without increasing their formal skill *lose* in the longer term compared to male stayers at lower levels (see the estimate -1.5 in row 8, column 2). And to push the argument further, men who stay at lower levels benefit *more* from local employment opportunities than women who make the same choice: one percent increase in the full-time employment rate in the initial region (rows 7 and 14, column 2) increases the earnings rank by 0.7 for men and by 0.3 for women (p difference < 0.001). It fits into the same picture that women, independent of migration, obtain higher aggregate premiums on education (row 2, column 1: 16.3%) than men (row 9, column 1: 13.4%) (p difference < 0.001). In short: ambitious women have stronger incentives than male peers to leave smaller places that lack higher education institutions.

5.2 Static effects

To further advance our argument, we will now disentangle static advantages that emerge because firms in cities can profit from shared facilities, easy access to consumers and a larger

common labour pool. All of these features secure a lower cost per user, which in turn enables higher wages, and, aside from that, additional clustering of social and political institutions. We measure the *sum* of static advantages by exploring earnings change for individuals who shift residence upward in the regional hierarchy (equation 1), using downward movement as the reference category.

Table 4 presents the results of such estimation. Columns 1 to 4, relating to stage 1, demonstrate a huge difference between men and women. Women who move from a lower geographical level to Oslo gain substantially more than men who make a similar move. Equally important, the premium for women is only slightly reduced when we account for unobserved individual heterogeneity (column 2). If women, or men for that sake, move to *another* city than Oslo, there is no significant gain.

In the next stage, after completed education (columns 5 to 8), some intriguing changes emerge. Now, the Oslo premium is reduced for women and increased for men, ending up at 4.1% (women) and 4.4% (men) in the fixed effects estimation. The difference between OLS estimates and fixed-effects estimates indicate that female migrants in this stage are a more select group than men. Interestingly, we also observe significant rewards for upward migration to level 2, with small reduction in the subsequent fixed-effects estimations (columns 6 and 8).

TABE 4 APPROXIMATELY HERE

5.3 Dynamic effects

The second type of advantage depends on interaction, learning and labour-market adjustments in cities. A key point is that benefits appear after some time in the city, and continue to accumulate with declining increments as years pass by. Our instrument here is a variable that counts number of years at level 1 or 2, controlling for number of years at origin levels (equation 2). We use all person-year observations for upward migrants, and add control for employment change, time fixed effects and all individual-level characteristics. Given the detailed documentation of long-term impacts (Table 3), and a frequent tendency to remain in the place of study, we do not separate between stage-1 and stage-2 migration.

What we find (Table 5, columns 1 and 3) is that one year's additional experience in Oslo has an initial impact that amounts to 2.7% for women and 2.2% per for men, which decline to 2.2% and 1.9% after control for selective out-migration (columns 2 and 4). OLS estimates for tier-2 cities (columns 5 and 7) are much lower, with a statistically significant advantage to men (p difference < 0.001). Controlling for selection (columns 6 and 8) reduces the male estimate more than the female estimate, and produces a non-significant difference. *All* main effects are as expected instable over time, with the fastest reduction in the Oslo region. Some

further calculations[7] show that female and male migrants with five years' experience in a tier-2 city obtain 46 and 78% of the corresponding Oslo premium. This indicates, once again, that tier-2 regions provide career ladders that favour men more than women. To shed some light here, let us add that both Stavanger and Bergen, and to some extent Trondheim, are nodes in the Norwegian petroleum economy. Expansions in this economy in the 1990s and 2000s provided solid pay for typically "male work".

TABE 5 APPROXIMATELY HERE

5.4 Gendered impacts – additional evidence

Our data are much richer for later years, so we are able to test whether long-term impacts attenuate after control for work hours and industrial sector. UWP research suggests, as we have seen, that women, compared to men, obtain similar or slightly smaller rewards for similar work. Such a pattern would thus imply that larger migration gains for women (Tables 3-5) reflect changes in employment activity (i.e., amount and type of work).

The results (Table 6) show that more than half of the female advantage from stage-1 migration disappears (p for the remaining difference < 0.05), whereas the male advantage from stage-2 migration remains at the same level. Counting both stages, there is now a non-significant advantage to men. [8] It is clear, therefore, that female migrants do *not* work in branches that provide higher gains; nor do they obtain a gender-specific premium. Unfortunately, we cannot employ the same test on static and dynamic gains[9], but the pattern as a whole suggests that static wage premiums are small or gender-neutral. In concrete terms: we would not expect to reproduce the large female advantage in Table 4 if working time and industrial sector were added to the model.

Another question is whether female migrants benefit from institutional and physical characteristics of the Oslo labour market. *One* such possibility concerns public transport: the metro system in Oslo, along with the railway system, provides easy access to jobs in central parts of the region. This structure may facilitate full-time work for women in the suburbs, given a documented relationship between gender and commuting time (Hjorthol & Vågane, 2014). There is also variation in the social and cultural environment that surrounds women. Many religious communities in Norway, particularly along the Southern and Western Coast, encourage women to be full-time housewives in the child-rearing stage. Other communities are less committed to religion, but maintain traditional divisions of labour. More exactly,

[7] Formula: $f(t) = a(1-r)^t$, where a is the initial effect, r is percentage reduction per year and t is time.
[8] Adding work hours and sector raises R^2 considerably. Model fit statistics are marginally worse than previously, possibly due to missing values.
[9] The registers we employ started to include work hours, sector and occupation in year 2000. We tried to use occupation as well, but dropped it for two reasons: 1) estimates remained at the same level, 2) we lost a number of observations due to missing values.

women are likely to face conservative ideas regarding paid work and household responsibilities (for a survey study, see Rye, 2006b).

TABE 6 APPROXIMATELY HERE

Numerous details in our study strengthen this path of explanation. We cannot pursue the importance of motives and opportunities, but some crude statistics suggest that women gravitate from thin to thick labour markets. The full-time employment rate at the end of the period (2010-2014) was 54.3% among female stayers at level 1; 57.1% among female migrants who moved from level 1 to level 2; and 62.8% among female migrants who moved from level 1 to level 3. Even women who moved from level 2 to level 3 obtained a substantially higher rate than female stayers at level 2. Male migrants, on the other hand, experienced small changes in full-time employment (Table 7).

TABLE 7 APPROXIMATELY HERE

These impacts of migration on female employment illustrate the need for a broad perspective on agglomeration economies. Norwegian cities, as cities elsewhere, offer improved opportunities for labour-force participation.[10] That said, we do not suggest that changes in earned income are unimportant. The observed impact of gender is *real* – upward migration propels women to a higher earnings rank, measured annually, compared to men who make the same journey. This fact remains even if work hours and type of work explain the difference. A more general point is that earnings are inexorably linked to employment. Young individuals who face underemployment or skill mismatch in their local community may not separate one from the other.

5.5 Robustness checks

We conducted several tests to ensure that our core results hold up against alternative specifications. *One* such test concerns the definition of tier-2 cities. We re-estimated all three models with *three* cities instead of the current five. The results go in the same direction, so we only show total effects from the SEM model (Tables 3 and 6). As we can we see from appendix 1, the difference between male and female migrants remains at the same level.

[10] Urbanization is an evident factor behind female labour-force participation. We may see this clearly by comparing Norway and Sweden, two countries with similar gender policies over many years but quite different urbanization trajectories. Forty years ago, the highly urbanized Sweden had a considerably higher rate than Norway. Now, with urbanization catch-up in Norway, there is much less difference (Ortiz-Ospina & Tzvetkova, 2017).

6 DISCUSSION AND CONCLUSION

We have explored migration as a protracted force in people's life, where movements during adolescence and early adulthood may affect economic mobility later in life. Our perspective contrasts with the dominating tendency in both spatial economics (the UWP tradition) and population geography (the escalator region tradition), which often employ criteria that remove students and individuals below a certain age. Migration that takes place at young age is potentially shaped by many different forces, such as lack of labour-market opportunities and external economies of scale that facilitate institutional diversity and rich opportunities in larger cities. The complexity of movements in this phase, and extensive changes in education and family lifestyles, suggests that more women than men may engage in upward spatial migration, with subsequent effects on relative earnings.

Several pieces of evidence support this proposition. Migration to a higher spatial level raises the long-term earnings rank by 5.8% for women and 1.7% for men after control for own education, parental background and the prospect of full-time employment in the region of residence. The difference is vastly reduced but still significant when we add control for work hours and industrial sector. Results for the next stage, after finished education, show a slight advantage to men in the simple model, which grows to a moderate advantage in the extended model. The sum of this is that female migrants obtain a long-term advantage, i.e., higher annual earnings, through employment behaviour. They move from lower geographical levels to larger cities, particularly Oslo, where they enter labour markets with rich opportunities for full-time employment. Male peers, in contrast, have less to gain in this respect.

A closer look at the pattern shows that female migrants gain more from static benefits than men do. It is, in Fielding's conception, the *elevator* properties of the urban region that produce differences between male and female migrants. Dynamic benefits are more difficult to summarize, since tier-2 regions are relatively more favourable to men, and since earnings growth plays out differently over time depending on geographical level and gender. Our impression is that men, on average, gain marginally more than women from continuous experience at higher levels.

The importance of spatial sorting in our study is small to moderate, and supports the view that sorting processes vary across different population groups (Carlsen, Rattsø, & Stokke, 2016; Eeckhout, Pinheiro, & Schmidheiny, 2014). Some estimates are surprisingly similar in pooled OLS and fixed-effects specifications, but it is important to remember that we include parental characteristics in all models. We thereby capture sorting that most studies assign to unobserved variation. Parents' education and earnings are highly significant throughout the study, even in the most advanced models. This further suggests that *both* sources of enhanced economic mobility in cities – self-selection and agglomeration economies – are at work. We should also exercise some caution regarding our ability to handle omitted variables. Fixed-effects estimation neutralizes *part* of the bias, but not all of it. *One* source of uncertainty, in

this case an *upward* bias, occurs if employers at higher geographical levels value subtle abilities more than employers at lower levels (Yankow, 2006). Another one is *change* of informal skills or motivation, which may occur in several shapes and forms, e.g., if migrants decide to break old habits in order to "make it" in the big city. A slightly different point is that rural-urban migrants may differ from non-migrants in terms of lifestyle and identity. Some migrants are likely to leave the smaller place in search of a different sociocultural setting. It is conceivable, as indicated by previous research (Rye 2006b), that more women than men are subject to this type of sorting.

The findings as a whole bear a distinctive mark of economic rationality: women are overrepresented in upward migration in a stage of life that maximizes their long-term benefits. We thus confirm the relevance of agglomeration theory, with an added emphasis on labour-market deficiencies in non-urban regions. Compared to men, women are also more prone to settle in Oslo, which is a relatively better choice for women. But as indicated, we do not rule out the possibility that many migrants are attracted to sociocultural opportunities in larger cities. Investigating this topic, and the implications for economic mobility, is a hard and pressing task for further research. A related task is to assess higher-level experiences in greater detail. How does part-time work during studies, or job changes across/within the field of study, affect the gender difference? Are male and female migrants, as some research suggests (Wessel, 2013), attracted to different branches of the urban economy? And not the least, does early migration have similar implications in other countries?

We end with an appropriate qualification: the vocabulary of "urban advantage" and associated labels are primarily heuristic devices. We do not have evidence to suggest that migrants are *generally* better off at higher geographical levels. As many studies show, much of the earnings premium in larger cities is merely a compensation for higher housing costs (Eeckhout, Pinheiro, & Schmidheiny, 2014; Combes & Gobillon, 2015).

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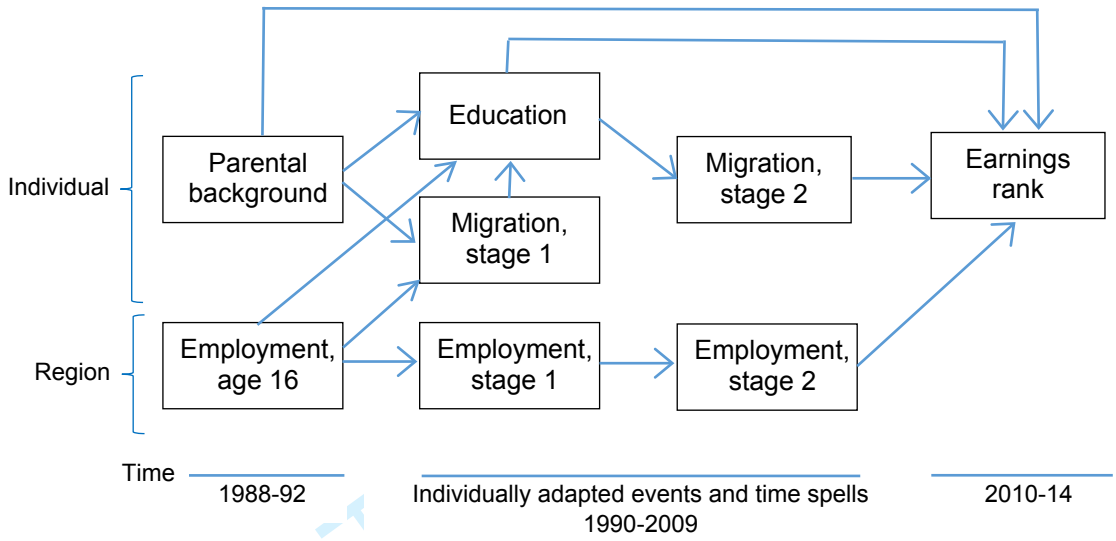

FIGURE 1 Path model of relationships between parental background, own education, migration, employment opportunities in the region of residence, and relative earnings

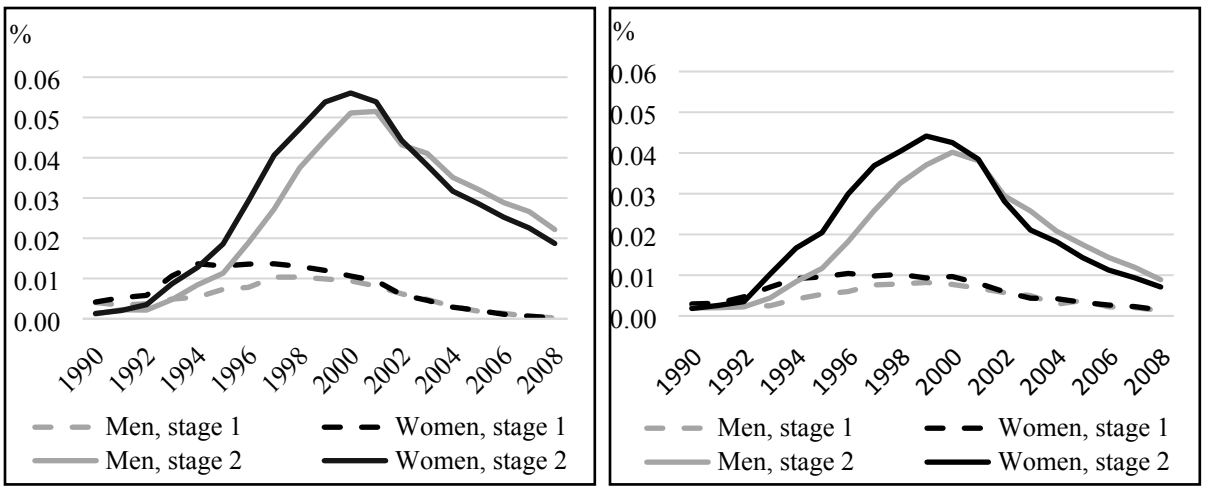

FIGURE 2 Migration over time by gender and stage. Left: all movements. Right: Upward movements

TABLE 1 Descriptive statistics

	Whole sample		All migrants		Upward migrants	
	Women	Men	Women	Men	Women	Men
Earnings (NOK 1000) 2010-2014	381,4 (187.1)	552,3 (316,0)	410,7 (201,4)	605,6 (370.4)	422.8 (196.7)	615.9 (364.4)
Migration movements:						
Stage-1 migration	10.9	7.8	26.7	21.8		
Stage-2 migration	39.9	34.9	97.3	97.9		
Up to level 1	23.7	20.3				
Up to level 2	13.5	12.5				
Down from level 1	15.5	12.3				
Down from level 2	9.3	7.5				
Other determinants:						
Own education	2.51 (0.84)	2.34 (0.89)	2.74 (0.84)	2.64 (0.91)	2.81 (0.81)	2.70 (0.89)
Parents' earnings	162,5 (72.9)	162,1 (73.7)	167,5 (72.5)	169,1 (75.0)	164.9 (69.6)	165.9 (70.6)
Parents' education	2.23 (0.77)	2.23 (0.77)	2.35 (0.79)	2.40 (0.82)	2.36 (0.79)	2.40 (0.80)
Full-time employment rate (region), age 16	43.3 (6.8)	82.3 (3.4)	42.9 (6.8)	82.3 (3.4)	41.9 (6.1)	82.2 (3.3)
Full-time employment rate (region), stage 1	46.2 (9.3)	81.7 (8.4)	46.8 (6.9)	82.3 (2.8)	43.8 (11.4)	79.8 (14.0)
Full-time employment rate (region), stage 2	53.2 (12.4)	81.1 (14.1)	56.5 (6.7)	82.6 (2.4)	54.4 (13.1)	79.4 (15.6)
Higher-level experience					9.65 (7.49)	9.54 (7.67)
Lower-level experience					11.58 (5.80)	12.51 (5.75)
Work hours 2010-2014: 0-19.9	22.5	12.7	20.5	11.5	18.3	10.1
Work hours 2010-2014: 20-29.9	21.4	7.2	19.9	8.3	19.6	8.3
Work hours 2010-2014: 30+	56.1	80.1	59.6	80.2	62.1	81.6

Note: We transform all earnings observations into ranks. Standard deviations in parentheses.

TABLE 2 Mean socio-economic status in nine subgroups, with standard deviation in parentheses

	Destination location					
	Women			Men		
Origin location	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3
Earnings rank 2010-14						
Level 1 (rest of country)	47.8	53.7	54.4	47.6	52.9	56.3
	(28.0)	(29.6)	(29.5)	(27.8)	(28.74)	(29.1)
Level 2 (tier-2 regions)	49.4	52.8	60.9	48.6	50.7	61.0
	(29.8)	(28.9)	(29.6)	(28.6)	(29.1)	(29.2)
Level 3 (Oslo)	48.5	58.9	53.9	49.1	57.3	55.7
	(29.4)	(29.4)	(29.9)	(28.7)	(29.0)	(29.9)
Own education						
Level 1 (rest of country)	2.24	2.60	2.60	2.44	2.71	2.72
	(0.79)	(0.90)	(0.90)	(0.81)	(0.83)	(0.84)
Level 2 (tier-2 regions)	2.45	2.39	2.92	2.58	2.54	2.94
	(0.90)	(0.87)	(0.91)	(0.84)	(0.85)	(0.83)
Level 3 (Oslo)	2.40	2.83	2.46	2.51	2.87	2.58
	(0.90)	(0.96)	(0.92)	(0.85)	(0.84)	(0.88)
Parents' earnings rank						
Level 1 (rest of country)	44.7	48.9	52.5	45.2	49.3	52.1
	(26.7)	(27.9)	(28.2)	(26.9)	(27.5)	(28.21)
Level 2 (tier-2 regions)	48.6	53.3	62.1	49.3	53.4	61.3
	(28.9)	(28.2)	(29.0)	(28.0)	(28.4)	(28.7)
Level 3 (Oslo)	51.7	61.3	61.1	51.6	58.6	60.7
	(29.1)	(29.2)	(29.1)	(28.5)	(29.0)	(29.2)
Parents' education						
Level 1 (rest of country)	2.11	2.29	2.11	2.11	2.26	2.34
	(0.71)	(0.78)	(0.70)	(0.70)	(0.74)	(0.79)
Level 2 (tier-2 regions)	2.28	2.27	2.23	2.23	2.27	2.60
	(0.79)	(0.78)	(0.72)	(0.72)	(0.77)	(0.85)
Level 3 (Oslo)	2.32	2.58	2.26	2.26	2.53	2.42
	(0.81)	(0.84)	(0.78)	(0.78)	(0.82)	(0.84)

Note: Stayers are individuals who never left level 1, 2 or 3. Other observations are based on person-years.

TABLE 3 Impacts of upward migration 1990-2009 on earnings rank 2010-2014: summary results from structural equation model with standard errors in parentheses

			Indirect effects			
	Total effects	Direct effects	Stage-1 migration	Own education	Stage-2 migration	Full-time employment rate (region), stages 1 and 2
	(1)	(2)	(3)	(4)	(5)	(6)
Women						
Stage-1 migration	5.776***	1.859**		4.048***	-0.131***	
	(0.703)	(0.635)		(0.284)	(0.031)	
Own education	16.315***	16.156***			0.159***	
	(0.213)	(0.222)			(0.046)	
Stage-2 migration	1.511***	1.511***				
	(0.430)	(0.430)				
Full-time employment rate	0.436***	0.495***				-0.059***
(region), stages 1 and 2	(0.051)	(0.051)				(0.005)
Parent's earnings	0.162***	0.100***	-0.003***	0.065***	0.001***	
	(0.007)	(0.006)	(0.000)	(0.003)	(0.000)	
Parent's education	4.136***	-0.990***	-0.043***	5.118***	0.050***	
	(0.258)	(0.241)	(0.004)	(0.133)	(0.014)	
Full-time employment rate	0.208***	0.319***	-0.017***	-0.029**	0.000*	-0.065***
(region), age 16	(0.026)	(0.025)	(0.001)	(0.012)	(0.000)	(0.004)
Men						
Stage-1 migration	1.666*	-1.457*		3.285***	-0.162***	
	0.768	0.732		(0.238)	(0.035)	
Own education	13.371***	12.900***			0.471***	
	0.255	0.259			(0.045)	
Stage-2 migration	3.951***	3.951***				
	0.365	0.365				
Full-time employment rate	1.868***	1.878***				-0.010**
(region), stages 1 and 2	0.092	0.092				(0.004)
Parent's earnings	0.178***	0.129***	0.000**	0.048***	0.002***	
	0.007	0.007	(0.000)	(0.002)	(0.000)	
Parent's education	1.882***	-1.284***	0.026***	3.028***	0.111***	
	0.255	0.250	(0.005)	(0.097)	(0.011)	
Full-time employment rate	0.234***	0.659***	-0.001**	0.046**	0.002**	-0.471***
(region), age 16	0.051	0.059	(0.001)	(0.018)	(0.001)	(0.017)

Note: N = 25,033 for women and 26,001 for men. Degrees of freedom=8. SRMR = 0.053 for women and 0.051 for men. CFI= 0.955 for women and 0.946 for men. . RMSEA= 0.098 for women and 0.089 for men. R^2 total = 0.238 for women and 0.451 for men.
* p < 0.05. **, p < 0.01, *** p < 0.001.

TABLE 4 Regression of earnings rank (one-year impacts) on upward migration in stages 1 and 2, with robust standard errors in parentheses

	Stage-1 migration				Stage-2 migration			
	Women		Men		Women		Men	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Up to Oslo	7.483***	7.053***	2.598*	2.583*	5.024***	4.148***	4.118***	4.410***
	(1.004)	(1.075)	(1.035)	(0.997)	(0.459)	(0.478)	(0.391)	(0.358)
Up to tier-2 city	1.433	0.888	1.365	0.497	1.829***	1.395**	1.871***	1.541***
	(1.070)	(1.068)	(1.091)	(1.066)	(0.522)	(0.500)	(0.440)	(0.412)
Earnings prior to migration	0.700***	0.594***	0.689***	0.544***	0.663***	0.499***	0.694***	0.485***
	(0.012)	(0.014)	(0.014)	(0.018)	(0.006)	(0.008)	(0.006)	(0.009)
Own education					8.146***	6.900***	5.713***	5.558***
					(0.246)	(0.234)	(0.224)	(0.209)
Individual fixed effects		Yes		Yes		Yes		Yes
R^2	0.494	0.564	0.471	0.570	0.590	0.689	0.586	0.697
Person-years	3,701	3,701	2,667	2,667	13,937	13,937	12,703	12,703

Note: Additional control variables stage 1= parents' earnings, parents' education, full-time employment rate (region) age 16, full-time employment rate (region) stage 1 and time fixed effects. Additional control variables stage 2 = parents' earnings, parents' education, full-time employment rate (region) stage 2 and time fixed effects. * $p < 0.05$. **, $p < 0.01$, *** $p < 0.001$.

TABLE 5 Regression of earnings rank on higher-level experience, with robust standard errors in parentheses

	The Oslo region				Tier-2 cities			
	Women		Men		Women		Men	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All								
Higher-level	2.727***	2.232***	2.249***	1.943***	1.012***	0.753***	1.826***	1.156***
experience	(0.095)	(0.169)	(0.108)	(0.177)	(0.116)	(0.202)	(0.138)	(0.201)
Higher-level	-0.202***	-0.183***	-0.193***	-0.171***	-0.088***	-0.070***	-0.148***	-0.094***
experience^2	(0.008)	(0.015)	(0.010)	(0.016)	(0.010)	(0.016)	(0.012)	(0.016)
Lower-level	-1.142***	-1.754***	-0.512***	-1.456***	-0.581***	-1.126***	0.083	-0.816***
experience	(0.049)	(0.067)	(0.053)	(0.062)	(0.061)	(0.081)	(0.071)	(0.081)
Lower-level	0.034***	0.041***	0.000	0.018***	0.016***	0.024***	-0.022***	-0.004
experience^2	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Own education	5.082***	5.593***	-0.300***	0.745***	5.040***	5.437***	-0.996***	0.085
	(0.063)	(0.167)	(0.064)	(0.173)	(0.077)	(0.198)	(0.078)	(0.205)
Individual fixed effects		Yes		Yes		Yes		Yes
R^2	0.061	0.110	0.022	0.024	0.035	0.072	0.016	0.035
Person-years	395,432	395,432	407,615	407,615	273,467	273,467	283,313	283,313

Note: Additional control variables = parents' earnings, parents' education, employment change (region) and time fixed effects.
* p < 0.05. **, p < 0.01, *** p < 0.001.

TABLE 6 Impacts of upward migration 1990-2009 on earnings rank 2010-2014, with added control for work hours and sector: summary results from structural equation model with standard errors in parentheses

			Indirect effects			
	Total effects	Direct effects	Stage-1 migration	Own education	Stage-2 migration	Full-time employment rate (region), stages 1 and 2
	(1)	(2)	(3)	(4)	(5)	(6)
Women						
Stage-1 migration	4.322***	1.709**		2.694***	-0.082***	
	(0.546)	(0.577)		(0.187)	(0.023)	
Own education	10.388***	10.270****			0.118**	
	(0.181)	(0.187)			(0.036)	
Stage-2 migration	1.111**	1.111**				
	(0.339)	(0.339)				
Full-time employment rate	0.470***	0.512***				-0.042***
(region), stages 1 and 2	(0.044)	(0.023)				(0.005)
Parent's earnings	0.083***	0.049***	-0.003***	0.036***	0,000**	
	(0.005)	(0.005)	(0.000)	(0.002)	(0.000)	
Parent's education	3.269***	0.043	-0.028***	3.217***	0.037**	
	(0.197)	(0.191)	(0,003)	(0.093)	(0.011)	
Full-time employment rate	0.196***	0.280***	-0.012***	-0.013	0,000	-0.060***
(region), age 16	(0.020)	(0.020)	(0.001)	(0.008)	(0.000)	(0.003)
Men						
Stage-1 migration	2.380***	-0.261		2.746***	-0.105**	
	(0.677)	(0.674)		(0.200)	(0.036)	
Own education	10.989***	10.481***			0.509***	
	(0.234)	(0.237)			(0.042)	
Stage-2 migration	4.149***	4.149***				
	(0.320)	(0.320)				
Full-time employment rate	1.486***	1.495***				-0.009*
(region), stages 1 and 2	(0.104)	(0.058)				(0.004)
Parent's earnings	0.146***	0.108***	0.000**	0.036***	0.002***	
	(0.006)	(0.006)	(0.000)	(0.002)	(0.000)	
Parent's education	2.894***	0.209	0.038***	2.525***	0.123***	
	(0.226)	(0.222)	(0.005)	(0.085)	(0.011)	
Full-time employment rate	0.052	0.406***	-0.002***	0.028	0.001	-0.381***
(region), age 16	(0.044)	(0.052)	(0.000)	(0.015)	(0.001)	(0.015)

Note: N = 23,294 for women and 24,526 for men. Degrees of freedom=18. SRMR = 0.064 for women and 0.062 for men. CFI= 0.912 for women and 0.896 for men. RMSEA=0.102 for women and 0.095 for men. R^2 total = 0.537 for women and 0.565 for men.
* p < 0.05. **, p < 0.01, *** p < 0.001.

TABLE 7 Full-time employment rates (percentage) in nine subgroups

	Destination location					
	Women			Men		
Origin location	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3
Level 1	54.3	57.1	62.8	80.1	79.9	80.3
Level 2	52.1	57.0	64.2	76.3	81.3	80.7
Level 3	55.2	62.0	62.8	75.7	81.5	80.4

APPENDIX 1 SEM results with tier-2 regions specified as Bergen, Trondheim and Stavanger

	Simple model				Extended model			
	Five cities (Table 3)		Three cities		Five cities (Table 6)		Three cities	
	Total effects	Direct effects	Total effects	Direct effects	Total effects	Direct effects	Total effects	Direct effects
Women								
Stage-1 migration	5.776***	1.859**	6.061***	2.144**	4.322***	0.928	4.493***	1.855**
	(0.703)	(0.635)	(0.751)	(0.680)	(0.546)	(0.577)	(0585)	(0.543)
Own education	16.315***	16.156***	16.208***	16.064***	10.388***	7.855****	10.425***	10.310***
	(0.213)	(0.222)	(0.226)	(0.236)	(0.181)	(0.213)	(0.191)	(0.198)
Stage-2 migration	1.511***	1.511***	1.351**	1.351**	1.111**	0.947**	1.068**	1.068**
	(0.430)	(0.430)	(0.462)	(0.462)	(0.339)	(0.341)	(0.365)	(0.365)
Full-time employ-ment rate, age 16	0.208***	0.319***	0.182***	0.306***	0.196***	0.269***	0.199***	0.291***
	(0.026)	(0.025)	(0.029)	(0.027)	(0.020)	(0.020)	(0.022)	(0.021)
Men								
Stage-1 migration	1.666*	-1.457*	2.215**	-0.997	2.380***	-0.629	2.932***	0.168
	0.768	0.732	(0.817)	(0.779)	(0.677)	(0.674)	(0.722)	(0.690)
Own education	13.371***	12.900***	13.401***	12.914***	10.989***	7.169***	10.988***	10.459***
	0.255	0.259	(0.268)	(0.272)	(0.234)	(0.253)	(0.246)	(0.249)
Stage-2 migration	3.951***	3.951***	4.037***	4.037***	4.149***	3.597***	4.256***	4.256***
	0.365	0.365	(0.382)	(0.382)	(0.320)	(0.323)	(0.334)	(0.334)
Full-time employ-ment rate, age 16	0.221***	0.645***	0.234***	0.671***	0.052	0.361***	0.055	0.427***
	(0.051)	(0.060)	(0.054)	(0.063)	(0.044)	(0.053)	(0.047)	(0.056)

Notes: The model includes control for parents' earnings, parents' education and full-time employment rates during stages 1 and 2. Summary statistics for five cities: see Tables 3 and 6. Summary statistics for three cities, simple model: N = 22,891 for women and 22,451 for men. SRMR = 0.056 for women and 0.051 for men. CFI= 0.952 for women and 0.947 for men. RMSEA= 0.103 for women and 0.089 for men. R^2 total = 0.227 for women and 0.447 for men. Summary statistics for three cities, extended model: N = 21,312 for women and 22,452 for men. SRMR = 0.064 for women and 0.062 for men. CFI= 0.918 for women and 0.898 for men. RMSEA= 0.103 for women and 0.094 for men. R^2 total = 0.527 for women and 0.562 for men.
* p < 0.05. **, p < 0.01, *** p < 0.001.