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HUMAN CAPITAL MIGRATION: A LONGITUDINAL PERSPECTIVE

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ABSTRACT

Based on micro-level administrative data this paper aims to identify the role of internal migration in shaping regional and inter-urban contrasts in human capital stocks in the Netherlands. We follow birth cohort 1979 from age 16 until age 35 and compare spatial trajectories between university graduates(-to-be) and their lower educated peers. We conclude that, in a context of dominating rural-to-urban migration flows, the highest educated(-to-be) are more than others attracted to metropolitan core areas and the Randstad. Second, we aim to test whether this urban preference may be prompted by spatial variation in socio-economic progression by comparing changes in the relative wage position of employees in different spatial settings. Metropolitan settings and the Randstad in general are found to function more than other regions as socio-economic escalators during the first phase of the labour career. However, these effects appear to be equal among educational groups.

Key words: internal migration, human capital, urbanisation, escalator regions

INTRODUCTION

Since the second half of the 1980s academics highlight the impact of human capital on growth trajectories of national and regional post-industrial economies based on knowledge-intensive jobs. Regional differences in human capital stocks largely reflect disparities in regional incomes (Gennaioli *et al.* 2013) and employment growth (Raspe & van Oort 2006). In the Netherlands, regional wage disparities also persist mainly due to regional differences in human capital (Groot *et al.* 2014). Regional variation in human capital stocks may originate from *in situ* training of resident populations but is also highly affected by spatial flows, that is migration of the highly educated (Faggian & McCann 2009). Since

highly educated individuals are found to exhibit highest levels of spatial mobility (Faggian *et al.* 2015), patterns of internal migration can strongly shape the redistribution of human capital within countries and thereby affect regional economies.

In the UK, internal migration was found to be the major component of regional population change in the 2000s in the UK (Fielding 2012). In most European countries a mosaic of growing and shrinking regions can be discovered within relatively short distance (Eurostat 2016). Population growth and shrinkage as a result of internal migration must be regarded as two sides of the same coin and therefore should not be considered in isolation.

Recently, patterns of population growth and decline are often linked with debates about

'urban resurgence' (Turok & Mykhnenko 2008) or presented as a 'triumph of the city' (Glaeser 2011). Cities and city-regions have been identified as the main engines of national and international economic development, the main nodes in global networks of capital, people, knowledge and information, and the prime locations of the emerging 'creative knowledge economy'. Whether the focus is on advanced producer services (Taylor & Derudder 2016), or on the cognitive-cultural economy (Storper & Scott 2009), or on the 'creative class' (Florida 2002), the preferred location of the economic sectors and categories of workers highlighted in this research invariably seems to be a large city-region. In the 2000s there are indications of a concentration of population growth increasingly in the central cities of these city-regions (Kabisch & Haase 2011). This process seems to be fuelled by an expanding group of skilled workers who reveal a preference for large urban areas both in Europe and the US. Several studies have shown how regional contrasts in human capital have deepened over time (Berry & Glaeser 2005) and even suggest a process of cumulative causation, whereby regions with higher initial levels of human capital attract the best educated newcomers (Ritsilä & Haapanen 2003; Whisler *et al.* 2008; Waldorf 2009).

Many scholars studying internal migration of human capital take on board the entire labour force, whereas it is widely acknowledged that moving behaviour highly depends on the stage in the life course. Others instead focus on very specific groups like young, recent graduates (Venhorst *et al.* 2011). An important exception is the analysis of out-migration propensities of the college-educated in the US by Whisler *et al.* (2008), who differentiate between several demographic groups. They show how young graduates indeed reveal a preference for large urban areas, whereas families with children prefer locations with lower densities. This is in line with Fielding's (1992) notion that young adults in Britain use the primate city-region of Greater London to realise rapid upward social mobility and step off the 'escalator' in later life to enjoy a more quiet, spacious living environment.

This paper aims to contribute to a better understanding of the impact of internal

migration upon the spatial distribution of human capital by taking a longitudinal perspective which accounts for several stages in the life course. What is the role of internal migration in the redistribution of human capital from the moment people leave the parental home until they are settled halfway their labour careers? Many studies on the spatial redistribution of human capital by internal migration ignore the fact that a significant part of spatial mobility of intellectual talent takes place before completion of the educational career. Those flows remain unobserved by cross-sectional research designs. Elaborating on the Dutch case we adopt a cohort approach in which we determine educational attainments in hindsight and compare spatial trajectories of university graduates with their lower educated contemporaries. Thus we are able to isolate the effect of skill-specific internal migration from the effect of *in situ* training on regional disparities in education attainments among the population. The spatial redistribution of human capital is mapped during different phases in the life course: leaving the parental home, college-to-work migration and migration around the age of 30 which is often associated with suburbanisation and counter-urbanisation.

Like many other industrialised countries, the Netherlands experienced a rapid expansion of tertiary education during the last decades, while population growth predominantly took place in urban areas at the expense of peripherally located rural areas and smaller cities. However, the urban system in the Netherlands deviates from that in many other industrialised countries. Whereas for instance France and the UK are dominated by a primate city, the Netherlands is characterised by a polycentric core region (Kloosterman & Musterd 2001). The political capital, the financial capital, the world port and the world airport are all located in the so-called Randstad region, but in different cities within this region. Besides, the Randstad megalopolis comprises a diverse set of living environments including spacious, green and small villages in between the four bigger cities: Amsterdam, Rotterdam, The Hague and Utrecht. The Randstad offers the densest labour market in the Netherlands but the geography of job access

within the Randstad strongly depends on commuting tolerance (van Ham *et al.* 2001).

Given the polycentric structure of the urban system in the Netherlands this paper aims first to identify the spatial redistribution of human capital during the life course at two spatial scales. The first scale is national and differentiates between three macro regions based on job access (Randstad, semi-periphery and periphery). The second scale is regional and differentiates within these macro regions between varying degrees of urbanisation. A second aim is to assess how these spatial settings function as socio-economic escalators for its residents with various amounts of human capital.

SPATIAL MOBILITY OF HUMAN CAPITAL

In the human capital theory, migration is considered as an investment in the human agent which involves costs and returns (Sjaastad 1962). Individuals or families (Mincer 1978) decide to migrate only if the expected future returns exceed the expected costs of migration. According to this theory human capital is the dominant personal driver of migration. Through migration people can get access to opportunities beyond their current activity space. These opportunities may be jobs that directly render higher financial returns, but also educational facilities or jobs through which people can augment their human capital which may render higher returns in the long run.

Empirically the relation between educational attainments and migration is widely confirmed: the more education the higher the probability of interregional migration (Faggian *et al.* 2015). These higher migration probabilities can be expected not only after, but also prior to graduation. In many countries higher education facilities, especially universities, are concentrated in just a few locations. This implies that many students are inclined to leave the parental home and their home region when they enrol in university. Faggian *et al.* (2015) provide a clear overview of explanations for the greater spatial mobility of the highly educated after graduation. Compared to the lower educated they are argued to less strongly rely on family and friends, to adapt

easier to new places and to obtain and process information about opportunities in unknown, distant regions more efficiently. An important structural explanation seems to be that suitable jobs for university graduates are relatively unevenly distributed across space and hence the job search area may be expanded. Partly people may compensate for this by commuting long distances. van Ham *et al.* (2001) argue that commuting tolerance is lower among low-skilled workers because the costs of commuting are higher relative to their wages than for high-skilled workers. Based on this argument they showed that in the Netherlands, although the Randstad offers best job access for both high-skilled and low-skilled workers, within the Randstad the ideal location is different for both groups. Whereas the central city still offers best job access for low-skilled workers, high-skilled workers who accept commutes up to 45 minutes can settle in smaller villages in between the four big cities (van Ham *et al.* 2001).

In contrast to 'hard' location factors such as employment, wages and education, site-specific 'soft' quality-of-life factors may also drive migration and location choice. These 'soft' factors might comprise natural amenities (Graves 1983), urban consumption amenities (Glaeser *et al.* 2001) or cultural aspects such as tolerance, openness and diversity (Florida 2002). However, in Europe employment opportunities appear to be the dominant factor among high-skilled workers. Quality-of-life factors do play a significant role, but only if the necessary condition of employment is fulfilled (Martin-Brelet *et al.* 2010; Niedomysl & Hansen 2010; Sleutjes 2016). Once a job has been found in a specific region quality-of-life factors, of which the valuation is found to change during the life course (Whisler *et al.* 2008), can be crucial in the location choice between different living environments *within* that region (Biagi *et al.* 2011).

METROPOLITAN AREAS AS SOCIO-ECONOMIC ESCALATORS

For a longer or shorter period workers may be attracted to areas with dense, diversified labour markets with a rich human capital base because of the ample opportunities to realise upward social mobility. These settings are

supposed to be urban areas in which the transmission of ideas and knowledge is boosted by multiple face-to-face contacts (Storper & Venables 2004). In Sweden nominal income increase of migrants moving up in the urban hierarchy was found to almost double that of comparable migrants who moved in the opposite direction (Korpi *et al.* 2011). Also in the Netherlands positive agglomeration effects have been demonstrated (Groot *et al.* 2014) while labour market entry in a large job market was found to enhance occupational mobility in the long run (van Ham 2002).

The British geographer Fielding linked social and geographical mobility during an individual's life course and expressed this in the concept of 'escalator regions' (Fielding 1992). In the UK a vast amount of people in their early twenties still migrate to the main escalator region South East England including Greater London in search for rapid upward occupational mobility (Fielding 2012). The escalator concept suggests that people step off the escalator by moving to a region with lower living costs and a higher quality of life once they have realised upward social mobility. Within 15 years after arrival almost half of the in-migrants in South East England were found to have moved on or returned to other British regions (Champion 2012). In Sweden, households that stepped off the metropolitan escalator and migrated from urban to rural regions realised the largest gains when taking into account regional housing cost disparities (Korpi *et al.* 2011). Venhorst *et al.* (2010, 2011) thoroughly analysed migration patterns of higher education graduates during the first 18 months after graduation in the Netherlands. The results confirmed that employment is the main driver of interregional migration with the Randstad attracting graduates from university cities in other regions. However, it remained unclear for how long these recently graduated persons stay in the regions to which they moved after graduation. Suburbanisation is still a common move for young families in several European countries, but raising children in the city has also become a popular choice again among middle-class couples (Boterman *et al.* 2010).

A substantial growth of human capital in the area appeared to be the only robust preference

of the college-educated in the US across different stages in the life course (Whisler *et al.* 2008), which suggests that the presence of human capital is an amenity in itself. Waldorf (2009) showed that the educational status of a state's resident population is the most powerful predictor of the educational status of newcomers, especially in urban settings. Some counterevidence comes from Germany, where labour market regions actually converged in skills structure due to migration (Südekum 2008). The author suggests that this trend of regional skill convergence in Germany may be driven by the relatively immobile older generations and that, given the increased labour mobility in Germany, 'among young workers it appears more plausible to expect a divergence trend of local skill compositions than among all workers' (Südekum 2008, p. 158). In our analysis we focus on a younger generation and selected birth cohort 1979 of which the highly educated entered the labour market during the onset of the twenty-first century.

DATA AND METHOD

We use the System of Social statistical Datasets (SSD) of Statistics Netherlands (Bakker *et al.* 2014) which covers the complete registered population of the Netherlands. This enables us to trace individuals longitudinally and spatially from 1995 until 2014, enriched with demographic and socio-economic information. A cohort analysis allows us to compare trajectories of the highly educated with their lower educated peers. Within the available data time span birth cohort 1979 best suits our research aims since they nearly exclusively live in the parental home in 1995 (at age 16) and by that time are about to start their independent housing career. In the Netherlands at age 16 more than 99% still lives in the parental home, while from age 17 leaving the parental home takes off (Stoeldraijer 2014).

Human capital is operationalised as a person's highest completed level of education. We choose the threshold of university degrees because university graduates turn out to be much more mobile than graduates from Dutch vocational colleges of higher education (Venhorst *et al.* 2010), partly because vocational colleges are distributed more evenly across space.

Birth cohort 1979 can be followed until 2014 at age 35, when spatial mobility probabilities have dropped sharply. By identifying educational attainment in hindsight we can take on board the pre-graduation mobility patterns. We identified the educational attainments in 2014. At that time almost the complete birth cohort finished their educational career. For all years between 1995 and 2014 we measured the residential, demographic and socio-economic information in September. This means that we ignore individuals who lived abroad in 2014 or had passed away in the meantime. This concerned approximately 6 percent of all persons aged 16 who lived in the Netherlands in 1995.¹ Those who lived abroad temporarily but returned to the Netherlands before 2014 have been taken on board for all years they could be observed. Our research population consists of 179,733 individuals who were registered in the Netherlands both in 1995 and in 2014.

Slightly more than 14 per cent of the birth cohort 1979 (25,320 individuals) had graduated from university. We can isolate the effect of migration on spatial disparities in human capital from the effect of regional variance in *in situ* training by comparing the relative presence of graduates-to-be at age 16 with the relative presence of the same group of individuals until age 35, way after graduation. For every combination of age and spatial area we determined the relative presence of graduates(-to-be) by calculating location quotients (Fielding 2012). Location quotients (LQs) are usually calculated to determine the regional importance of a specific economic activity compared to the national share, but can also be used to determine overrepresentation or underrepresentation of human capital. Values below 1 indicate a relatively low share of graduates(-to-be) of a specific age in a specific region compared to the national mean (14%), while values above 1 indicate an overrepresentation. Changes in the location quotients during this stage in the life course reflect the difference between net migration rates of university graduates(to-be) and net migration rates of the lower educated from the same birth cohort. We have defined a move as a transition of residence over one year

intervals. Migration is operationalized as a move between municipalities with a distance of more than 30 kilometres as the crow flies. We selected a threshold of 30km for two related reasons. First, it was found that in the Netherlands employment is the main driver among moves over more than 30km (Feijten & Visser 2005). Second, differences in moving probabilities between educational groups emerge above this distance.

Geographically we created a typology of municipalities² based on three dimensions. The first and most basic dimension comprises three large geographical zones based on the number of jobs that can be accessed within 50 kilometres by road from the geometric centre of that specific municipality.³ Thus we distinguished a core region that very much resembles the way scholars have defined the Randstad, a semi-periphery and a national periphery. Second, we took into account the degree of urbanisation and distinguished the four big cities (Amsterdam, Rotterdam, The Hague and Utrecht, all of which are located in the Randstad), medium-sized cities (>100,000 residents) and small municipalities. Third, we distinguished between municipalities with and without a university.⁴

Thus, we categorised 393 municipalities in 10 types (Table 1), mapped in Figure 1. A cross-section for 1999 and 2014 among the population aged 35–39 shows that university graduates are not evenly distributed across space in the Netherlands. In 2014 in the Randstad 21 per cent had a university degree, while this was 12 per cent in the semi-periphery and 9 per cent in the national periphery. Besides, urban municipalities in general have higher shares of university graduates than smaller municipalities. All four big cities exhibit above-average shares of university graduates but there is much inter-urban variation. Especially Amsterdam and Utrecht stand out. From 1999 onwards the share of university graduates among this age group has increased all over the Netherlands. However, the proportion of university graduates residing in the Randstad (predominantly in the metropolitan areas and university cities) increased since between 1999 and 2014.

Table 1. *Spatial distribution of university graduates aged 35-39.*

	Municipalities (N)	Proportion with university degree (%)		Spatial distribution of university graduates (%)	
		1999	2014	1999	2014
Randstad	92	11	21	52	56
Amsterdam	1	16	31	11	13
Rotterdam	1	9	16	4	5
The Hague	1	14	22	5	5
Utrecht	1	24	36	5	7
Non-metropol. univer- sity city in Randstad	2	21	35	4	3
Medium-sized city in Randstad	8	7	14	7	7
Small municipality in Randstad	78	9	17	16	16
Semi-periphery	103	7	12	24	22
University city in semi-periphery	4	14	21	6	6
Medium-sized city in semi-periphery	7	8	14	6	6
Small municipality in semi-periphery	92	5	10	11	10
Periphery	198	5	9	23	21
University city in periphery	3	11	18	4	3
Medium-sized city in periphery	4	5	9	2	2
Small municipality in periphery	191	4	8	18	16
Total	393	8	14	100	100
N		1,310,051	1,014,693	1,310,051	1,014,693

SPATIAL MOBILITY OF UNIVERSITY GRADUATES-(TO-BE)

What is the role of internal migration in this spatial concentration of human capital? Table 2 confirms the association between spatial mobility and education. Almost two thirds of university graduates migrated at least once over more than 30 kilometres between the ages of 16 and 35. Among those with a degree in vocational college and lower levels of education this was less than 40% and slightly more

than 20% respectively. Repeat migration, be it onward or return migration, is quite common among university graduates. Of those who migrated at least once, more than 60% migrated more than once. This supports earlier studies stressing the relative importance of repeat migration in internal migration (Newbold 2001). These differences in spatial mobility are reflected in the distance between a person's residence at age 35 and his or her parental home at age 16. Half of the university graduates lived 30km or more from their original parental

Legend

- 1 Amsterdam
- 2 Rotterdam
- 3 The Hague
- 4 Utrecht
- Medium-sized city
- Randstad
- Semi-periphery
- Periphery

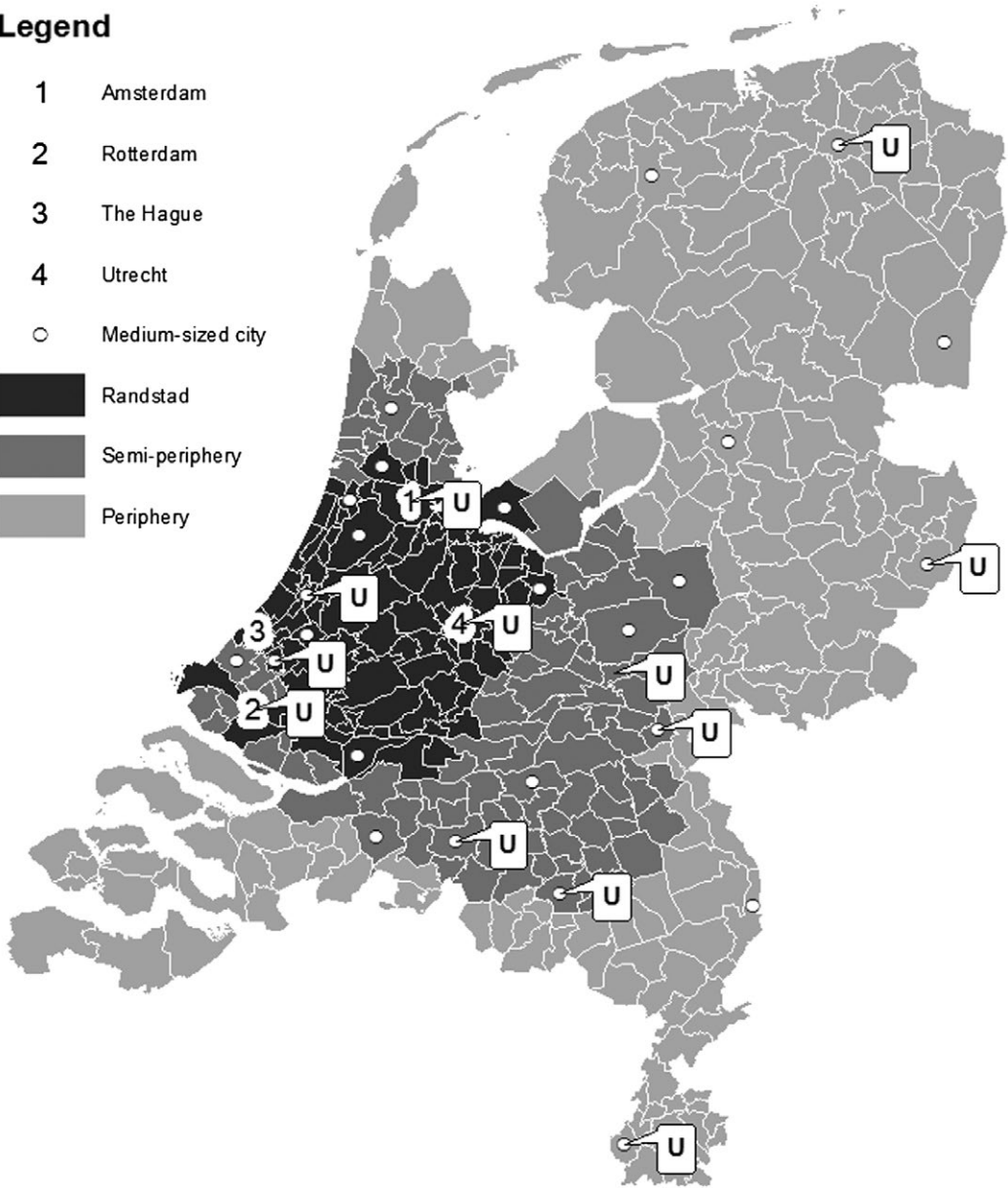


Figure 1. *Geographical typology of Dutch municipalities based on job access, population size and distribution of universities.*

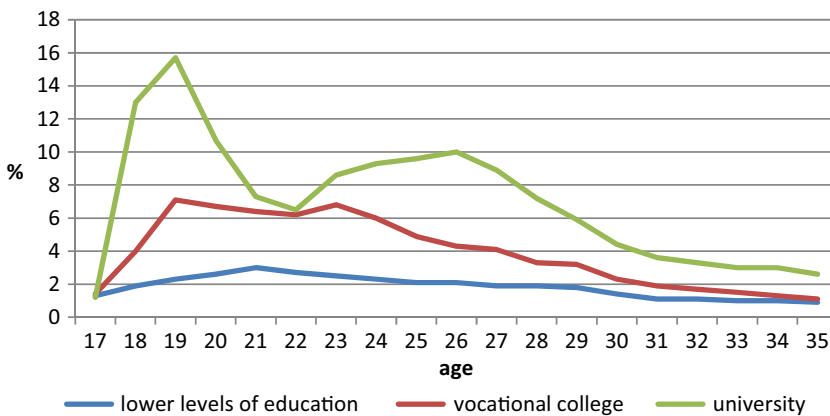
home against a quarter of those with a degree in vocational college and about a sixth of those with lower levels of education.

In Figure 2 year-by-year migration probabilities are depicted for birth cohort 1979, split by age and education level.⁵ First, it shows that the

higher spatial mobility of university graduates holds during the entire observed phase in the life course. Second, the relation between spatial mobility and age varies between education groups. Age-specific migration propensities of individuals with lower than vocational college

Table 2. Number of migrations between age 16 and age 35, birth cohort 1979.

	Lower education	Vocational college	University
0	79.7	60.9	34.7
1	10.4	16.1	24.7
2	7	15.3	23.2
3	1.9	4.9	10.8
≥4	1	2.7	6.7



Note: Age has been measured at the end of the year. [Colour figure can be viewed at wileyonlinelibrary.com]
 Figure 2. Year-by-year internal migration probabilities per education group, birth cohort 1979, age 16–35.

education exhibit a rather flat curve with one relatively low peak around the age of 21. Instead, also contrary to the age-specific migration propensities of those who would eventually obtain a vocational college degree, spatial mobility of university graduates shows two peaks between age 16 and 35. The first arises around age 18 when students leave the parental home and move to university cities. Then spatial mobility drops until the age of 22. A second top in inter-regional migration propensities occurs around the mid-twenties when most university students have graduated and probably move on to take the first steps in their professional careers.

ACCUMULATION OF HUMAN CAPITAL IN METROPOLITAN AREAS

Irrespective of educational attainments, the geographical redistribution of the 1979 birth cohort during the first two decades of the

independent housing career can be characterised as a process of urbanisation, followed by the onset of suburbanisation (Table 3). In this stage of the life course in which spatial mobility peaks, the proportion residing in one of the four big cities in the Randstad increased from 9 per cent at age 16 to 17 per cent at age 28. This increase results from positive net migration rates in metropolitan areas during this phase of the life course, mainly realised at the expense of smaller municipalities throughout the country. As expected, university cities experience a strong increase until the age of 22. The proportion of the 1979 birth cohort residing in medium-sized cities increased slightly from age 16 until age 35, but the location of these cities matters. In general, medium-sized cities in the Randstad succeed better in attracting or retaining people in their twenties than peripherally located medium-sized cities. Around the age of 30 the proportion residing in one of the big cities starts to decrease slowly,

Table 3. *Spatial distribution of birth cohort 1979 from age 16 (1995) to age 35 (2014).*

		Age							
		16	19	22	25	28	31	35	
Place of residence, total birth cohort 1979 (%)	Randstad	30.8	32.4	34.4	36.1	37.6	37.6	37.2	
	Metropolitan	9.3	11.1	13.8	15.7	16.9	16.6	15.4	
	University city	0.9	1.5	2.0	1.9	1.5	1.3	1.2	
	Medium-sized city	5.7	5.8	5.9	6.4	6.8	6.9	7.1	
	Small municipalities	14.8	13.9	12.7	12.2	12.3	12.8	13.5	
	Semi-periphery	26.9	26.8	26.5	26.3	25.9	25.9	26.0	
	University city	3.2	4.4	5.3	5.3	4.8	4.5	4.1	
	Medium-sized city	5.5	5.6	5.8	6.2	6.4	6.3	6.2	
	Small municipalities	18.3	16.8	15.4	14.8	14.7	15.1	15.7	
	Periphery	42.3	40.7	39.1	37.5	36.5	36.5	36.9	
	University city	2.1	4.3	5.5	4.6	3.5	3.1	2.9	
	Medium-sized city	2.6	3.0	3.2	3.1	3.1	3.0	2.9	
	Small municipalities	37.6	33.5	30.4	29.8	29.9	30.4	31.1	
	The Netherlands	100	100	100	100	100	100	100	
	Location quotient of university graduates (-to-be)	Randstad	1.0	1.1	1.2	1.3	1.4	1.5	1.5
		Metropolitan	0.7	1.2	1.6	1.9	2.1	2.1	2.0
University city		1.3	3.0	3.4	3.1	2.5	2.3	2.2	
Medium-sized city		0.9	0.8	0.6	0.6	0.7	0.8	0.9	
Small municipalities		1.1	1.0	0.8	0.7	0.8	0.9	1.0	
Semi-periphery		1.1	1.0	1.0	1.0	0.9	0.9	0.9	
University city		1.1	2.0	2.4	2.3	2.0	1.7	1.5	
Medium-sized city		1.0	0.8	0.7	0.8	1.0	1.0	1.0	
Small municipalities		1.1	0.8	0.6	0.6	0.6	0.6	0.7	
Periphery		1.0	0.9	0.8	0.7	0.6	0.6	0.6	
University city		1.1	2.9	3.0	2.4	1.8	1.6	1.4	
Medium-sized city		1.0	0.6	0.5	0.5	0.6	0.6	0.6	
Small municipalities		1.0	0.7	0.5	0.5	0.4	0.5	0.6	
The Netherlands		1.0	1.0	1.0	1.0	1.0	1.0	1.0	

while smaller municipalities begin to attract newcomers.

On top of this process of urbanisation, those with higher educational attainments more than others flow towards metropolitan municipalities during this phase in the life course. At age 16 location quotients of human capital (graduates(-to-be)) are strikingly close to 1 in all municipality types which indicates little regional variation in the share of youth (age 16) who eventually obtained a university degree. In other words, graduates(-to-be) born in 1979 appeared to be quite evenly spread over space in the Netherlands at age 16, when they live with their parents. Big cities in the Randstad constitute the only exception. Of those who lived there at age 16 a relatively low percentage eventually graduated from university. Geographical disparities developing as the birth cohort grew older stem from distinct net older stem from distinct net migration patterns between graduates(-to-be) and the lower educated. Between the ages of 16 and 35 university graduates exhibit spatial trajectories which differ from those of the lower educated. This process occurs in two steps. Not surprisingly, up to the age of 22 graduates-to-be are most prone to move towards university cities. In these regions among persons aged 22 the proportion of graduates(-to-be) is two or three times higher than the national mean. Amsterdam, Rotterdam and Utrecht have universities as well and also gain human capital in this phase. However, contrary to smaller university cities, these big cities and The Hague continue to be recipients of human capital during the second peak in spatial mobility, which is associated with job search of recent graduates in their mid-twenties, whereas smaller university cities start losing human capital. There is substantial inter-metropolitan variation though: around age 30 Rotterdam and The Hague have human capital location quotients of about 1.5, while Amsterdam and Utrecht exhibit LQs of about 2.5. Out-migration of skilled workers from the metropolitan municipalities between age 28 and 35 predominantly concerns suburbanisation. Those who leave the metropolitan areas are mainly young families settling in adjacent lower density areas within the Randstad. Of all 30 to 35 year old university graduates who

moved out of Amsterdam, Rotterdam, the Hague or Utrecht more than two third stayed within the Randstad, 20 per cent moved to the semi-periphery and about 10 per cent towards the national periphery.

This brain gain in the Randstad comes at the expense of small municipalities and medium-sized cities outside the Randstad. The national periphery loses most human capital. From age 26 onwards the share of university graduates in peripheral municipalities is on average 40 per cent lower than the national share, as reflected in an LQ of 0.6. Human capital losses in the national periphery are most severe in small municipalities, but medium-sized cities are hardly better endowed. From age 30 onwards small municipalities in the national periphery start to regain some human capital. The main source is university cities in the area. Of all graduates leaving university cities in the national periphery 60 per cent settles in a peripherally located small municipality. Small municipalities in the Randstad experience less brain drain and regain human capital from age 25 onwards from suburbanisation. At age 35 these municipalities on average equal the national share of human capital.

To account for (housing) market conditions which could impact upon spatial mobility of this specific birth cohort in certain age periods, we repeated this analysis for birth cohorts 1978 to 1985. We found quite similar results, pointing to the consistent nature of geographical mobility patterns in the early twenty-first century.

BIG CITIES AS SOCIO-ECONOMIC ESCALATORS

After having quantified patterns of urbanisation and accumulation of human capital in the Randstad region from age 16 to 35 we attempt to understand both trends by identifying the degree to which these different types of municipalities function as socio-economic escalators and whether this function varies between educational groups. We defined socio-economic mobility as the change in relative wages compared to peers of the same birth cohort (1979) and the same attained level of education. We observed socio-economic

Table 4. Mean values of variables used in OLS regression analyses.

		Lower than vocational education	University
Labour	Wage percentile change	0.00	-0.17
	Change in hours worked	-0.01	-0.01
	Wage percentile 2006	53.32	52.32
	Experience in years 2006	6.54	3.49
Sex	Female	0.44	0.57
Household 2008	Single	0.23	0.27
	Partners without children	0.33	0.54
	Partners with children	0.38	0.17
	Single parent	0.05	0.01
	Other household types	0.01	0.01
Distance parental home	>30 km (yes/no)	0.11	0.47
Residence	Amsterdam	0.05	0.17
	Rotterdam	0.04	0.06
	The Hague	0.03	0.05
	Utrecht	0.02	0.11
	Non-met. university city Randstad	0.01	0.03
	Medium size city in Randstad	0.08	0.05
	Small municipality in Randstad	0.11	0.07
	University city in semi-periphery	0.04	0.10
	Medium size city in semi-periphery	0.07	0.06
	Small municipality in semi-periphery	0.15	0.08
	University city in periphery	0.03	0.06
	Medium size city in periphery	0.04	0.02
Small municipality in periphery	0.34	0.13	
N		26,355	8,721

mobility between 2006 and 2010, corresponding with the ages 27–31. In this phase of the life course almost everyone had started their labour career and socio-economic mobility is relatively high. Separately for workers⁶ with lower than vocational college education and workers with a university degree, for both 2006 and 2010 we ranked the wages and divided this wage distribution in percentiles. A change in the relative wage was calculated by subtracting the initial wage percentile in

2006 from the wage percentile in 2010. On average, individual change in relative wages between two points in time is equal to zero since progression of one individual comes at the expense of its peers. We had to exclude the self-employed because the information about those incomes is less reliable and incomplete. Since we are mainly interested in the effect of geography we excluded employees who moved between municipalities in this period (19% of all employees). To take into account

the possible effect of migration before the age of 27 we modelled a variable measuring the distance between a person's residence in 2006 and his or her parental home in 1995.

We conducted separate OLS regression analyses for persons with lower than vocational college education and university graduates.⁷ Apart from the distance from the parental home as control variables we included the change in hours worked, the initial wage percentile, labour market experience, sex, household structure and 21 economic sectors. The means of the variables used in the models are given in Table 4.⁸ These confirm that university graduates in this phase of the life course on average have less experience on the labour market, are overrepresented in large cities and university towns and live further away from the municipality in which they were raised. At this age family formation is more common among the lower educated, while university graduates are more often partnered without children. University graduates are overrepresented in financial services, ICT, specialist business services and public services.

Models 1 and 2 (Table 5) concern the lower educated, models 3 and 4 university graduates. In models 1 and 3 we only included the geographical categories as dummy variables using Amsterdam as the reference to identify descriptively the wage progression of the lower educated and university graduates in different spatial settings. Although the explained variance is limited it becomes clear that there is serious spatial variation in wage progression. Furthermore, the spatial pattern is rather similar among both groups. Both the lower educated and university graduates residing in one of the four metropolitan areas enjoyed more wage progression between 2006 and 2010 than their peers in other cities and regions.

In models 2 and 4 we included the control variables of which the change in hours worked and the initial wage percentile in 2006 appeared to be the most important. A considerable part of shifts in the wage rank distribution can be attributed to changes in the hours worked by employees, indicating that shifts in the rank distribution of hourly wages are smaller. Besides, employees who had relatively low wages in 2006 and who had less experience on average experienced most

progression until 2010. Previous migration is only positively associated with wage progression among the lower educated. Other control variables mainly reveal the expected signs. Both among lower and higher educated workers women enjoy less wage progression than men. In addition, a family context augments the difference in wage progression between women and men. This finding is in line with the literature on the gender pay gap (Cooke *et al.* 2009). In comparison with those who are employed in health care employees in ICT, financial services, specialist business services and public services, but also in manufacturing industries or construction enjoyed on average more wage progression, whereas for instance those who work in education experienced less gains.

Taking these factors into account much inter-urban variation in wage progression vanishes. For the lower educated the spatial scale that matters appears to be the regional scale. Lower educated employees in the Randstad experience more wage progression than their peers in the national periphery and to a lesser extent the semi-periphery, but within the Randstad there are no significant differences between locations. Outside the Randstad differences between university cities, medium-sized cities and smaller municipalities disappeared as well if control variables are accounted for. Among university graduates spatial differences in wage progression unfold at both geographical scales. First, significant variation in wage progression exists within the macro-region of the Randstad. Most rapid wage progression was experienced by those who live in metropolitan areas. University graduates living in Amsterdam, Rotterdam, The Hague and, to a lesser extent, Utrecht experienced more upward mobility than their peers in smaller (university) cities and villages in the Randstad. Second, significant variation appears between the macro-regions. Those who live in medium-sized cities or smaller municipalities in the national periphery enjoyed less wage progression than their peers living in medium-sized cities or smaller municipalities in the Randstad. Non-metropolitan university cities form the exception: no significant differences exist between non-metropolitan university cities throughout the country.

Table 5. *Factors influencing change in personal wage percentile (2006–2010) of the lower educated and university graduates, employees born in 1979, OLS regression analysis.*

Model	Lower than vocational college				University graduates			
	1		2		3		4	
	B	SE	B	SE	B	SE	B	SE
(Constant)	8.43**	0.66	32.52**	0.72	7.20**	0.65	24.75**	1.10
Destination (ref. Amsterdam)								
Rotterdam	-4.53**	0.96	0.08	0.69	-2.35	1.25	-0.27	0.93
The Hague	-5.31**	1.01	-1.23	0.77	-2.13	1.39	0.62	1.03
Utrecht	-3.04*	1.21	-0.80	0.86	-4.52**	1.05	-2.74**	0.77
Non-metr. university city in Randstad	-1.56	1.52	-0.39	1.07	-8.33**	1.63	-5.31**	1.21
Medium-sized city in Randstad	-8.68**	0.83	-1.17*	0.60	-10.45**	1.40	-3.54**	1.05
Small municipality in Randstad	-9.77**	0.78	-0.86	0.57	-12.06**	1.19	-4.28**	0.92
University city in semi-periphery	-7.66**	0.96	-2.84**	0.69	-7.88**	1.09	-5.45**	0.82
Medium-sized city in semi-periphery	-9.12**	0.86	-3.22**	0.62	-10.34**	1.26	-4.94**	0.95
Small municipality in semi-periphery	-11.72**	0.75	-2.69**	0.55	-13.34**	1.17	-6.32**	0.92
University city in periphery	-4.95**	1.02	-5.03**	0.73	-6.73**	1.29	-4.59**	0.97
Medium-sized city in periphery	-9.63**	0.98	-5.68**	0.70	-13.67**	2.09	-7.95**	1.54
Small municipality in periphery	-11.38**	0.70	-4.78**	0.52	-15.85**	0.99	-7.28**	0.80
Change in hours worked			54.88**	0.65			48.05**	1.45
Wage percentile in 2006			-0.35**	0.00			-0.39**	0.01
Work experience in years			-1.18**	0.06			-0.58**	0.16
>30km from parental home			1.56**	0.46			-0.01	0.66
Female			-2.60**	0.46			-4.04**	0.90
Household (ref. single)								
Partners without children			2.36**	0.35			2.51**	0.71
Partners with children			0.59	0.35			-0.60	0.99
Single parent			-3.16**	0.79			7.14	3.74

Table 5. (Continued)

Model	Lower than vocational college				University graduates			
	1		2		3		4	
	B	SE	B	SE	B	SE	B	SE
Other household types			-3.76**	1.14			5.77*	2.66
Partners without children * female			-5.19**	0.56			-4.64**	0.95
Partners with children * female			-9.50**	0.56			-9.94**	1.29
Single parent * female			-2.86*	1.06			-13.448**	4.98
Other household * female			3.78*	1.81			-2.23	3.52
>30km from parental home * female			-0.57	0.64			1.04	0.82
Adjusted R2	0.02		0.52		0.04		0.50	

Notes: ** $p < 0.01$, * $p < 0.05$, control variables not shown: 21 economic sectors.

In a combined model we checked whether the effect of geography on relative wage progression varied between education groups, but none of the interaction terms turned out to be significant. This indicates that the wage premium of the Randstad in general and the big cities in particular is equal for both university graduates and the lower educated.

CONCLUSION AND DISCUSSION

Based on a cohort analysis we have shown that patterns of internal migration play a decisive role in the spatial distribution of human capital within the Netherlands. During approximately the first two decades of their independent housing career, university graduates more than the lower educated moved towards the employment centre of the Netherlands, the Randstad. In the mid-1990s the spatial distribution of 16-year-olds who later on achieved a university degree was rather egalitarian across the country. However, once having reached the age of 35 human capital

has accumulated in the Randstad. Until their late twenties university graduates are over-represented in the larger cities and university cities. From then on suburbanisation of human capital starts off but human capital remains mainly concentrated within the Randstad. The literature shows that, via intergenerational transfer of intellectual, economic and social capital, the offspring of highly educated parents enjoys the best odds for successful educational achievement themselves. The actual spatial distribution of pupils aged 16 in pre-university education seems indeed to be more uneven than that of university graduates-to-be in 1995, but more profound analysis is needed to verify this statement.

By analysing wage growth among 27–31 year old employees, separately for the lower educated and university graduates, we have shown that the urbanisation trend can be understood in terms of socio-economic upward mobility. The major part of the spatial variation in relative wage progression stems from differences in hours worked and the composition of

economic sectors. In other words, employees in the largest cities make more wage progression than their peers in smaller cities and villages because they increased the number of hours worked and because they work in industries in which employees in general make above-average wage progression. However, on top of that some spatial variation remains. Employees who live in the Randstad enjoyed more wage progression in this early phase in their labour careers than their peers in more peripherally located regions. These results are in line with findings in other European countries.

These variations across the three macro zones was found for both the lower educated and university graduates. This raises the question why lower educated workers do not migrate towards the Randstad to the same degree as university graduates do. Also in the US, Moretti (2012) signalled that lower educated workers benefit from the inflow of highly educated workers as well, but nevertheless tend to stay put in regions with relatively scant opportunities. In the literature on interregional migration, this relative immobility of the lower educated is argued to be based on several reasons ranging from a lower ability to obtain and analyse efficiently information on opportunities elsewhere to a stronger reliance on family and friends (Faggian *et al.* 2015). It might also be that for the lower educated these spatial bounded benefits are predominantly financial in nature – higher wages for the same job – whereas for university graduates metropolitan areas and the Randstad offer more substantive, functional career steps. Furthermore, in the Netherlands interregional migration just for financial reasons might be discouraged by a relatively generous welfare system and considerable regional variation in house prices, which may reduce net benefits after migration.

The ‘triumph of the city’ is only one side of the coin. Since we described rather broad types of municipalities some particular regions lag more behind than the averages we showed. On the other hand, these peripheral regions might attract skilled workers when they arrive in the second half of their labour careers. We only analysed a single birth cohort which we followed until age 35. It is conceivable that,

when workers grow older employment considerations might lose some weight in migration decisions and net flows of human capital could be more directed towards more spacious and less expensive areas in the national periphery. However, as we have shown, these possible effects are expected to be limited since interregional migration probabilities drop sharply after the age of 30.

Outcomes in the long run depend heavily on long-term economic restructuring and the resulting migration patterns (Fielding 2012). Robotisation has just started, digitisation and globalisation will continue. These are signals for structural economic change. Moreover, a new generation of young people in their twenties possess more knowledge capital than ever before. Jobs matching this knowledge capital of these new generations are concentrating in urban regions. From this perspective living in urban regions is the optimal prerequisite to survive in the modern economy. Although new communication technologies will facilitate the disconnection of workplace and residence the need to live near high concentrations of jobs can be expected to persist due to increasing amounts of temporary jobs. Therefore research focussing on the relationship between types of labour agreements and migration would be invaluable.

Notes

1. We checked whether the probability of emigration/death by 2014 was related to education by measuring educational attainments at earlier points in time. As expected, it turned out that the highly educated were slightly overrepresented among the absentees.
2. Municipal borders of 2015 have been used for the entire study period.
3. Randstad: more than 1,700,000 jobs; Semi-periphery: more than 1,000,000 and less than 1,700,000 jobs; Periphery: less than 1,000,000 jobs.
4. Excluding the theological universities and the so-called open universities.
5. We repeated this analysis for birth cohorts 1977 until 1985. Results were very similar.
6. Workers were defined as individuals who gained the major part of their incomes from an employee's salary.
7. We do not show the results for graduates from vocational colleges because these are rather

similar. These can be obtained from the authors on request.

8. To save space we do not show the means and coefficients of the economic sectors in the tables. These can be obtained from the authors on request.

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