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Mikołaj Herbst[1], Paweł Kaczmarczyk[2], Piotr Wójcik[3]

Migration of Graduates Within a Sequential Decision Framework: Evidence from Poland[4]

1 University of Warsaw, Centre for European Regional and Local Studies (EUROREG), e-mail: mherbst@uw.edu.pl.
2 University of Warsaw, Centre of Migration Research.
3 University of Warsaw, Faculty of Economic Sciences.
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Abstract: The aim of this paper is to identify the main drivers of highly skilled migration between regions. We argue that the spatial mobility of individuals should not be considered in terms of one-off displacements, but rather as a sequence of migration decisions within a certain time period. The important context of the research is provided by the economic transformation of Poland, accompanied by the growing demand for education, and the lack of well-established patterns of graduate mobility. By applying multinomial logit modelling on a unique database of Polish graduates, we find that all the tested migration strategies can be explained in terms of structural factors, human capital characteristics or aspirations/capabilities related variables.

Keywords: skilled migration, graduates, sequential decision framework, aspirations, capability

JEL Codes: I25, J24, J61, J62

1 Introduction

The goal of this paper is to better understand the drivers of interregional migration of well-educated individuals. Human capital is commonly considered as an important factor of economic growth. Economic theory assumes that human capital affects growth by influencing labour productivity (Lucas 1988) and by determining the ability of the economy to innovate (Nelson and Phelps 1966). Numerous empirical research studies have confirmed the positive effect of human capital stock and its quality on growth rates at both country and regional level (*inter alia* Barro 1999; Chen and Dahlman 2004; Lesage and Fischer 2008; Ciccone and Papaioannou 2009; Del Bo, Florio and Manzi 2010; Arnold, Bassanini and Scarpetta 2011; Barra and Zotti 2016). As the directions and scale of skilled migration are likely to influence the future performance of regional economies, the mobility of human capital should be a subject of interest for both academic researchers and policymakers. Indeed, some empirical research shows that regions and cities make efforts to attract and retain highly-skilled migrants (Fobker *et al.* 2014).

We chose to investigate the issue of human capital mobility using data from Poland, which we consider as a valuable case for such studies. Poland is a relatively big, polycentric economy, with a dynamically developing university network and a growing demand for education. The transformation of the 1990s triggered a change from an elite to a mass tertiary education system.[1] The net enrolment rate (computed within the age group officially corresponding to tertiary education) grew from 9.8% in the academic year 1990/1991 to 40.8% 20 years later. The share of people aged 25−64 years attaining tertiary education grew between 1997 and 2010 by 7.2% annually, doubling the average OECD rate of growth for this period. At the same time, the structure of the economy changed profoundly, causing the rise of unemployment. In all, the transformation to a market economy created pressure to attain a higher education, and to be mobile (also in international terms), in order to keep pace in the increasingly competitive conditions (Kwiek 2011).

Although the issue of student and graduate mobility between regions has been widely studied with respect to some countries (United States, Italy, Germany, etc.); so far, it has not been investigated in the context of economic transformation, in the presence of rapidly growing demand for education and the lack of well-established spatial patterns of skilled migration. We believe that the evidence from Poland may provide a fresh look on the drivers of graduates' mobility.

We expect that this study will reveal some specificity of the education systems and labour markets of countries, which has recently undergone a dynamic shift from the centrally planned to the market oriented economy, and from the industrial and agricultural model to the knowledge based paradigm. Poland shares this experience with other Central and Eastern Countries, and thus we expect that conclusions from the study will be particularly valid for this region. Moreover, our findings may be relevant and inspiring for other countries sharing the main characteristics of Polish transformation, such as rapidly increasing returns to education, growing private sector in education, high structural unemployment (resulting from the decline in the industrial and agricultural sectors), severely underdeveloped housing

1 The transformation involved massive deregulation, privatization, and restructuring of the economy from the agricultural and extensively industrial model into the one based increasingly on services. Demand for higher education increased rapidly, and so did the number of tertiary education institutions, as private entities became allowed to establish schools for the first time since the World War II. For more details on how Poland's transformation of the 1990s influenced the education system, see Kwiek (2011), Herbst and Rok (2014).

market and transport infrastructure, and the experience of administratively limited mobility of people in the past decades.

The novelty of this study relies also on combining the understanding of migration as a sequential process (following Faggian and McCann 2009a, 2009b) and an explanatory potential of the approach of de Haas (2010) and Czaika and Vothknecht (2014), conceptualizing mobility as a function of aspirations and capabilities (or the capacity to aspire and the capacity to accomplish migration).

Following the findings of earlier studies (for literature review see section 2), we argue that the spatial mobility of individuals should not be considered in terms of one-off displacements, but rather as a sequence of migration decisions within a certain time period. Moreover, we assume that the propensity to migrate depends on factors relating to a person's expectations and opportunities (aspirations and capabilities) and, additionally, the structure and importance of these factors can change in the course of a person's lifetime and education. Along those lines, in this article, we develop an empirical model of sequential migration behaviour to test a series of hypotheses related to the factors driving particular migration strategies (see section 3).

The remaining part of the article is organized as follows: Section 2 discusses the main theoretical and empirical findings on the drivers of graduate mobility. It also introduces the concept of sequential migration behaviour, push and pull factors, as well as the concept of aspirations and capabilities as explanatory framework for migration behaviour. Section 3 explains the empirical strategy and describes the data used for estimation. Section 4 presents the results of our study, and section 5 concludes.

2 Drivers of (graduate) mobility – conceptual framework and literature review

According to the theoretical and empirical economic literature, human capital is a critical growth factor; for a review see Herbst and Rok (2013). Thus, the mobility of persons well-endowed with human capital and their spatial allocation is of utmost importance for both sending and receiving regions or countries. As the main aim of this article is to assess the mobility patterns of Polish graduates, in this section we conceptualise our approach and position the issue under consideration in a broader context of the scientific debate on migration and its causes. While considering the mobility of graduates from a theoretical perspective, there are a few pivotal issues to be considered.

First, there is the question on the interlinkages between literature on internal and international mobility. On the one hand, as King and Skeldon (2010) and others claim, there are two separate 'realms' of research on internal and international migration characterized by different methods, concepts but also policy agendas. On the second hand, most of the theories looking at causes of mobility do not distinguish explicitly between internal and international forms of movement and the same holds true in case of conceptual approaches to migration (Ravenstein 1885; Sjaastad 1962; Lee 1966; Castles and Miller 1993; De Jong *et al.* 1983). This is particularly well visible in the case of economic approaches to migration which rarely consider differences between these two kinds of mobility related, among others, to institutional factors (Massey *et al.* 1993; Brettel and Hollifield 2000). As the primary focus of this paper is on the drivers of mobility, we will base our conceptual framework on literature related to both internal and international migration.

Second, as per traditional approaches, migration involves a change in place of residence of more or less permanent character (e.g., Lee 1966). This kind of approach assumes that migrants settle in a new destination or return to the place of origin. The New Economics of Labour Migration was among the first theoretical approaches which argued that apart from settlement-driven mobility, there is a plethora of temporary or circular movements resulting from risk diversification strategies (Stark and Bloom 1987). This approach has been further developed by Dustmann and Kirchkamp (2002) and, particularly, by Dustmann and Görlach (2015). They argue, among others, that temporary migration can be a function of not only the differences in purchasing power or consumption preferences, but also be driven by various skill accumulation possibilities, legal issues or family related considerations. Nonetheless, the migration projects are understood as not a one-off event but rather a sequence of mobility related decisions remain seriously under researched in the migration literature (see Flahaux *et al.* 2014; Beaverstock 2002, 2005). Following seminal Harris−Todaro model (1970), one could argue that migration output (in pecuniary terms) can be weighted by the probability of being employed

and, further, because this 'probability' is not easily identifiable, many search models would imply that migrants may tend to simply try their luck. In fact, there are certain destination characteristics that are only observable once the migrant arrives at their destination (Molho 1986). Similarly, migrants or would-be migrants may apply a 'wait and see' strategy and delay their departure (migration or return migration; see Burda 1993). These two examples reveal that migration projects should not be treated as a one-off or one place decision, but rather as a set of decisions where the motives and factors can change over time.

For this reason, in analysing the mobility of Polish graduates, we will follow the approach and typology of migrants as proposed by Faggian and McCann (2009a, 2009b), who assessed the student-graduate migration behaviour in Great Britain. They identified five distinct types of sequential migration associated with this particular group, namely:

1. **Repeat migrants** who move away from their home areas to gain an education and then move to a third area after graduation.
2. **Return migrants** who move away from their home areas to gain an education and then return in order to find gainful employment.
3. **University stayers** who move away from their home areas to gain an education and then settle in the university / school area.
4. **Late migrants** who remain in their home area to complete their education there, and move away only after graduation.
5. **Non-migrants** whose place of education and labour market entrance are the same as their domicile.

The typology described above allows for identifying factors responsible for variation of mobility behaviour as related to graduation and, additionally, makes it possible to consider not only the characteristics of individuals but also the structural factors associated with home areas, university areas and potential destinations (see below).

Third, there is a tension in migration studies between macro and micro-oriented approaches. Traditional economic literature on migration presents mobility as an outcome (by-product) of spatial differences in economic opportunities (Hicks 1932). These economic opportunities are defined predominantly in terms of incomes or wages, less often in terms of well-being or standards of living. This is clearly present in the Heckscher–Ohlin–Samuelson framework, which argues that mobile agents respond to wage differentials resulting from the spatial misdistribution of production factors (Mundel 1957; Samuelson 1948). In the case of macro studies, wage differentials are still commonly considered as the most important factors explaining the direction and intensity of flows (Hatton and Williamson 2002; Carletto *et al.* 2004; Quinn 2006). There is a growing number of studies, however, showing that the structural context matters as well. Empirical studies show that migration should be assessed in terms of the following influences: (1) purely economic factors (e.g., the structure and conditions of the labour market (Gottlieb and Joseph 2006); (2) the so-called new factors of migration, that is, the types of amenities (Delisle and Shearmur 2010) or quality of institutions (Nifo and Vecchione 2014); and, particularly in the case of graduates, (3) the specialization of a given region (Faggian, McCann and Sheppard 2006; Gibbons and Vignoles 2012; Haapanen and Tervo 2011). Series of papers point also to the importance of non-economic (quality-of-life) factors (Cebula 2005; Cebula and Payne 2005).

On the other hand, micro approaches focus on migration decision making and introduce considerations concerning risk, uncertainty and time preferences. According to the human capital approach (Sjaastad 1962) migration can be assessed as an investment decision aimed at finding the optimal utilization of actual and potential human capital. As a typical neoclassical microeconomic approach, it explains the migration decision in terms of rational analysis based on cost-benefit comparisons, where the expected and discounted incomes in the origin and (potential) destination countries are compared. Importantly, Sjaastad and followers suggest considering not only purely monetary costs and benefits but also the non-financial and psychological costs attached to migration. Moreover, the variables in question depend on expectations and their formation as well as preferences regarding time and risk. Thus, factors such as age, sex and education level are expected to play a critical role in determining the migration propensity.[2]

The approaches mentioned above would argue for (purely) individualistic migration decision making (rational agents without social or family context); in

2 In this regard, the human capital approach is similar to the idea of immigration markets, as proposed by Borjas (1994). He linked the selectivity of migration to the rates of return on observable and non-observable characteristics and argued that immigrants tend to positively select when the payoff for observed characteristics abroad is higher than in the country of origin (in the case of negative selection, the opposite holds).

simple terms, it would mean that individuals and only individuals make migration decisions (DaVanzo 1981). This kind of approach has been seriously challenged by a large number of scholars arguing that, in most cases, the family is a reasonable decision-making unit. Mincer (1978) claims that migration studies should be conducted at the family level rather than individual level because it is not an individual gain but family gain which matters in mobility decision-making. Stark (1984) and Stark and Bloom (1985) within the New Economics of Labour Migration (NELM) argue that families or even larger social units are actively involved in migration decision making and, consequently, migration should be understood not only as a mobility driven by profit maximization but also as a risk diversification strategy (allocation of labour). NELM brings into the discussion the issue of relative deprivation, that is, an idea that a non-satisfactory or deteriorating relative position within a reference group will result in a migration decision and that the expected outcome of this decision is a change in one's relative income position (or change of the reference group).

A large number of empirical studies tested the hypotheses that were derived from the micro approaches to migration and its drivers. Apart from the already mentioned impact of wage differentials (or expected wage differentials), the feeling of being relatively deprived is also discussed as a possible driver of migration (Stark and Taylor 1989, 1991a, 1991b; Queen 2006; Czaika 2011). Nonetheless, responses to wage differentials are highly selective and this selectivity depends on factors such as human capital/education/skills (Kaczmarczyk 2005; Anacka 2010; Anacka and Okólski 2010; Grabowska and Okólski 2009; Mosca and Wright 2010; Venhorst *et al*. 2010), age (Kaczmarczyk 2005; Kaczmarczyk and Okólski 2008; Gottlieb and Joseph 2006; Grabowska and Okólski 2009; Mosca and Wright 2010), gender (Faggian and McCann 2007; Faggian, McCann and Sheppard 2006), marital status and family situation (Newbold 2001; Haapanen and Tervo 2011), migration experience (Kodrzycki 2001; Kaczmarczyk 2005) and so on. Last but not least, in a large number of studies the importance of social capital and migrant networks responsible for lowering the risks and costs associated with spatial mobility was pointed out (Fawcett 1987). Empirical studies document that the access to various forms of social capital is responsible for the migration propensity on an individual level, and determines to a large degree the pace of migration in social terms (migration as a social process) (Haapanen and Tervo 2011; Wulff 2008; Kaczmaczyk 2005; Glaeser and Redlick 2009).

In this work, we attempt to overcome the above-mentioned division between macro and micro-level. While identifying possible factors responsible for individual decisions within sequential migration framework, we rely on the commonly used push and pull factors model (Lee 1966). This analytical model – being an analytical approach rather than theory itself – takes into account the factors influencing decisions regarding migration in both sending (push factors) and receiving (pull factors) countries/regions. Additionally, among the push and pull factors, 'stick' and 'stay' factors can be distinguished. The first group, 'stick' factors are those that prevent people from migration regardless of the impact that push factors in the country (region) of origin can have. 'Stay' factors are those that prevent migrants from coming back to the country (region) of origin (Paradath *et al*. 2003). In this way, we refer directly to factors impacting the sequential migration decisions.

When interpreting the results, we will also move beyond the traditional literature on migration propensity by referring to the migration capabilities approach, as suggested by de Haas (2010). De Haas argues that migration decisions on the individual level should be analysed as the outcome of two factors: capability for migration and aspirations to migrate. Czaika and Vothknecht (2014) broaden the notion of aspiration, arguing that it includes not only the ability to aspire but also the knowledge of how to achieve certain goals. It can change over time, be inherited but can also be the product of one's social environment (e.g. university, family home, etc.). This approach – based on an interplay of mobility aspirations and all kind of capacities – reflects the increasing complexity of migratory behaviour that can involve many places and be also a sequential phenomenon (Paul 2011). However, it also has serious limitations in methodological terms. First, in the case of static survey (like ours), investigating the past migratory experience of individuals, aspirations and capabilities are in fact latent factors, which we are trying to evoke. Second, even in the longitudinal studies, which allow a 'real time' assessment of capabilities, the clear distinction between the capacity to aspire and capacity to realise is often difficult, as the two notions are highly correlated and they affect each other being affected by other factors as well, including mobility experience (endogeneity issue). We therefore consider this approach as useful, but rather subsidiary while interpreting the results of our study.

3 Empirical strategy and data

The main aim of the empirical analysis is to examine the role of a given set of characteristics on the migration propensity of Polish graduates. Following the conceptual approach, as presented in section 2, we claim that independent variables used in the analysis may serve as proxies for aspirations and capabilities to realize the migration project/life project by a given person. Additionally, they interrelate with structural factors observed at the macro level. Thus, in assessing the graduates' mobility, we **assume** the following:

1. Migration decisions are to some extent shaped by macro-level factors (push/pull/stick/stay).
2. The decision (propensity) to migrate depends on factors associated with individual/family characteristics, past migration experience, and educational career, affecting the individual aspirations and capabilities.
3. The structure and importance of the migratory drivers can change over the course of a lifetime and during the education process. Thus, we differentiate a few distinct types of sequential migration driven by various sets of causal factors.

With regard to those assumptions, and following the literature review presented above, we expect that the propensity to migrate is correlated with:

1. Factors observed at the regional (municipal) level (macro-level factors): with regard to this level, we included hometown population and unemployment rate in the municipality of origin, which can be interpreted in terms of push/pull/stick/stay factors.
2. Factors associated with the academic career and the quality of human capital, such as: choice of academic (general) track in secondary education stage, exemption from (part of) final examination in secondary school, graduation from MA programme, quality (rank) of the chosen university.
3. Factors associated with the inherited capability to realize certain life project**:** educational attainment of parents, presence of books in family home, family material status in the past (having own room while in primary school), parents' employment status, family size, past mobility experiences (including these in parents' generation), some of them can be interpreted as proxies of social and/or cultural capital.
4. Factors associated with the professional experience and expectations: reservation wage, and experience of employment during university studies.

Additionally, in our econometric characteristics we include a set of controls: socio-demographic variables (age, gender, marital status), as well as variables related to respondents' field and mode of studies. Based on the evidence from earlier research, we believe that these factors may affect migration decisions, but they cannot be interpreted as belonging to any of the above categories.

The main hypothesis says that there is no common set of factors influencing various migration strategies (there are statistically significant differences between identified categories). Thus, we propose a set of specific hypotheses related to particular migration strategies:

1. Repeat migration is driven predominantly by the level of people's aspirations. More ambitious individuals should also be more willing to repeatedly change their place of residence. However, this strategy can also be a function of opportunities available. In turn, coming from a privileged environment may provide a strong disincentive to move (higher capacity helps to materialize one's aspirations even without migration).
2. Return migrants are a very heterogeneous group. This kind of migration behaviour may be driven by a low individual ability to realize a successful project of permanent migration. However, characteristics of the hometown (such as city size and labour market opportunities) are important in assessing the strength of the migration push factor. It is possible that a return strategy is optimal for an individual, and does not indicate the failure of a wider life project.
3. University staying is the outcome driven by high motivation (aspiration) required to be able to graduate from university outside an individual's hometown, and to find employment in the place of graduation. The capacity to realize this plan is however dependent on family budget constraints, and other kinds of family support (inherited human capital, intergenerational migration experience, etc.).
4. Late migration may be characteristic to graduates of certain faculties. For example, studies in technical/engineering may encourage late migration due to the specificity of the related labour market.
5. Non-migrant category is likely to include those who are not able to move (due to low aspirations, or low

ability), but also those who do not face the incentive to migrate (e.g. inhabitants of large cities). These two subcategories need to be interpreted differently.

Thus, our empirical aim is to examine the role of independent variables on the migration status of Polish graduates. This status can be described as repeat migrants (j = 1), return migrants (j = 2), university stayers (j = 3), late migrants (j = 4) and non-migrants (j = 5). Let us assume that the utilities corresponding with a given situation (migration status) are given by:

$$U_{i,j} = x'_i\beta_j + \varepsilon_{ij} \quad (1)$$

where x is a vector of variables which are proxies of capabilities, aspirations and push/pull/stick/stay factors as well as control variables (including socio-demographic characteristics), β_j is the coefficient corresponding to alternative j and ε_{ij} indicates the error term. In such a framework, the probability of representing one of the migrant categories is determined by the pair wise comparison of utilities as given above (set of logits). If the error terms are independent and properly distributed, the probability of representing a given category of migrant (choosing one type of migration) can be expressed as a multinomial logit model in the following form (McFadden 1973; Long 1997):

$$Prob[y_i = j] = \frac{\exp(x'_i\beta_j)}{\sum_{j=1}^{5}[x'_i\beta_j]}, j = 1, \dots 5 \quad (2)$$

For identification purposes, we need a reference category describing one kind of sequential migration behaviour, to which we can relate all other strategies. As we are interested in a better understanding of the mobility of young individuals, a natural choice for reference is non-migrant category. However, the eventual interpretation of model outcomes may be sometimes difficult, as non-migrants are definitely a heterogeneous group with respect not only to individual aspirations and capacities to realize their life projects, but also regarding the need to be mobile in order to achieve their goals. For example, the incentives to migrate are very different for individuals raised in the large metropolises as compared to the small, remote settlements. One way of overcoming this problem would be to use a narrower definition of the reference category, so that it includes a less heterogeneous group of individuals. Unfortunately, this would lead to multiplication of categories, and will ultimately make the interpretation of results harder. For this reason, we decided to stick to the five categories of sequential migration behaviour used by Faggian, McCann and Sheppard (2006). However, we perform the multinomial logit estimation twice, using two different reference categories, and we draw conclusions on the drivers of sequential migration behaviours based on such a dual reference instead of using non-migrants as a unique point of reference. We chose return migration as the 'auxiliary' reference category. Although this group is also far from being homogenous, and the interpretation of the results needs to be very careful; from the point of view of sequential migration approach, return migration may be considered as an interrupted migration project, which offers some perspective for discussing the outcomes of the model estimation.

Few attempts to study the patterns of skilled migration between the Polish regions have been based on the original, user-generated data. Herbst (2010) exploited a unique dataset from a Polish social networking website to assess the ability of Polish academic cities to attract and absorb human capital. Herbst and Rok (2014) eventually used the same data to develop a typology of skilled migration and to construct an empirical model of student and graduate migration.

In this study, we used a database constructed jointly by EUROREG, University of Warsaw and the Education Research Institute (IBE) in Warsaw. The research survey was originally performed on a sample of 5,800 Polish citizens aged 25−30 years, who had attained at least a full secondary education.[3] For the purpose of this research, the sample was restricted to individuals holding a BA or MA degree, as we were interested in the sequential migration behaviour of university graduates. This, along with deleting about 70 records with missing data, reduced the research sample to 2,426 observations.

At the time of interview, all the respondents were between 1 and 10 years after graduation from tertiary school and they were not enrolled in any education institution.

3 The research was conducted in the spring of 2013 using CAPI on a quota sample, stratified with respect to the sex, region of residence, and the type of settlement unit, so that the sample reflects the structure of population holding at least secondary education. As in this article, the analysis becomes restricted to respondents holding BA or MA, the analytical weight is applied in all estimations in order to achieve a sample that is representative of the population of tertiary school graduates with respect to the strata used in the original sampling procedure. The data covers only Polish residents. Graduates who left abroad are beyond the scope of our study, which naturally causes a selection bias. This has to be acknowledged when interpreting the results, and using them to formulate the policy recommendations. The dataset is available on request from the Educational Research Institute (IBE), Warsaw, Poland.

Tab. 1. Explanatory variables

Explanatory variable	Mean	St. Dev.
Individual/family characteristics		
Sex (female = 1)	0.580	0.493
Married (yes = 1)	0.405	0.491
Age of respondent	27.808	1.806
Mother with university degree (yes = 1)	0.187	0.390
Mother with less than secondary education (yes = 1)	0.267	0.443
More than 200 books at home (yes = 1)	0.165	0.371
Father's occupation high skilled white collar (yes = 1)	0.209	0.407
Number of siblings	1.377	1.308
Birth order	1.568	0.842
Own room while in primary school (yes = 1)	0.697	0.460
Past migration experience		
Mother's family home more than 20 km from respondent's primary school (yes = 1)	0.163	0.370
Distance between respondent's primary and secondary schools (km)	10.660	38.443
Hometown characteristics		
Population of municipality of origin	302 649	510 635
Unemployment rate in municipality of origin	13.059	6.891
Secondary school characteristics/achievements		
Completed general secondary school (yes = 1)	0.700	0.458
Respondent exempted from any part of Matura (secondary school leavers) examination (yes = 1)	0.091	0.288
Tertiary school characteristics/achievements		
Attended non-public tertiary school	0.230	0.421
Graduated from MA program (yes = 1)	0.627	0.484
Was employed during last year of university studies (yes = 1)	0.397	0.489
Respondent's university quality indicator	51.492	33.336
Study field: science-engineering (yes = 1)	0.210	0.407
Study field: social science (yes = 1)	0.302	0.459
Non-stationary mode of studying (yes = 1)	0.357	0.479
Wage aspirations		
Wage expected in respondent's post (reservation wage)	3499.938	3093.673

Source: Authors' own elaboration.

The respondents were interviewed in 50 randomly chosen counties (out of a total number of 380 counties in Poland). The survey dataset was merged with selected data from the Local Data Bank (administered by the Central Statistical Office), and with the results of a university ranking administered by the independent web portal 'Perspektywy'.

The explanatory variables used in the model specification are listed in Tab. 1. To make the way we interpret certain variables clearer, the table is organized by the type of characteristics they represent, that is, into: respondent's individual and family characteristics, past migration experience, hometown characteristics, secondary school experience, tertiary education experience, and wage aspirations. Tab. 1 also includes descriptive statistics of the variables used in the econometric modelling.

The dependent variable reflects the sequential migration decisions of individuals. It takes one of the five values: 0 − for non-migrants; 1 − for return migrants; 2 − for university stayers; 3 − for repeat migrants; and 4 − for late migrants. The first two categories are interchangeably used as reference groups in the estimations.

Following Faggian and McCann (2009a), we consider migration as a movement covering a distance of more than 15 km. We assess the individual sequential migration behaviour by mapping the localities in which he or she completed primary school (the earliest location available in our dataset), graduated from university and lived at the moment the survey was conducted. Only those individuals, who had already terminated their school education, were included in the sample. For example, a return migrant is an individual, whose university was located more than 15 km away from his

or her primary school, and his/her ultimate place of residence was less than 15 km away from the primary school.

We decided to apply a criterion of 15 km as a delimiter of migration activity, following the approach taken in the earlier, well recognized study. However, intuitively such distance may be considered too short, particularly when considering mobility to the university. Therefore, we tested the sensitivity of our results to the changes in the definition of the dependent variable, by performing an alternative classification into categories of sequential migration behaviour (using 30 km and 50 km as delimiters). This exercise showed that with the augmentation of a distance considered as migration, the general findings (signs and magnitudes) remain largely unchanged, but since the number of observations belonging to some categories of the dependent variable drops, problems arise with the statistical significance of the observed phenomena. We therefore decided to report and discuss the results obtained using the criterion of 15 km, although we believe that applying more strict delimiters does not affect the merit of our findings.

Naturally, by focusing on school locations as the criteria for assessing migration, we consider permanent and circular mobility as equal phenomenon. In other words, individuals who do not change their place of residence, but decide to commute (on a daily basis) to a school located more than 15 km away are equivalent to those who physically move more than 15 km in order to attend this school. This approach is clearly different from a large number of studies distinguishing between migration and commuting, but in our approach, we put an emphasis on the experience of mobility as such, and thus, no distinction is being made.

The model has been subjected to a number of diagnostic checks. One of the popular scalar measures of fit for the multinomial logistic regression is McFadden's R2. According to Mc Fadden (1978), the rule of thumb is that the pseudo R2 should be between 0.2 and 0.4 for such models, and in our case – it is 0.3005, which suggests that the model fits the data relatively well. The Hausman−McFadden test for Independence of Irrelevant Alternatives was performed, but the result was not satisfactory. We obtained a negative outcome, in contradiction to the asymptotic chi-square distribution of the test statistic. A similar result was confirmed by many other researchers using this test. Long and Freese (2006) do not encourage the use of common IIA tests (McFadden and Small−Hsiao) and indicate that there seems to be no reliable test of the IIA assumption.

Using the estimated coefficients, it is also possible to generate the predicted probabilities to better understand the model and its fit. Based on the predicted probabilities calculated for each observation and each alternative, we generated in-sample predictions of migration status (based on the alternative with the highest probability at the observation level) and compared them with the observed values of migration status using a so-called confusion matrix (a two-way frequency table). The percentage of correctly predicted levels is quite high and equals 70.4% (for 1,708 observations, the in-sample prediction is correct). However, it seems that the model performs well in predicting two levels of migration status – non-migrants and return migrants (78.7% and 93.8% correct predictions respectively), and much worse with respect to the remaining two categories. It rarely predicts university stayers (only 0.04% share in predictions while 5.9% in actual values – only 0.7% of predictions are correct for this group) and repeat migrants (1% share in predictions and 8.2% share in actual values – 3% of predictions are correct) and never predicts late migrants which cover 5.2% of the sample (126 observations).

In terms of robustness check, we decided to perform a leave-one-out cross-validation of the model. This requires estimating the model n times, where n is the number of observations. In each estimation, one of the observations is left out and not used in estimation. Then, based on the estimated coefficients, the out-of-sample prediction is performed for this single observation. The procedure is repeated for each observation in the sample. The results are not very different from the in-sample predictions. The percentage of correctly predicted levels is again quite high and equals 70.7% (for 1,715 observations, the out-of-sample prediction is correct). This contrasts with the in-sample prediction results where the model predicts late migrants slightly better – they cover 5.2% of the sample (126 observations) and the model predicts this status in 1.0% of cases. The prediction is correct for 9.5% of the actual late migrants.

4 Results

As presenting full results of the multinomial logistic regression with all its statistics would take a lot of space and it would provide a reader with information which is difficult to interpret, we take a different approach. In order to keep our discussion clear and relatively straightforward, we first summarize the main outcomes

with reference to the simplified Tab. 2, showing only the odds ratios calculated from variable coefficients (e^{β}) and their level of statistical significance. We report only the ratios that proved statistically significant at least at 10% level.

A disadvantage of using the multinomial logit is that the model coefficients themselves do not have any direct meaning, and even the odds ratios are not easy to interpret. Intuitively, it is the probabilities that we are interested in, not the log odds, or the odds ratio of an event. Difficulties in logit interpretation are more profoundly discussed by Norton, Wang and Ai (2004). One way to overcome this shortcoming is to compute the estimated (conditional) probabilities for some values of the independent variables (for algebraic details see Stata Library 2011). More precisely, in Tab. 3, we present the changes in probability of different types of migration behaviour in response to the hypothetical shifts in the values of the explanatory variables. Again, we focus on those variables that proved statistically significant (at least at 10% level) in the logit estimation.

While interpreting the results, we will first refer briefly to the impact of particular drivers − push/pull/stick factors, human capital endowment, experience, expectations − on the mobility of individuals. We attempt to associate these factors with certain types of sequential migration behaviour: return migration, university staying, late migration and repeat migration. Then, we discuss the importance of selected variables in more detail, referring to the estimated effects on the probability of choosing particular migration strategy. Finally, we confront the revealed mechanisms with our hypotheses on the nature of sequential migration, as defined in section 3 of this study.

With respect to the macro level factors, the results clearly show that the impossibility (or difficulties) of realizing aspirations in place of origin (proxied by hometown population and unemployment rate) constitute a strong push factor, increasing the propensity to migrate, both at early stage (before tertiary education is completed) and after graduation. Students originating from small towns are often trying to realize the scenario of university staying. In turn, scarce labour market opportunities in the student's hometown works as a push factor, but they may also contribute to return mobility, which in this case may be considered as an unsuccessful attempt of permanent migration.

Parental education and SES also have a strong effect on the sequential migration behaviour. Individuals with highly educated mothers are more likely to become university stayers, and unlikely to become repeat migrants. In turn, having a mother with very low educational attainment particularly supports strongly late migrations.

MA aspirations support all types of interregional migration behaviour. Furthermore, graduating from a better university (from either a BA or MA program) is associated with higher mobility. It notably increases the likelihood of return migration, and repeat migration. It also supports the university staying scenario, but not late migration. This result differs from the one observed recently by Ciriaci (2014) for Italy. As concluded by this author, university quality positively affects the inflow migration, which suggests that universities are the proper 'supply' tools for policymakers, in order to counterbalance the negative effects of brain drain on regional human capital accumulation. The evidence from Poland does not fully support this view, as better universities work in favour of not only 'staying' strategy, but also repeat and return migration.

Employment during studies works in favour of the university staying strategy, and it has no effect on other migration strategies. The importance of employability in the context of migration decisions is in line with the results of some earlier studies, including the very recent research on the regional labour mobility in Germany (Krabel and Flother 2014; Arntz, Gregory and Lehmer 2014). In accordance with some earlier studies (Kodrzycki 2001; Gottlieb and Joseph 2006) it turns out that past migration experience (both this in parents' generation, and own experience in the course of secondary education) increases the probability of all types of sequential migration, with a particularly strong impact on repeat migration. This in turn shows that the ability to take (and to control) risks related to mobility plays a crucial role in migration decision making.

Those studying social sciences are more likely to become university stayers, while technical education supports late migration. This outcome corresponds to the earlier observation by Venhorst *et al.* (2010) regarding the Dutch graduates. It turned out that the young Dutch economists were more determined to maximize their returns from investment in education (for example, by moving to large cities) as compared to the students graduating in other fields. Polish evidence also shows that wage aspirations have a positive association with repeat migration and university staying, but they are not statistically related to other types of sequential migration behaviour.

Tab. 2. Odds ratios based on logit regression coefficients (only significant results reported)

Migration behaviour:	**No migration vs**		**Return migration vs**		**University staying vs**		**Repeat migration vs**		**Late migration vs**	
Reference:	**No migration**	**Return migration**	**No migration**	**Return migration**	**No migration**	**Return migration**	**No migration**	**Return migration**	**No migration**	**Return migration**
Individual/family characteristics										
mother with university degree						1.791**	0.472**	0.358***		
mother below secondary education		0.706**	1.416**				1.782***		2.028***	1.846**
father – high skilled white collar		0.605***	1.735***		1.657*		2.433***		1.644*	
married							1.449*	1.412*	1.761**	
birth order							1.230*	1.251**		
own room							1.478*	1.418*		
Past migration experience										
mother's migration experience		0.664***	1.392*		2.401***		2.321***	1.998***		
dist. from primary to second. school		0.990***	1.010***		1.018***	1.009**	1.020***	1.011***	1.020***	1.012***
Hometown characteristics										
population of municipality (x1000)		1.005***	0.993***		0.992***		0.996***	1.003***	0.999***	1.004***
unemployment		0.930***	1.138***		1.183***	1.044***	1.169***	1.026*		0.941***
Secondary school characteristics/achievements										
general secondary school										
exempted from Matura exam							1.716*	1.694**		
tertiary school characteristics/achievements										
private school						1.885**				
employed during studies					2.507***	1.791***				
university quality		0.989***	1.019***		1.020***		1.019***			0.992**
graduated MA		0.451***	2.077***		2.514***		1.665**		2.356***	
social science					1.697**	1.657**				
science-engineering							0.530**	0.415***	1.749**	1.795**
non-stationary mode		0.743**	1.322*			0.461***			1.565*	
Wage aspirations										
reservation wage (a) (x1000)					1.058*	1.042*	1.076***	1.058***		

Note: Number of obs = 2.426; Prob > chi2 = 0.0000; Log likelihood = -2064.5572; Pseudo R2 = 0.3005

Source: Authors' own elaboration.

Finally, sex does not seem to have any significant effect on sequential migration strategies. This is in line with the results of many studies (Groen 2004; Haapanen and Tervo 2011), although there is also some evidence for higher mobility of women (Faggian and McCann 2007). Some authors argue that the role of sex in migration decisions may be indirect − through the intra-family gender relations, and the importance of such factors as the access to childcare provision or a life-stage perspective (Shinozaki 2014).

Tab. 3 presents the effects of change in the values of selected variables (the same as those presented in Tab. 2) on the conditional probability of certain types of migration behaviour. Expressing the impact of different factors in terms of probability allows us to assess the real (and not just statistical) significance of the observed phenomena. As we can see, having a highly educated mother has a moderate positive effect on the choice of a university staying strategy. The impact of maternal educational attainment on the probability of repeat migration and late migration is in turn clearly negative. More precisely, having a mother with only a primary education increases the probability of repeat migration by 11 percentage points (with non-migrant serving as reference category), and the probability of late migration – by 5 to 10 percentage points (depending on whether the reference category is non-migrant or return migrant). The results support our initial intuition that parental education may be viewed as a proxy for the given person's capabilities. High SES may provide a disincentive to migration, as individuals from educated families face higher chances of employment without the need to be mobile, but if an individual decides to migrate in order to enrol to the university, high family human capital helps to settle down in the migration destination. In turn, low family human capital may be bonding (causing return migration) or may delay act as strong push factor, increasing the probability of repeat migration.

Past migration experience has the strongest (positive) effect on the mobility of skilled individuals within the category of repeat migrants. A mother's migration experience increases the likelihood of a child's choice of repeat migration by 17 percentage points with reference to non-migrants, and by 9.5 percentage points compared to the probability of becoming a non-migrant. Furthermore, an individual's own experience with mobility, proxied by the distance between primary and secondary school location, makes further migration (other than return migration) more probable. By comparing the two hypothetical and otherwise identical individuals, one of which has completed primary and secondary school in the same town (0 km distance), and the second, for whom the respective distance was 20 km,[4] we observe that the probability of further migration is higher for the latter individual. The difference ranges from 2.1 to 7.1 percentage points depending on the considered sequential migration type.

Completing primary school in a large city makes an individual less prone to migrate. A hypothetical difference between somebody growing up in a city with a population of 100,000, as compared to an individual originating from a town with 10,000 inhabitants, is transformed into a 14-point gap in the probability of belonging to the university stayer category, and an 8-point difference in the probability of repeat migration. This outcome is well understandable if we interpret it in terms of push/pull/stick factors or the relatively lower gap between aspirations and capabilities in the case of inhabitants of large cities.

In turn, unemployment seems to be a very strong factor pushing for migration on the one hand, but on the other hand, it is often associated with a failure to permanently break away from the adverse environment. A 5-point difference in the unemployment rate in the town where an individual has completed primary school is transformed into a 14.5 percentage point gap in the probability of return migration (as referred to no migration), and a 1 to 7 points rise in the probability of other types of sequential migration behaviour. Finally, attending a university of high quality (high ranking) is positively correlated with all strategies involving early migration. Tab. 3 illustrates this effect showing the difference between a university in the first versus third quartile, according to the quality ranking. As it turns out, attending a better university is associated with an increase in the probability of return migration (versus non-migrant category) by 23 percentage points, and an increase in the probability of repeat migration by 17 percentage points. The positive effect on university staying is smaller (6 percentage points), but still highly significant.

At this stage of the study, the results of the model estimation need to be placed in the context of the hypotheses formulated in Section 3, referring to the nature of sequential migration behaviour. We expected repeat migration to be driven predominantly by characteristics

4 A distance of 20 km is just exemplary, it has not been picked for any purpose other than presenting the magnitude of the effect with respect to some 'real' mobility range.

Tab. 3. Change of the conditional probability of (in pp)

Variable	Change of the conditional probability of (in pp):										
	Migration behaviour:	**No migration vs**		**Return migration vs**		**University staying vs**		**Repeat migration vs**		**Late migration vs**	
	Reference:	**No migration**	**Return migration**	**No migration**	**Return migration**	**No migration**	**Return migration**	**No migration**	**Return migration**	**No migration**	**Return migration**
Individual/family characteristics											
mother with university degree	0→1						+2.4	-11.5	-11.5		
mother below secondary education	0→1		-8.6	+8.6				+10.9		+10.7	+4.9
father – high skilled white collar	0→1		-13.5	+13.5		+3.4		+17.6		+7.4	
married	0→1							+6.6	+6.3	+8.0	
birth order	1→3							+7.6	+6.5		
own room	0→1							+6.6	+0.4		
Past migration experience											
mother's migration experience	0→1		-8.2	+8.2		+6.7		+16.9	+9.4	+5.3	
distance from primary to secondary school	0→20		-5.2	+5.2		+2.1	+0.8	+7.1	+3.3		+2.4
Hometown characteristics											
population of municipality	10k→100k		+7.7	-7.7		-14.7		-7.8	+2.8	-1.9	+2.1
unemployment	5% → 10%		-14.5	+14.5		+2.1	+0.9	+7.7	+2.1		-10.0
Secondary school characteristics/achievements											
general secondary school	0 →1										
exempted from Matura examination	0→1							+10.6	+8.0		
Tertiary school characteristics/achievements											
private school	0→1						+1.1				
employed during studies	0→1					+5.9	+4.1				
university quality	75→25		-22.7	+22.7		+6.2		+16.9			-8.8
graduated MA	0→1		-18.1	+18.1		+5.0		+8.6		+10.9	
social science	0→1					+3.4	+3.9				
science-engineering	0→1							-10.0	-8.9	+8.5	+8.7
non-stationary mode	0→1		-6.9	+6.9			-2.2			+6.4	
Wage aspirations											
reservation wage (PLN)	3000→6000					+1.0	+0.3	+4.0	+1.9		

Source: Authors' own elaboration.

related to the level of aspirations. Indeed, the probability of becoming a repeat migrant turns out to be positively affected by aspiration related variables such as achievement based exemption from examinations, the quality of the university chosen by the student, or wage ambitions measured by the reservation wage. The impact of factors related to cultural capital is less unequivocal. Repeat migration seems to be negatively affected by family human capital, which suggests that individuals from low educated families may be more mobile in search for employment opportunities. However, high material status also supports a repeat migration strategy. At the same time, the probability of repeat migration is clearly conditioned by the past mobility experience. More precisely, it positively depends on the migration experience of the family in the previous generation, and on the mobility of an individual in the early stages of their education.

Return migration was expected to be driven by (low) capacities to realize a migration project and by the characteristics of the hometown (employability). Indeed, unemployment in the town of origin significantly affects return migration, but the sign (influence) of this effect is positive, indicating that migrants are likely to return to localities with low employment opportunities. This may suggest that the binding effect of an underprivileged starting location is stronger than its pushing effect resulting from increased motivation to migrate.

Surprisingly however, the probability of return migration is positively affected by some aspects of an individual's human and cultural capital, such as the quality of university and the intergenerational migration experience. It seems therefore that those who are expected to succeed in permanent migration tend to come back to their hometowns after graduating from university. It is likely that the obtained results are partly driven by the fact that the return migrant category, as defined in this research, includes many cases of circular mobility during studies. Students residing in the proximity of academic centres and commuting to school more than 15 km are classified as migrants, even if they have never changed their place of residence. In reality, however, circular migration is for many reasons very different from a permanent move to the city, and eventual return to the hometown. This calls for further analyses, and possibly for testing alternative definitions of the dependent variable.

In accordance with expectations, the strategy of university staying is positively related to both an individual's aspirations and the inherited capital, conditioning the capacity to realize life projects. The ability to remain in the city where the individual studied seems to depend significantly on the university career of an individual. Enrolling in a good university, graduating from an MA program and starting a professional career during studies are all events which positively affect the probability of becoming a university stayer. Another positive determinant is past migration experience. Being raised in a small town with poor employment prospects, acts as a significant push factor, increasing the propensity to become a university stayer. University staying is a migration strategy that is significantly affected by the field of studies. Graduates of social science programs are more likely to belong to this category than graduates of other faculties. The dominant role of specialized services in the labour market structure of large cities seems to be the important factor here.

In turn, as expected, studying engineering or in technical faculties is positively associated with late migration. This migration strategy is also more likely to be chosen by the graduates from the non-stationary programmes. The link between late migration and aspirations is rather weak and ambiguous. The MA graduates are more likely to migrate late as compared to BA, but graduating from a good school prevents rather than support late mobility. Growing in the family with low educational attainment (low human capital endowment) is one of the strongest determinants of late migration, which is difficult to explain and needs further consideration.

Finally, the non-migrant category turns out to be very heterogeneous. Some non-migrants clearly decide to be immobile since they live in large cities with good local employment prospects. The role of these 'stick' factors is self-explanatory here. Lack of migration is positively related to the individual's hometown population, and negatively – to the unemployment level. We might summarize the behaviour of such non-migrants as no-need-to-aspire, and thus – no migration. On the other hand, immobility is associated with low levels of aspirations, and particularly, lower quality of university and graduation from a BA, rather than an MA programme. In terms of capacities, non-migration is more likely to be the choice of students from families without any past migratory traditions. Therefore, there are reasons to claim that immobility might also be driven by the lack of certain kind of capacity.

5 Conclusions

The aim of this paper was to discuss the drivers of highly skilled migration, with a focus on the internal mobility of Polish graduates. With respect to the research hypotheses formulated in Section 3 of the paper, we find partial confirmation of our intuitions. First, we hypothesized that the set of factors responsible for certain migration strategies is different, and it can be explained in terms of structural factors, human capital characteristics or aspirations/capabilities related variables. Based on the estimates, we claim that repeat migrants are mainly driven by aspirations-related variables or, more precisely, by the gap between the aspirations and abilities to realize a certain life project. Whereas, this inability is mostly associated with low capabilities (low educated parents, low level of cultural capital, etc.). Unexpectedly, the return migration strategy is strongly (and positively) associated with an individual's human capital, including the quality of university. We conclude that this category combines those people whose abilities are strong enough to overcome labour market failures at origin and those with a very strong binding effect. University staying strategy is clearly positively associated with an individuals' aspirations and both inherited and possessed human and cultural capital. Poor opportunity prospects at origin act as a significant additional push factor in this case. Late migration strategy is only vaguely related to aspirations but, on the other hand, it is positively associated with certain types of education, particularly engineering and technical faculties. It points to the importance of transferability of skills and employability of people with easily transferable curricula, as opposed to people educated in social sciences or humanities who often struggle with limited opportunities offered by local labour markets. Non-migrant category seems to be the most heterogeneous one, as it combines persons born in large university towns and fully equipped with all forms of capital (and thus, able to realize their life projects without being mobile) and persons with low quality education who are not capable to move, but also may have limited aspirations in terms of mobility.

Second, the internal mobility of Polish graduates reflects severe spatial differences within the country, which is typical for most of the transition countries. In this context, mobility or migration serves as a measure to overcome limited opportunities (capabilities) in terms of financial or cultural capital or labour market. Our study shows that those limited capabilities in the home community act as the strongest push factors influencing not only student mobility, but also subsequent migration decisions. Importantly, the available studies show that internal mobility of well-educated Poles can play both substitutive and complementary role to the international migration. As, in many cases, it presents the first step towards moving abroad on temporary or permanent basis (Anacka 2010; Kaczmarczyk and Okólski 2008).

Third, the outcomes of our study can be interpreted in a broader context of educational, labour market and regional policies. Unequivocally, post-graduate mobility is an important factor shaping the allocation of well-skilled labour on regional level, and thus, impacts the development prospects of local communities. This form of mobility is positive from the perspective of active mobile persons as it is a manifestation of an ability to take some risk (even in case of return migration). At the same time, however, it can be challenging from the perspective of small, remote or economically lagged regions. As shown by some earlier research, the outcomes of the education related migration in Poland wear signs of a brain drain (Herbst 2010). Our study confirms that, so far, return migration exhibits the characteristics of 'return of failure' to a large extent. The propensity to be mobile, and to return migration as well, is strongly and positively associated with the quality of university education that is particularly well visible in case of some specializations. The very fact that the highest aspirations seem to support mobility in general could be used to strengthen the potential of migration to moderate spatial inequalities. This will only be possible if the rate of 'returns of success' will increase and the return migrants start playing a role of agents of change in their home communities. Mobility or migration does not present an ultimate solution in this case, as its development potential depends strongly on a set of other policies including those aimed at building the regional human capital stock (see *inter alia* Rodríguez-Pose and Fratesi 2004; Arnold, Bassanini and Scarpetta 2011), and those related *per se* to the labour market (higher flexibility, improved employability, better quality employment services, etc.).

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