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Małgorzata Markowska, Dariusz Głuszcuk,  
Beata Bal-Domańska



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**Barbara Dańska-Borsiak**

University of Lodz

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## THE DETERMINANTS OF MIGRATION OUTFLOWS FROM POLISH SUB-REGIONS IN BOTH INTERNAL MOVEMENT AND ABROAD – IDENTIFICATION AND COMPARISON

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**Summary:** An important aspect of migration is the movement of the labour force. The level of migration outflows may be the result of a stagnant situation in the region and/or the inhabitants' aspirations to improve their socio-economic conditions. The aim of this paper is to analyze the economic factors affecting the level of outflows from sub-regions. The hypothesis being verified is that the economic factors that determine the registered departures for permanent residence elsewhere are different depending on the migration's destination: abroad or in internal movement. In particular, the effects of human capital and the level of social development of regions are investigated, both measures being constructed for the purpose of the analysis. Additionally the hypothesis that the sub-region type (urban, near-urban, other) affects the level of outflows, is also verified. Analyses were performed using statistical tools and econometric models based on panel data.

**Keywords:** migration, sub-regions, panel data models, Hausman-Taylor estimator, human capital, social development.

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### 1. Introduction

One of the consequences of economic stagnation in a region could be the increasing number of people who migrate out of the region and take up permanent residence elsewhere, while the number of people coming into a region can be regarded as a symptom of its competitiveness. This is due to the fact that an important aspect of migration is the migration of the labour force. The motivations of migrants mainly concern improving their access to jobs and the possibility of obtaining higher wages, thereby improving their wellbeing somewhere else, as opposed to their current place of residence.

This paper aims to analyze the factors affecting the level of migration outflows from Polish NUTS3 sub-regions, measured by the number of registered departures for permanent residence per thousand inhabitants. The main hypothesis being verified in

the paper is that economic factors determining the departure for permanent residence are slightly different depending on the type of migration, i.e. whether internal movement or migration abroad. Among the potential determinants of migration outflows, two factors have been considered: the measure of human capital and the measure of the social development of a sub-region. The second hypothesis being verified in this paper is that the type of sub-region (urban, 'near-city', other) affects the level of migration outflows. The study was conducted using a panel data sample consisting of 66 Polish sub-regions for the years 2003-2010.

## 2. Migration outflows from sub-regions and their potential determinants

Research into inter-regional migrations has a long tradition. Among the most recent papers attention should be paid, *inter alia* to: [Ghatak, Mulhern, Watson 2008], [Sarra, Del Signore 2010], [LeSage, Pace 2008]. In Poland the research was undertaken in, *inter alia*: [Dańska-Borsiak 2008, 2013] and [Lewandowska-Gwarda 2013].

The research presented here is conducted on the level of sub-regions<sup>1</sup>. The choice of such spatial units is a compromise between data availability (poor at 'powiat' (district) level), and the belief that the level of voivodship (province) is too general to reflect the different levels of development and sectoral structure of the economy.

The analysis of migration outflows<sup>2</sup> for permanent residence, presented in this paper, focuses on economic factors. This applies to both internal migration and departures abroad. However, one should be aware that the migration decisions of the population, in addition to economic factors, are also affected by other factors arising from personal preferences, life situation, etc.

The main goal of this study is to verify whether the economic determinants of departures to take up permanent residence elsewhere differ with respect to internal migration or migration abroad. There is a large regional differentiation in terms of registrations for permanent residence elsewhere and registrations for permanent residence abroad. This is illustrated in the maps in Figure 1.

The sub-regions with the highest number of registered departures in internal movement are concentrated in northern and western Poland. The smallest number of departures to other Polish regions was registered in Łódź (7 registrations per 1000 inhabitants), Kraków, Warszawa, and Wrocław (8-9 registrations per 1000

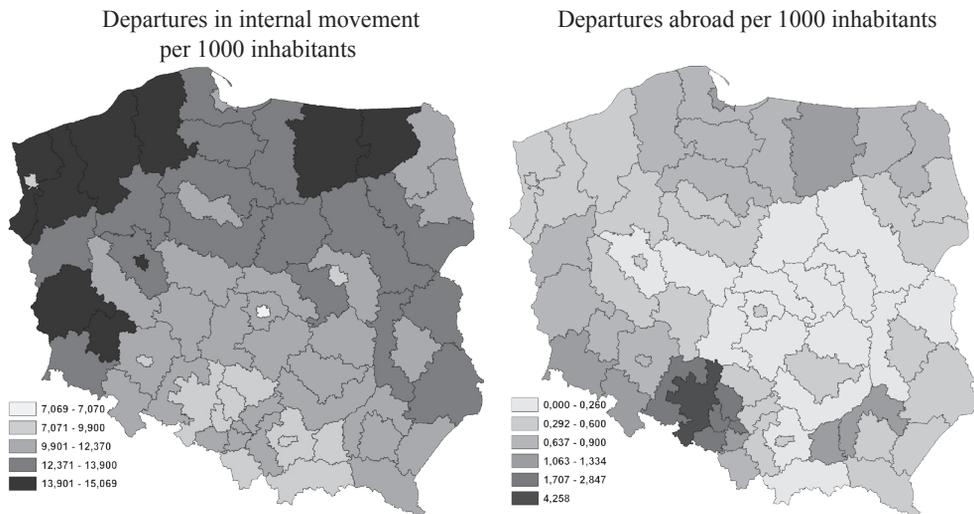
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<sup>1</sup> Division into sub-regions has been introduced in the research conducted by GUS [*Polish Central Statistical Office*] in connection with the necessity to adjust to the requirements of European Union law regarding regional statistics. The NUTS system is based on the binding administrative division of the member countries. Only in exceptional cases are new units created for statistical purposes which have no equivalent in the official territorial division. In the case of Poland, this pertains to sub-regions (NTS 3).

<sup>2</sup> The analysis of migration inflows into sub-regions was presented in [Dańska-Borsiak 2013].

inhabitants), as well as in the southern and central regions. A much smaller number of people decided to depart for permanent residence abroad. In this case the definitely highest number departed from the opolski sub-region (4.26 registrations per 1000 inhabitants). Also, the nyski sub-region and sub-regions of the śląskie voivodship (bytomski, gliwicki, rybnicki) had a significantly above-average number of departures for abroad (2-2.8 registrations per 1000 inhabitants). Generally, a relatively large number of departures for abroad is observed in the border areas, and a smaller number in central Poland.

As stated, the number of departures for permanent residence abroad is much smaller than departures for permanent residence elsewhere in the country. However, the share of departures abroad in the total number of departures for permanent residence elsewhere varies considerably between sub-regions. In 2003 in Kraków not a single departure for abroad was registered, and in the piotrkowski sub-region the share was only 0.03%. In contrast, in the opolski sub-region in the years 2003-2008 departures abroad constituted 31-36% of the total number of departures (in 2009 and 2010 this percentage fell to 20% and 18% respectively). In eight sub-regions the average percentage of registered departures for abroad exceeded 10%. Among them are five out of the eight sub-regions of the śląskie voivodship and both sub-regions of the opolskie voivodship.



**Figure 1.** The inter-regional variation of registrations of departure for permanent residence elsewhere (average for the sample period 2003-2010, by NUTS3).

Source: author's calculations based on GUS data.

The set of possible economic determinants of migration includes: GDP per capita, wages, unemployment rate, labour productivity, the human capital level, the

share of various economic sectors in value added, the rate of investment, and the level of social development.

The inclusion of GDP per capita, wages, and labour productivity can be justified by the fact that people usually move from poorer regions to those in which the standard of living is better. The impact of the unemployment rate is similar, but works in the opposite direction – indicating that the lack of work in one's current place of residence is a significant component in the decision to move elsewhere. The human capital level and the share of the services sector are measures of the Knowledge-Based Economy. Enhancing the level of development of the Knowledge-Based Economy should lead to increasing prosperity, and thus prevent migration outflows of population. The level of social development should have an analogous effect.

In order to verify the second hypothesis of the paper, three types of sub-regions have been distinguished. Eight "urban" sub-regions constitute the first type. They are the biggest Polish cities: Warszawa, Poznań, Kraków, Wrocław, Trójmiasto, Łódź, Szczecin, and Katowice. Ten other sub-regions, called "near-city", are those surrounding or neighbouring the above-mentioned cities, plus the bydgosko-toruński region. The latter covers two big cities, Toruń and Bydgoszcz, and their surrounding areas. The remaining forty eight regions are the "others".

### **3. Differentiation in the economic situation of sub-regions**

Eight out of all sixty six sub-regions, called "urban", comprise the biggest Polish cities. They are the socio-economic centres of their surrounding areas. They are characterized by the high level of development of their economies, relatively low unemployment rate, and wages higher than in many other regions. Their other distinguishing features include a highly skilled labour force, as indicated by the high value of human capital in these sub-regions (see Figure 1) and the highest shares of services in the sub-region's value added (in 2010 these sub-regions occupied eight of the top nine spots on the list of regions with the highest percentage of services' share; this proportion ranged from 69% in Katowice to 77% in Szczecin and almost 86% in Warszawa).

Poland is highly diversified in terms of its economic situation. This differentiation concerns practically all aspects of economic life, including the level of economic development, the situation on the labour market, and economic structure. These factors may influence the migration decisions of Poland's population. The stagnation of the economic situation of a region may affect the decision to move to a sub-region with a higher standard of living, or abroad. For these reasons, the following factors are recognized as the potential determinants of migration outflows (see [Kwiatkowski, Kucharski, Tokarski 2005]): the unemployment rate, GDP per capita, investment, wages, and the share of sectors (services and agriculture) in value-added. In addition, the authors constructed two synthetic measures which are included in the

set of potential explanatory variables: the human capital measure and the measure of social development of the sub-region.

Economic differences between sub-regions are affected to a large extent by the modernity of their economies, which in turn depends, *inter alia*, on its sectoral structure. The shares of the agricultural sector in the value added of urban sub-regions are equal to zero. In sub-regions such as the sub-regions of the Śląsk agglomeration or bydgosko-toruński sub-region this share is about 1.5%, whereas in the łomżyński and ostrołęcko-siedlecki sub-regions it rises to 15-17%. The share of the services sector ranges from 30-40% to up to 70-80% in urban sub-regions. It should also be noted that in the period of the sample there were no distinct changes in the sectoral structure of the sub-regions' economies.

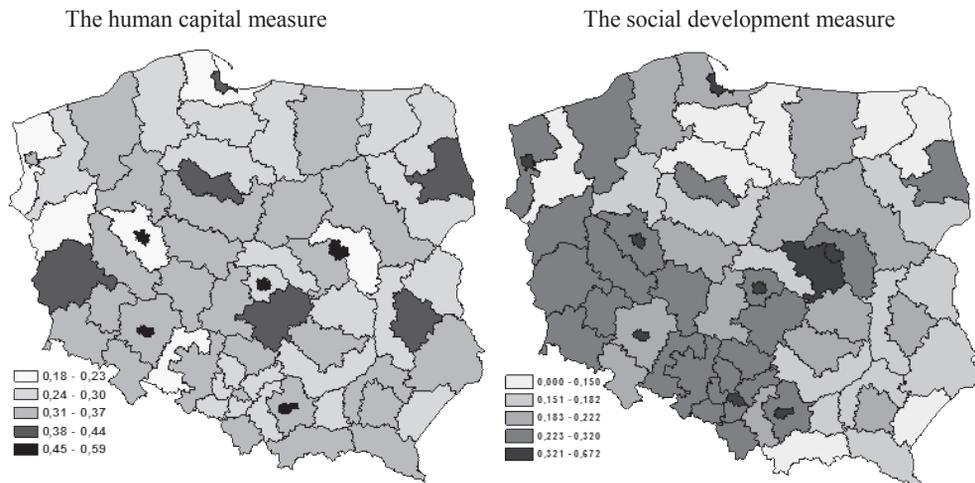
The role of human resources in building the competitiveness of economies is being raised more and more often. According to the theory of endogenous growth, human capital is considered to be an important factor in technological progress, and thus economic growth (see [Florczak 2007]). Human capital is defined as the stock of knowledge, skills, health and vital energy contained in a given society or nation.

As a measure of human capital a self-constructed indicator is adopted, the design of which is described in the paper by Dańska-Borsiak and Laskowska [2012]. For the purposes of this study the value of this measure is calculated additionally for the year 2010. The choice of the diagnostic variables for constructing the measure was limited by the very poor availability of data at NUTS3 level. Finally, the following indicators were selected to account for various human capital aspects: computer with Internet access per ten thousand inhabitants, number of students per ten thousand inhabitants, number of graduates of schools of higher education per ten thousand inhabitants, gross scholarisation coefficient in the case of post-secondary schools (age: 19-21 years old), and outlays on health (measured by the number of consultations with physicians per ten thousand inhabitants). The last variable has been used as the indicator of the state of health owing to the lack of other information about the state of health (e.g. life expectancy) at the level of sub-regions. The value of the aggregate variable for each object  $i$  and each time period  $t$  is the unweighted sum of the above-mentioned individual diagnostic characteristics after normalization. The higher the value of the aggregate variable, the higher the human capital level.

Sub-regions with the highest level of human capital include the vast majority of urban sub-regions. On average in the considered period, the sub-regions with the highest level of human capital included the cities of Warszawa, Poznań, Łódź, and Kraków. The average level of the human capital measured in the Polish sub-regions in the period 2003-2010 is illustrated in Figure 2.

The poor quality of life in a particular sub-region is another factor that may affect the decision to migrate out of the region. For the purpose of this study a measure of social development in the sub-regions has been constructed. It is a synthetic non-patterned measure, being an arithmetic mean of diagnostic variables after unitarization. The following diagnostic variables have been selected to account for

various social development aspects: expenditure of 'gminas' and cities with a 'powiat' status budgets per one inhabitant, revenue of 'gminas' and cities with 'powiat' status budgets per one inhabitant, outlays on fixed assets serving environmental protection, municipal waste-water treated per 100 km<sup>2</sup>, entities entered in the REGON register per ten thousand inhabitants, percentage of children aged 3-6 covered by pre-school education, and average usable floor space per single dwelling. The higher the value of the aggregate variable, the better the social development level.



**Figure 2.** The inter-regional variation of human capital and social development measures (average in the sample period 2003-2010).

Source: author's calculation.

As in the case of human capital, so too in the case of the social development measure, the highest values are observed in the urban regions. Eight out of the nine sub-regions with the highest values of the measure are urban regions. The ninth is the warszawski-zachodni sub-region, which is the near-city (Warszawa) one. It is also noticeable that western sub-regions are characterized by higher values of the measure. The inter-regional variation of the social development measure is shown on the map in Figure 2.

#### 4. The determinants of migration – the results of econometric analysis

According to the assumptions presented in the previous section and the purpose of the study, two models have been elaborated. One of them describes the number of registered departures for permanent residence elsewhere in internal movement per

1000 inhabitants (variable  $rdi_{it}$ ), and the second describes the number of registered departures for permanent residence abroad per 1000 inhabitants (variable  $rda_{it}$ ). Estimation results are based on the data from 66 Polish NUTS3 regions during 2003-2010, published by GUS (<http://www.stat.gov.pl/bdl>).

Several alternative models with different sets of explanatory variables have also been elaborated. In particular, in accordance with the second hypothesis formulated in section 1, an attempt was made to verify whether the type of sub-region (urban, near-city, other) affects the number of departures for permanent residence. However, the dummy variables for the region type have been insignificant in the models. The variables are also weakly correlated with the left-hand side variables (the strongest correlation,  $-0.29$  is between city sub-regions and  $rdi$ ).

Based on the results of numerous attempts, the final specifications of both models have been chosen. Models that have the best statistical properties and are economically sensible are of the following form:

$$rdi_{it} = \beta_0 + \beta_1 sb_{i,t-2} + \beta_2 urol_{it} + \beta_3 \sin v_{i,t-1} + \beta_4 mrs_{it} + (\alpha_i + \varepsilon_{it}) \quad (1)$$

$$rda_{it} = \beta_{a0} + \beta_{a1} sb_{i,t-1} + \beta_{a2} urol_{it} + \beta_{a3} pkbpc_{i,t-2} + \beta_{a4} kl_{i,t-2} + \beta_{a5} d_i + (\alpha_i + \varepsilon_{it}) \quad (2)$$

where the explanatory variables are:  $sb$  – rate of unemployment;  $urol$  – share of agriculture in of the sub-region's value added (in %);  $pkbpc$  – GDP *per capita* in thousands of PLN;  $kl$  – human capital measure;  $sinv$  – rate of investment as a ratio of investment outlays to GDP (in %);  $mrs$  – social development measure;  $d_i$  – dummy variable, 1 for the opolski sub-region;  $u_{it} = \alpha_i + \varepsilon_i$  – error term, containing group effects  $\alpha_i$ .

During the research, alternative specifications for panel data were applied, such as the fixed effects model (FEM) and random effects model (REM), both with alternative assumptions: of AR(1) disturbance and of no autocorrelation, as well as the Hausman-Taylor model (HT). Tables 1 and 2 present the results yielded by the models (1) and (2) respectively, achieved by choosing the method producing the best statistical properties and correct from the standpoint of economic theory.

Looking at the results included in Table 1, it can be stated that the factor having the strongest impact on migration outflows in terms of internal movement is the social development level. This means that the high quality of living in a region is a disincentive for departure. More precisely, the design of the measure  $mrs$  includes derivatives of the level of a region's wealth (e.g. the revenue of region's budget, entities entered in the REGON register) as well as "comfort" derivatives (e.g. environmental protection, availability of pre-school education, usable floor space of dwellings).

**Table 1.** Estimation results of the model (1), FEM with an AR(1) disturbance

Variable	Parameter estimate	Standard error	t-statistics	p-value
$\beta_0$	2.492	0.313	7.950	0.000
$sb_{i,t-2}$	0.108	0.024	4.530	0.002
$urol_{it}$	0.846	0.096	8.860	0.000
$sinv_{i,t-1}$	-0.097	0.028	-3.420	0.001
$mrs_{it}$	-3.875	1.097	-3.532	0.000
Goodness of fit				
$R^2_{within} = 0,595$		$R^2_{between} = 0,645$		$R^2_{overall} = 0,663$
Chow test of group effects				
F = 17.46		p-value = 0.000		

Source: author's calculations.

Another factor that deters people from departing from a region is a high investment rate, which is in line with the Keynesian theory about the importance of investment for an economy. This impact is lagged, as is the impact of the unemployment rate. An increase in the unemployment rate increases the number of registered departures for permanent residence elsewhere in internal movement with a two-year lag. The lag in reaction may be due to the generally low mobility of Polish society and the reluctance to retrain, as well as to the relatively few job opportunities in other regions, especially in certain occupations. Another stimulant of migration outflows in internal movement is the share of agriculture in the sub-region's value-added. The effect of this variable is immediate and relatively strong. This means that the old-fashioned structure of the economy is an important factor deterring people from remaining in the region.

As can be noted in Table 2, the variable that has the strongest effect on the number of registered departures abroad is the human capital variable, with a time lag of two years. The sign of the parameter estimate is positive, which is a very unfavourable phenomenon, as it reflects the fact that well-educated people tend to move out of the country for permanent residence. The variable  $kl$  is treated as endogenous in the model, which signifies its correlation with group effects.<sup>3</sup> Thus in sub-regions there are latent, non-measurable factors, constant over time, which promote human capital.

The impact of the unemployment rate is weaker in the case of migration abroad than in the case of internal migration. However the increase of migration outflow takes place significantly quicker than in the case of migration in internal movement (the lag time is only one year), so those who are more mobile and willing to move

<sup>3</sup> This is possible through the use of the Hausman-Taylor estimator. This estimator, being basically the estimator of the Generalized Instrumental Variable Method, is also an efficient estimator of the Generalized Method of Moments. Therefore it is possible to account for the endogeneity of chosen explanatory variables (see e.g. [Baltagi 2008]).

abroad (perhaps better educated or younger) decide to leave more quickly. Such an interpretation is consistent with the positive sign of the parameter at the variable  $kl$ .

**Table 2.** Estimation results of model (2), the Hausman-Taylor method

Variable	Parameter estimate	Standard error	t-statistics	p-value
$\beta_{a0}$	0.219	0.107	2.05	0.041
Time-varying exogenous variables				
$sb_{i,t-1}$	0.019	0.006	3.17	0.002
$urol$	-0.062	0.017	-3.64	0.000
$pkbpc_{i,t-2}$	-0.027	0.006	-4.10	0.000
Time-invariant endogenous variable				
$kl_{i,t-2}$	4.026	0.669	6.02	0.000
Time-invariant exogenous variable				
$d_i$	3.106	0.605	5.14	0.000
Stochastic structure parameters				
$\sigma(\alpha_i) = 0,355$	$\sigma(\varepsilon_{it}) = 0,578$		$\sigma^2(\alpha_i) / \sigma^2(u_{it}) = 0,726$	
Wald test				
$\chi^2 = 147.89$		$p\text{-value} = 0.000$		

Source: author's calculations.

In contrast to model (1), the effect of the share of agriculture in the sub-region's value added is now negative. Indirectly, this may mean that people working in agriculture, usually less educated, are reluctant to migrate abroad, but more eager to move to other Polish sub-regions. The high value of the parameter estimate of the dummy for the opolski sub-region reflects the extremely high share of departures abroad observed in this sub-region, which has been mentioned in the previous section.

## 5. Conclusions

The study analyzes the relationship between the number of registered departures for permanent residence elsewhere in sub-regions and their economic development. A hypothesis was formulated that the determinants of registered departures for permanent residence elsewhere in internal movement are different from the determinants of outflows abroad. This hypothesis has been confirmed. The second hypothesis, that migration outflows differ for different types of regions, has been rejected.

A factor which determines migration outflows, both in internal movement and abroad, is the unemployment rate. An interesting fact is that the share of agriculture in value added of a sub-region has a negative effect on the number registered departures abroad, whereas the effect is positive for internal movement. A very unfavourable

phenomenon observed in the research is that the human capital measure has the strongest effect on the number of registered departures abroad, and that the effect is positive.

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## DETERMINANTY KRAJOWYCH I ZAGRANICZNYCH ODPŁYWÓW MIGRACYJNYCH Z PODREGIONÓW – IDENTYFIKACJA I PORÓWNANIE

**Streszczenie:** Ważnym aspektem migracji ludności są migracje zasobów siły roboczej. Poziom odpływów migracyjnych może wynikać ze stagnacji sytuacji w regionie i dążenia do poprawy warunków społeczno-ekonomicznych ludności. Celem referatu jest analiza czynników ekonomicznych wpływających na poziom odpływów migracyjnych ludności z podregionów. Weryfikowana jest hipoteza, że czynniki ekonomiczne, które decydują o wymeldowaniu na pobyt stały, są odmienne w zależności od celu migracji: za granicę czy w obrębie kraju. W szczególności badany jest wpływ kapitału ludzkiego i poziomu rozwoju społecznego regionu. Obie miary są skonstruowane na potrzeby badania. Dodatkowo weryfikowana jest

hipoteza, że wpływ na poziom odpływów migracyjnych ma typ podregionu (miejski, okołomiejski, inny). Analizy przeprowadzono z użyciem narzędzi statystycznych i modeli ekonometrycznych szacowanych na podstawie danych panelowych.

**Słowa kluczowe:** migracje, podregiony, modele danych panelowych, estymator Hausmana-Taylora, kapitał ludzki, rozwój społeczny.