

JOURNAL 
of Applied Economic Sciences



Volume XII
Issue 3 (49) Summer 2017

ISSN-L 1843 - 6110
ISSN 2393 - 5162

Editorial Board

Editor in Chief

PhD Professor Laura GAVRILĂ (formerly ȘTEFĂNESCU)

Managing Editor

PhD Associate Professor Mădălina CONSTANTINESCU

Executive Editor

PhD Professor Ion Viorel MATEI

International Relations Responsible

PhD Pompiliu CONSTANTINESCU

Proof – readers

PhD Ana-Maria TRANTESCU – *English*

Redactors

PhD Cristiana BOGDĂNOIU

PhD Sorin DINCĂ

PhD Loredana VĂCĂRESCU-HOBEANU



European Research Center of Managerial Studies in Business Administration

<http://www.cesmaa.eu>

Email: jaes_secretary@yahoo.com

Web: <http://cesmaa.eu/journals/jaes/index.php>

Editorial Advisory Board

Claudiu ALBULESCU, University of Poitiers, France, West University of Timișoara, Romania
Aleksander ARISTOVNIK, Faculty of Administration, University of Ljubljana, Slovenia
Muhammad AZAM, School of Economics, Finance & Banking, College of Business, Universiti Utara, Malaysia
Cristina BARBU, Spiru Haret University, Romania
Christoph BARMEYER, Universität Passau, Germany
Amelia BĂDICĂ, University of Craiova, Romania
Gheorghe BICĂ, Spiru Haret University, Romania
Ana BOBÎRCĂ, Academy of Economic Science, Romania
Anca Mădălina BOGDAN, Spiru Haret University, Romania
Giacommo di FOGGIA, University of Milano-Bicocca, Italy
Jean-Paul GAERTNER, l'Institut Européen d'Etudes Commerciales Supérieures, France
Shankar GARGH, Editor in Chief of Advanced in Management, India
Emil GHIȚĂ, Spiru Haret University, Romania
Dragoș ILIE, Spiru Haret University, Romania
Cornel IONESCU, Institute of National Economy, Romanian Academy
Elena DOVAL, Spiru Haret University, Romania
Camelia DRAGOMIR, Spiru Haret University, Romania
Arvi KUURA, Pärnu College, University of Tartu, Estonia
Rajmund MIRDALA, Faculty of Economics, Technical University of Košice, Slovakia
Piotr MISZTAL, Technical University of Radom, Economic Department, Poland
Simona MOISE, Spiru Haret University, Romania
Mihail Cristian NEGULESCU, Spiru Haret University, Romania
Marco NOVARESE, University of Piemonte Orientale, Italy
Rajesh PILLANIA, Management Development Institute, India
Russell PITTMAN, International Technical Assistance Economic Analysis Group Antitrust Division, USA
Kreitz RACHEL PRICE, l'Institut Européen d'Etudes Commerciales Supérieures, France
Mohammad TARIQ INTEZAR, College of Business Administration Prince Sattam bin Abdul Aziz University (PSAU), Saudi Arabia
Andy ȘTEFĂNESCU, University of Craiova, Romania
Laura UNGUREANU, Spiru Haret University, Romania
Hans-Jürgen WEIßBACH, University of Applied Sciences - Frankfurt am Main, Germany

JOURNAL

of Applied Economic Sciences

Journal of Applied Economic Sciences

Journal of Applied Economic Sciences is a young economics and interdisciplinary research journal, aimed to publish articles and papers that should contribute to the development of both the theory and practice in the field of Economic Sciences.

The journal seeks to promote the best papers and researches in management, finance, accounting, marketing, informatics, decision/making theory, mathematical modelling, expert systems, decision system support, and knowledge representation. This topic may include the fields indicated above but are not limited to these.

Journal of Applied Economic Sciences be appeals for experienced and junior researchers, who are interested in one or more of the diverse areas covered by the journal. It is currently published quarterly in 2 Issues in Spring (30th March), Summer (30th June), Fall (30th September) and Winter (30th December).

Journal of Applied Economic Sciences is indexed in SCOPUS www.scopus.com, CEEOL www.ceeol.org, EBSCO www.ebsco.com, and RePEc www.repec.org databases.

The journal will be available on-line and will be also being distributed to several universities, research institutes and libraries in Romania and abroad. To subscribe to this journal and receive the on-line/printed version, please send a request directly to jaes_secretary@yahoo.com.

Journal of Applied Economic Sciences

ISSN-L 1843 - 6110

ISSN 2393 – 5162

Table of Contents



1	György KOVÁCS Layout Redesign for Cost Reduction and Efficiency Improvement	663
2	Aleksandr Mikhaylovich BATKOVSKIY, Mikhail Aleksandrovich BATKOVSKIY, Vladislav Valerievich KLOCHKOV, Elena Georgievna SEMENOVA, Alena Vladimirovna FOMINA Analysis of the Efficiency of Specialization Centers Formation in High-Tech Industry	671
3	Omar ROJAS, Semei CORONADO, Francisco VENEGAS-MARTINEZ Adaptive Market Hypothesis: Evidence from the Mexican Stock Exchange Index	687
4	Halil Dincer KAYA The Impact of the Global Crisis on the Stability of the Financial System	698
5	Anastasia Grigorevna VASILIEVA, Elena Mikhailovna ZAITSEVA, Anton Vasilievitch IVLEV, Evgenia Aleksandrovna PUZANKOVA, Liliia Mukhametovna RAKHIMOVA Russian Experience of Practical Application of Banking Supervision Tools and Techniques	709
6	Md. Abdus SALAM, Sunghee CHOI The Impact of Exchange Rate Movements and Wage Levels on Foreign Direct Investment from South Korea into Banglades: Cost-Oriented versus Market-Oriented Industry	719
7	Arsen A. TATUEV, Georgiy N. KUTSURI, Violetta V. ROKOTYANSKAYA, Elena V. LYAPUNTSOVA, Sergey A. SHANIN Improvement of Russian Pension Fund Scheme: Financial Priorities in Using Population's Incomes and Savings	726
8	Octavian Dan RĂDESCU Premises for Business Activities: Economical Growth in an Uncertain World	736

9	Fayçal YAHYAOU, Pr. Mohamed TKIOUAT A Multi-Level Agent-Based Model of Reinsurance	746
10	Valentina E. GUSEVA, Laura UNGUREANU, Evgeny A. KUZMIN Mathematical Models of Uncertainty in Economics	753
11	Tatiana Vladimirovna AVILOVA, Nikolay Viktorovich VOYTOLOVSKIY, Varvara Andreevna DIKAREVA, Anna Mikhailovna CHERNYSHEVA Efficiency of Applying Risks Management Systems at Industrial Enterprises under Market Conditions	766
12	Ergin AKALPLER, Ban SHAMADEEN The Role of Net Export on Economic Growth in United States of America	772
13	Viktor KUZNETSOV, Anastasiya EGOROVA, Sergey YASHIN, Egor KOSHELEV, Ekaterina GARINA The Concept of Evaluation of Cluster Development Strategic Outlooks with the Use of Multiples	782
14	Abdulaziz Hamad ALGAEED The Oil Price Volatility and the Future of Saudi Arabian Service Sector: An Empirical Analysis	789
15	Vadim Faruarovich ISLAMUTDINOV Efficiency Assessment and Development Forecast of the Institutions Stimulating the Innovative Behavior of Economic Entities in a Resource-Extraction Region	808
16	Edi PURWANTO, Daniel D. KAMEO, John JOI IHALAUW, Sony Heru PRIYANTO The Complexity of Poverty Among Benteng Chinese in Tangerang District, Indonesia	820
17	Rastislav KOTULIC, Martina MARCHEVSKÁ Analysis of the Development of Regional Disparities in Slovakia	832
18	Irena SZAROWSKA The Relationship Between Public Expenditures on Research and Development and Economic Growth. Example for the Czech Republic, Denmark and Slovakia	839

19	Oleksandr Mykolayovych LEVCHENKO, Anna Oleksandrivna LEVCHENKO, Olha Volodymyrivna HORPYNCHENKO, Ilona Oleksandrivna TSARENKO The Impact of Higher Education on National Economic and Social Development: Comparative Analysis	850
20	Claudio DI BERARDINO, Dario D'INGIULLO, Gianni ONESTI International Skilled-Migration and Regional Growth in Poland	863
21	Aigul TOXANOVA, Alma GALIYEVA, Aigul MUHAMEDZHANOVA, Gulden BAIBUSINOVA, Aziya KULUBEKOVA, Zhanar ASHIKBAYEVA Innovative Entrepreneurship Financing in the Republic of Kazakhstan	875
22	Michal GÄRTNER, Tomáš SADÍLEK, Dana ZADRAŽILOVÁ Cross-Cultural Adaptability in a Sample of International University Students in Prague – Gender and Culture Effect	893
23	Yulia Mikhailovna GRUZINA, Anzhelika Petrovna BUEVICH, Olga Vladimirovna KARAMOVA Participation of Universities in Building Innovative Economy of the Regions	907
24	Peter DZUPKA, Petra SZLAFKAILOVA Methodology for Universities Economic Impact Assessment in Central and East Europe Countries	923
25	Sergey USTINKIN The Labor Migration in the Context of Value Orientations of Russian Youth	932

International Skilled-Migration and Regional Growth in Poland

Claudio DI BERARDINO

Department of Management and Business Administration
University of G. d'Annunzio, Chieti-Pescara, Italy
c.diberardino@unich.it

Dario D'INGIULLO

Department of Economics
University of G. d'Annunzio, Chieti-Pescara, Italy
dario.dingiuлло@unich.it

Gianni ONESTI

Department of Management and Business Administration
University of G. d'Annunzio, Chieti-Pescara, Italy
g.onesti@unich.it

Suggested Citation:

Di Berardino, C., D' Ingiullo, D., Onesti, G. 2017. International skilled-migration and regional growth in Poland. *Journal of Applied Economic Sciences*, Volume XII, Summer, 3(49): 863 - 874.

Abstract:

The paper aims to investigate the relationship between international migration and economic growth across the regions of Poland. In most studies, the potential determinants of migration have been investigated, while the impact of these flows of individuals on economic growth has received less attention. Using a panel data during the time period 1999-2005, the authors tested if different kinds of migration flows, distinguished by educational level, had an effect on economic growth. In order to control both the issue of endogeneity, due to the presence of some potentially endogenous variables among the explanatory variables, and the problem of omitted variables, the paper implements the difference-GMM of Arellano-Bond. The findings show that high-skilled in-migration flows has a strong positive impact on the growth dynamics of Polish regions. On the other hand, the outflow of skilled individuals reduces the regional skill-intensity and has a negative effect on income. The results also support the idea that skilled-migration can promote the provincial convergence.

Keywords: skilled-migration; international flows; regional convergence; Poland

JEL Classification: R10; R11; R23

Introduction

The present paper focuses on the effect of migration on destination places. In particular, by distinguishing the international flows we are interested in through investigating the role of skill-selective migration on regional growth in Poland. The economic and demographic characteristics make Poland an interesting case study in Europe. This country, indeed, represents the most populous among the new European Union members. Furthermore, the literature on the relationship between migration and regional disparities of Eastern European countries is less common than the literature on developed countries. The main findings reveal, on average, an amount of migration flows relatively less and decreasing with respect to the other developed European Union members (Kertesi 2000, Fidrmuc 2004, Bornhorst and Commander 2006, Ghatak *et al.* 2008, Ghatak and Pop Silaghi 2011). Moreover, the literature gap is accentuated by the additional scarcity of studies focused on the effect of migration on regional convergence in Eastern Europe (Kirdar and Saracoğlu 2008, Wolszczak-Derlacz 2009, Bunea 2011). This paper adds to the literature confirming that mobility of the more educated has a positive effect on the host regions and a detrimental effect on the sending regions in Poland. The remainder of the paper is organized as follow. In Section 1 is provided the literature empirical background, in section 2, the descriptive analysis and econometric model will be specified and the results will be presented. Finally, in the last section, we provide the main conclusions of the analysis.

1. Literature review

Despite the recognized importance of migration for economic development (Blanchard and Kats 1992, Borjas 1999, Rappaport 2005), scholars are still focused on the determinants of migration rather than the causal effect of migration on economic growth in the place of destination. In an important literature review, Etzo (2008) stressed the necessity of further investigation on the relationship between migration, growth and convergence. The author, indeed, argues that although the migration literature presents a huge number of empirical studies, the gap between the causes and the consequences of migration is still present and need to be reduced.

Moreover, most of the studies dealt with migration flows across regions within national borders. Conversely, by analysing the impact of international migration on economic growth, the evidence provided by the literature is still incomplete and partial. Brunow *et al.* (2015) have shown that a greater cross-border mobility can contribute to higher global long-run growth. The authors, considering a wide range of channels (such as age structure, entrepreneurship, trade, remittances etc.) through which migration can influence dynamic growth in sending countries, highlights that education and skills are among the most important factors able to influence the decision to move. Furthermore, education tends to take on a greater role if we study international mobility rather than intra-national mobility. Coulombe and Tremblay (2009), for instance, although they are not interested in the effects of migration on income disparities, analyse a sample of international and internal migrants in order to assess the role of migration on the skill disparities across Canadian provinces and highlight the positive contribution of international migration to the reduction of provincial skill intensity disparities.

According to the neo-classical growth model with diminishing returns to factor of production and homogenous labour, migration flows lead to a decrease of regional economic disparities by moving labour force from poor to rich regions (Barro and Sala-i-Martin 1992). This process would reduce the economic growth in the net in-migration regions and at the same time it boosts the economic dynamic in the emigration regions. At the end of this adjustment process, holding everything else constant, the economic disparities between the two places will disappear. For instance, Kırdar and Saracoğlu (2008) show how migration is an important source of reduction of regional economic disparities in Turkey. In this context where migration is characterized by flows of unskilled individuals, the labour mobility works as an adjustment mechanism that is able to reduce the economic differences.

Another important evidence of this equilibrating mechanism is found by Maza (2006) for the Spanish regions during the period 1995-2002. The author finds empirical support on the ability of migration in boosting regional convergence. Indeed, once migration is introduced among the regressors, the estimate of convergence decreases, indicating how mobility reduces regional disparities. Moreover, the negative coefficient associated with migration signifies that a higher level of migration slows down economic growth and reinforces the role of migration in terms of convergence.

However, some scholars argue that the simultaneous persistence of migration and economic disparities among regions do not confirm this theoretical model (Reichlin and Rustichini 1998) especially when migration “is not skill-neutral but skill-selective” (Fratesi and Percoco 2014, 1651). In particular, given the importance of migrant’s characteristics, such as labour skills, many authors oppose the standard framework and suggest an investigation of the composition effect. Shioji (2001) suggests that if the human capital embodied in the migration flows is higher than the human capital that remains, then the composition effect overcomes the quantity effect due to the labour mobility. Østbye and Westerlund (2007) consider the heterogeneity of migrants and separate the flows of individuals into in-migration and out-migration in order to capture a different effect on economic growth in Norway and Sweden. The results show that the composition effect is a predominant force in Norway, whereas in Sweden migration boosts the regional convergence as the quantity effect overcomes the effect due to the composition of migration.

Another important contribution comes from Hierro and Maza (2010), where the relationship between the internal movement of foreign-born individuals and the convergence process is analysed at the provincial level in Spain. In particular, the authors have investigated if and to what extent the presence of foreign-born individuals in provinces with a higher income per capita has a consequence on economic growth and convergence. The results affirm that this kind of migration positively reduce the economic disparities. Within this strand of literature, Vidyattama (2016) analysis the effect of inter-provincial migration on regional growth during the period 1975-2005

in Indonesia. The author aims to estimate the impact of migration on economic growth in general and at the same time to find a different causal effect of in-migration and out-migration on richer and poorer regions. The results highlight a positive impact of migration on the three low-income provinces, while on the other hand, there is no significant effect of migration on high-income provinces. Furthermore, Fratesi e Percoco (2014) point out, through an analysis at the Italian regional level, the contribution of migration to the human capital accumulation in the host region. The underlying idea is that migration affects the destination place by not only increasing its labour force, but also changing the way human capital is distributed and, as a consequence, the economic performance.

Finally, Kubis and Schneider (2016) estimate a dynamic panel model to address the role of regional migration in Germany. The results confirm a skill selection process of migration and in particular, the out-migration has a negative effect on the regional dynamic of growth. Furthermore, when the authors disentangle Germany into two subsamples (East and West Germany), the estimates are different. In the East Germany subsample, the in-migration positively affects the growth, whereas in West Germany, the opposite is true since the in-migration slow down the economic growth.

In summary, these studies confirm that the heterogeneous effects of migration on regional economic growth depend on the intangible skills embodied by each migrant. The underlying assumption is that the different educational level creates a selection process able to explain the different impact of migration on the economic growth. However, there is no empirical evidence to support this claim when we study international flows. Furthermore, differently from Kubis and Schneider (2016), another original element of the paper is the possibility to account for the skill-selectivity. In particular, the dataset provides a subdivision of migration flows which enables us to disentangle the different migrant's skills by using the level of education of migration flows.

From the methodological point, this kind of investigation arises from different identification issues. First, the endogeneity between migration and GDP per capita could lead to a simultaneous bias. In particular, the reverse causality among them could create a systematic distortion. Second, the endogeneity due to omitted variables, if not considered, could increase the error of estimation. The economic literature has approached this topic using different identification strategies and different methodologies, from the instrumental variable approach (Barro and Sala-i-Martin 1992, Kirdar and Saracoğlu 2008, Maza 2006) to the difference-GMM estimators (Niebuhr 2012, Vidyattama 2016). This work will try to study the relationship between selective migration and economic growth by implementing a dynamic panel estimation and, in particular, a *difference-GMM* of Arellano and Bond (1991).

2. Empirical analysis

2.1 Description of the data

The Poland spatial map is divided by the Eurostat into 6 macro-regions (NUTS1), 16 regions (NUTS2) and 66 provinces (NUTS3). Concerning the first level of division, the Eurostat used the geographical position as a method of identification and thus we have the centre, the south, the east, the north-west, the south-west and the north. The capital city is Warsaw placed in the centre macro-region where we find the highest population density. Also the city of Lodz, the second most populated city, is in the centre area, with an economic vocation in the textile industry. In the South of the country, we find the artistic and cultural complex placed in Cracow and in the Western side, the urban agglomeration of Poznan and Wroclaw. Finally, in the North is the city of Danzig, the centre of the shipbuilding industry and with the largest harbour in the country.

In this study, the reference economic unit analysed is the region (NUTS2). The regional territorial units express a good proxy of the territorial organization of economic activities and simultaneously allow us to capture the movements of labour force. The regions are, therefore, an appropriate instrument of analysis in investigating the socio-economic structure of Poland, according to a local development perspective.

Within studies on the economic growth, the unit of analysis has assumed an important role. There has been criticism from some scholars about the adequacy of the administrative level as a measure of territorial aspects of the economic system, and the necessity to use ad-hoc units of analysis (Boldrin and Canova 2001). As we can notice, on the one hand, this type of statistical unit, as functional urban areas (Cheshire and Carbonaro 1995), can be more appropriate, and on the other hand, the dynamic specifications of these areas suggest that their dimension is not fixed during the time (Fingleton 2001). Therefore, even if the administrative level is not exactly representative

of the features of the growth process, it guarantees a satisfactory level of analysis, capable of capturing the sub-national disparities (Fischer and Stirböck 2006).

In order to carry out the empirical analysis, we use the regional value added at power purchasing standard from the Eurostat database and migration flows for the period 1999–2005, provided by the Central Statistical Office of Poland. In order to verify a different impact on economic growth due to the different educational level embedded in the flows of individuals, we have divided the international migration into three categories by using the classification adopted by Li and Mc Hale (2006). In particular, the authors divided the migration flows by educational attainment in: low-skilled individuals who are those with primary education; medium-skilled migrants who possess a secondary education and finally the high-skilled individuals with a tertiary education.

Table 1 shows the descriptive statistics referring to the variables considered in the econometric analysis of Polish regions. Starting with the economic growth (ΔY_{it}), the annual average value during the whole period is positive and equal to 4.6%. Also, the migration flows were characterized, on average, by positive growth. In particular, the high-skilled in-migration has grown at an annual average rate equal to 0.08% and was higher than the rate of out-flows of people with the same level of education (0.03%). The medium-skilled individuals show high growth rates, respectively 0.11% for the immigration and 0.20% for the emigration. Furthermore, within the low-skilled individuals is interesting insight at the high differences between the in-going flows with a growth rate equal to 0.04% and the out-going migration, which registers a growth rate of 0.30%. Finally, in order to measure the human capital, the present paper, follows the methodology of Dolado *et al.* (1994) and then exploited by Fratesi and Percoco (2014). In particular, the average level of education of migration flows is used as a proxy of the human capital embedded in this flows of individuals. The paper implements three educational level: primary, secondary and tertiary. Therefore, the in-migration and the out-migration stocks of human capital for each region i (HK_i) are constructed separately through the following equation:

$$HK_i = \frac{\sum_k \text{migr}_k \text{year}_k}{\sum_k \text{migr}_k} \quad (1)$$

where: $k = 1, \dots, 3$; year_k is the number of year of schooling for the level of education k and migr_k is the number of migrants of schooling level k .

Concerning the human capital, Table 1 shows that on average, regions were characterized by a level of human capital equal to 7.23. However, this variable ranges between a maximum value of 9.85 for the region with the highest level of human capital and a minimum value of 4.13.

Table 1. Descriptive statistics of the variables

Variable	Description	Obs.	Mean	Std. Dev.	Min.	Max.
ΔY_{it}	income growth rate	96	0.0460405	0.0302072	-0.0139862	0.1612681
Y_{it-1}	the initial level of income	96	9.0782560	0.2072436	8.7160440	9.7231640
imm_tert	high-skilled immigration	96	0.0836296	0.0356667	0.0265637	0.1907423
emig_tert	high-skilled emigration	96	0.0390130	0.0411017	0.0015599	0.2520510
imm_second	medium-skilled immigration	96	0.1106984	0.0705437	0.0295484	0.4372703
emig_second	medium-skilled emigration	96	0.2077573	0.2503858	0.0060361	1.2227620
imm_prim	low-skilled immigration	96	0.0475736	0.0399741	0.0126564	0.1966762
emig_prim	low-skilled emigration	96	0.3040746	0.4943949	0.0093276	2.4388240
Hk	human capital	96	7.2323570	1.3106370	4.1330590	9.8518520
share_tert	share tertiary educated	96	0.1883275	0.0439306	0.0968720	0.3227151

Source: own elaboration on Gus and Eurostat data

Table 2 shows that the immigration and the emigration of human capital in the initial year (1999) and the final year (2005) for each region. The central regions seem to be the more attractive regions in terms of human capital in both periods. However, they show a drastic increase in the out-migration of human capital from 1999 to 2005. Indeed, in 1999, the emigration of human capital was on average 1.5, while in 2005 the loss of human capital for Lodzkie and Mazowieckie was equal to 8.55 and 6.33, respectively. Furthermore, apart from Wielkopolskie and Pomorskie, over the years the northern regions become more attractive in terms of human capital. These results seem to confirm the study of Di Berardino and Sarra (2013) in which they point out the potential attractiveness of the northern and central regions, which represent the first and second areas in terms of economic growth dynamic.

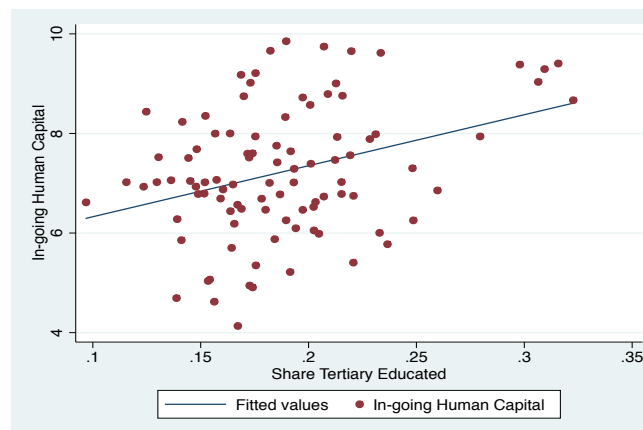
Table 2. In-migration and out-migration of human capital in 1999 and 2005

Macro-region	Region	Human capital 1999		Human capital 2005	
		In	Out	In	Out
Centre	Łódzkie	9.28	1.49	10.22	8.55
	Mazowieckie	8.01	1.61	9.76	6.33
South	Małopolskie	7.43	4.02	8.24	7.65
	Śląskie	6.76	6.97	6.96	5.01
East	Lubelskie	7.32	2.70	7.31	9.49
	Podkarpackie	7.03	6.13	6.26	7.14
	Podlaskie	6.97	6.69	7.13	6.95
	Świętokrzyskie	8.50	6.98	6.83	8.34
North-West	Lubuskie	5.37	7.47	6.51	4.67
	Wielkopolskie	9.30	4.20	9.37	7.10
	Zachodniopomorskie	7.43	7.33	8.11	5.28
South-West	Dolnośląskie	6.42	4.22	7.57	6.01
	Opolskie	5.17	5.85	5.61	4.59
North	Kujawsko-Pomorskie	6.18	4.62	7.33	5.41
	Pomorskie	7.22	4.57	7.79	6.65
	Warmińsko-Mazurskie	7.73	6.45	7.41	4.71

Source: own elaboration on Gus data

Another important question to answer is the direction of the in-migration of human capital. Figure 1 shows that skilled migration prefers to live where the share of tertiary educated individuals is high. This is in line with what Berry and Glaeser (2005) found for the American city. The authors, indeed, explain how high skilled workers tend to establish strong relationship with other highly educated people.

Figure 1. Relationship between the human capital in-migration and the share of tertiary educated



Source: own elaboration on Gus data

This result could have important economic implications. If the initial divergence, in terms of human capital, is widened by the tendency of a polarization process of the human capital, then the asymmetric increase of skilled individuals could slow down the convergence process among the regions of Poland. On the contrary, an increase of the human capital distribution in the lagged regions could lead to a convergence process among the Polish region.

2.2 Econometric issues

In this section, the relationship between international migration and economic growth is tested through an econometric model. The regression analysis focuses on the impact on the income per capita of different kinds of migration flows: high skilled, medium skilled and low skilled. We also include the initial level of income in the model, because it allows us to consider whether the difference in terms of economic growth between regions is decreasing more or less. In other words, we could verify if that among the Polish regions, a convergence process is occurring. Indeed, a value of the coefficient included in the range $[0, 1]$ indicates the presence of a convergence process (Barro and Sala-i-Martin 1992). Each specification also controls for the share of tertiary educated as a proxy of the human capital of each region (*share_tert*). This variable is in line with multiple studies, which stress the positive role of this factor on economic growth and in determining high level of growth.

Starting with the specification of interest that considers the impact of high skilled flows, the model is formulated as follows:

$$Y_{i,t} = \beta_1 Y_{i,t-1} + \beta_2 \text{imm_tert}_{i,t-1} + \beta_3 \text{emig_tert}_{i,t-1} + \beta_4 \text{share_tert}_{i,t-1} + \mu_i + \eta_t + \varepsilon_{i,t} \quad (2)$$

where: $i = 1, 2, \dots, 16$ is the region; $t = 1999, 2001 \dots 2005$ is the time period covered by the data; $\varepsilon_{i,t}$ is the idiosyncratic error term; $Y_{i,t}$ represents the income per capita while $Y_{i,t-1}$ is initial level of income per capita.

The migration rate is measured through the number of migrants with different educational levels over the total population in the same year. The paper also estimates two other different specifications by substituting the high-skilled migration with the other two skill levels based on educational attainment (medium-skilled and low-skilled). Therefore, we estimated three different equations necessary to measure the relationship between migration and economic growth.

The model also includes all the time effects (η_t) and the regional time-invariant characteristics (μ_i). All the variables are expressed as logarithms and lagged one year. We must also consider that the economic growth is influenced by other variables, such as the level of human capital presents in each region measured through the share of tertiary educated.

In order to verify this relationship, the choice of a fixed effects or random effects estimator is discarded, despite its generalised use in panel data models, as the presence of the lagged levels of income per capita creates a distortion that could bias the estimation results. Moreover, although the static models (fixed-effects or random-effects) are able to control for the time-invariant, different regional characteristics, which represent the unobservable heterogeneity¹⁶, they do not allow us to capture the endogeneity issue due to the presence of some potentially endogenous variables among the explanatory variables. In particular, the reverse causality between migration and economic growth could create a systematic distortion. As a result, the estimated coefficients through a static panel approach, such as fixed-effects or random-effects, are biased. Anderson and Hsiao (1982) proposed a solution to this simultaneity bias by transforming the equation in first differences and then by searching for instrumental variables (IV). However, when the lagged dependent variable is present among the regressors, in order to catch some convergence process, it is necessary to instrument both the lagged dependent variable and the other endogenous variables. Arellano and Bond (1991) proposed a generalization of the method suggested by Anderson and Hsiao. In this context, the first-differences of the endogenous explanatory variables are instrumented by a set

¹⁶ In the random-effects model the time-invariant regional characteristics are treated as stochastic and as such, are uncorrelated with the other explanatory variables while in the fixed-effects model the unobserved heterogeneity is treated as deterministic.

of lagged levels of the same explanatory variables. In line with these considerations, some studies have adopted a dynamic panel approach through a difference-GMM (Niebuhr 2012; Vidyattama 2016).

The present paper aims to estimate a dynamic panel data and it intends to treat the immigration and emigration flows as well as the lagged dependent variable ($Y_{i,t-1}$) as potentially endogenous variables. For this reason, we try to handle these errors due to simultaneous causation and to the presence of the lagged dependent variable by implementing a difference-GMM of Arellano-Bond (1991).

The additional advantages related to the GMM estimator, among the dynamic panel data, are the flexibility, and the few assumptions regarding the process of data generating. The Arellano-Bond estimator implies that the model is taken in first difference and therefore, we are also able to remove the unobserved time-invariant regional characteristics¹⁷. Furthermore, the presence of lags of each endogenous variable represents a set of instruments that can be used to account for the endogeneity problem. If the error term is not serially correlated and some explanatory variables are predetermined or sequentially exogenous (like the lagged dependent variable), *i.e.* correlated with past realisations of the error term, but uncorrelated with present and future shocks, the moment conditions applied for the first difference equation is as follows:

$$E[W_{it-s} \cdot (\Delta \varepsilon_{it})] = 0 \text{ for } s \geq t; t=3, \dots, T \quad (3)$$

where: W_{it-s} is the lagged dependent variable and all of the predetermined regressors in the model.

The validity of moment conditions is tested by implementing the Hansen J test of over-identifying restrictions and by testing if the error term is not second order serially correlated.

In order to verify the presence of integrated dependent variable and integrated regressors, we have also tested the stationarity of each variable included in the model. Table 3 shows the statistical significance of the two Panel unit root tests applied in this study: Levin-Lin-Chu-test (LLC) and the Im-Pesaran-Shin-test (IPS). Whereas the LLC does not consider the heterogeneity across regions, the IPS allows having a different autocorrelation coefficient for each region and for this reason it is more reliable. Once we have transformed all the original variables through the application of the logarithm, the panel unit root tests exhibit the stationarity of both the dependent variable and the regressors with a high significance level.

Table 3. Panel unit root tests

Variable	Levin-Lin-Chu unit-root test	Im-Pesaran-Shin unit-root test
Y_{it-1}	**	**
imm_tert	**	*
emig_tert	**	**
imm_second	**	**
emig_second	**	**
imm_prim	**	*
emig_prim	**	**
share_tert	**	**

Source: own elaboration on Gus data. ** significance at 1%, * significance at 5%.

2.3. Results

Table 4 shows the result of the model estimated with the difference-GMM estimator. In the first step we investigate the growth differentials and, in particular, by following the neo-classical traditional framework, in a dynamic panel setting, when the coefficient of the initial income level takes a value included in the range [0.1], there is evidence

¹⁷ The first difference transformation in the difference-GMM implies that the fixed provincial characteristics are deterministic and potentially correlate with the other regressors.

of a convergence process among the Polish regions¹⁸. Indeed, column 1 shows the presence of convergence, a process under which the backward areas have shown better performance than the richer areas. In order to evaluate the impact of migration on the regional disparities it is necessary to measure the coefficient associated to the initial income level once we control for our variable of interest. When we introduce high-skilled migration, the estimated coefficient of convergence decreases ($\rho_1 = \beta_1 - 1$) from -0.511 to -0.466. This confirms that high-skilled migration is a force able to reduce the differentials in terms of economic growth. Moreover, this result is also confirmed when the medium and low-skilled migrations are introduced.

By focusing on the variable of interest, column 2 displays the role of high-skilled migration on economic growth. The greater the in-migration of tertiary educated people, the greater the growth dynamic is. On the contrary, if the higher-educated people are also those who leave the region, the effect on regional income per capita will be negative. Moreover, the slight difference between the coefficient associated with migration indicates an asymmetry between in-migration and out-migration that seems to confirm the idea of separating this flows (Østbye and Westerlund 2007). Nowadays, the consolidated migration literature suggests the necessity of analyses that controls for gross migration instead of net migration in order to observe the heterogeneity effects between in- and out-migration and thus to observe the effects of asymmetric in- and out-migrant's skills.

When medium-skilled migration takes the place of high-skilled migration, the effects are different, and in particular, both in-migration and the out-migration of individuals with a secondary education have a negative impact on economic growth. However, only the emigration is statistically significant at 1% and could be used to make inference. Finally, the low-skilled migrations do not seem to have a significant effect on economic growth. This corroborates the assumption of a heterogeneous effect of migration when the skill content is taken into consideration (Fratesi and Percoco 2014).

In regards to the control variable, a high share of tertiary educated individuals in the region is able to explain the positive performance in terms of economic growth. Indeed, the coefficient associated with human capital is always positive and statistically significant at 1% with a coefficient that ranges between the value of 0.82 and 1.28. This result also contributes to support the relevance of the human capital when analysing the impact of migration on economic growth.

The estimates are robust. Since the model is over-identified, we use the Hansen J-test in order to verify the validity of the instruments. Moreover, the test on serial autocorrelation is also performed. The former indicates that the null hypothesis cannot be rejected at the 10%, while the latter shows that although first-order autocorrelation is expected, the test of second-order autocorrelation presents an absence of a higher-order autocorrelation in the GMM model.

Definitively, the estimates suggest the importance of the skill-intensity of migration flows as a key factor able to promote the regional economic performance. However, if the results display a prevalence of the mechanisms generated by the high-skilled in-migration, which positively affect the economic growth, it is also true that these mechanisms do not explain a divergence process but on the contrary a decrease of the disparities. This most likely means that poor regions have primarily benefited from the high-skilled foreign in-flows. The estimates confirm the picture drawn through the above discussed descriptive analyses. Indeed, the existence of a slight process of convergence could be explained by the fact that during the period of analysis, the richer regions (centre) were characterized by an increase of the average years of schooling of out-migration with respect to the other regions.

It could be argued that these analyses do not seem to go along with previous studies focused on the relationship between internal migration and economic growth. Some studies (Di Bernardino and Sarra 2013), for instance, despite the different time period of analysis, displayed that high-income regions are more attractive in terms of interregional migration flows and this appears to be an important element able to explain the positive economic performance of these regions, which contributes to increasing the economic disparities.

¹⁸ In order to test the regional convergence, a general dynamic panel data model has the following structure: $\log y_{i,T} - \log y_{i,0} = a + \rho_1 \log y_{i,0}$ with $\rho_1 = e^{-bT} - 1$ that can be analogously expressed in the following manner $\log y_{i,t} = a + \beta_1 \log y_{i,t-1}$ where $\beta_1 = e^{-bt}$. For this reason, if $0 < \beta_1 < 1$ there is evidence of a convergence process since the value of ρ_1 is negative ($\rho_1 = \beta_1 - 1$).

Therefore, within the framework of the effect of migration on economic disparities, it could be carefully argued that internal and international migration acts in different ways. However, the lack of updated international data and the difficulties that arise to comparing the levels of education among countries, prevents us from evaluating the net effects on economic growth. Nonetheless, the significance of this topic could encourage further empirical analysis in the future. In particular, an analysis could be performed on whether or not the entrance of Poland in the European Union has determined a structural change of the migration dynamics and on the regional disparities.

Table 4. International migration and economic growth

Dependent Variable	Gdp per capita (1)	Gdp per capita (2)	Gdp per capita (3)	Gdp per capita (4)
Y_{it-1}	0.4883323 (0.0944342)***	0.5340678 (0.1022388)***	0.5793209 (0.1017844)***	0.5464261 (0.0954965)***
imm_tert		0.9636143 (0.3368077)***		
emig_tert		-0.9091564 (0.4358181)**		
imm_second			-0.0109463 (0.1832089)	
emig_second			-0.120923 (0.0417669)***	
imm_prim				-0.4979909 (0.6568761)
emig_prim				0.0010844 (0.026521)
share_tert	1.176236 (0.2215597)***	1.287209 (0.2282946)***	0.827172 (0.2404862)***	1.234735 (0.2716216)***
<i>Test-statistics</i>				
Hansen test (p-value)	(0.849)	(0.850)	(0.366)	(0.523)
First-order serial correlation (p-value)	(0.003)	(0.042)	(0.023)	(0.068)
Second-order serial correlation (p-value)	(0.541)	(0.975)	(0.123)	(0.152)

Source: own elaboration on Gus and Eurostat data. *** significance at 1%, ** significance at 5%, * significance at 10%.

The estimation procedure is the GMM difference approach based on the two-step estimator. The estimation includes time fixed-effects, time dummies and control variables. The lagged dependent variable, the high-skilled, medium-skilled and low-skilled migration are treated as endogenous variables and instrumented with suitable lags. All the other variables are assumed to be exogenous. The authors instrument first difference of the lagged dependent variable with the second lag of its level in order to ensure sparse instrumentation. The dependent variable in the Arellano-Bond model is the income per capita. Standard errors clustered by region (NUTS2) are in parentheses. The Hansen test is run to verify the validity of over-identifying restrictions when the standard errors are robust to heteroskedasticity. We also report the p-values for first- and second-order autocorrelation in the first-differenced residuals.

Conclusions

The aim of the present paper is to analyse the consequences of the relationship between international mobility and economic growth in an emerging country like Poland during the period 1999-2005 and to extend the results to other national contexts through innovative features.

The study indicates the presence of a decreasing process in terms of economic disparities and finds that the characteristics of migration flows contribute to explaining this phenomenon. The results attest to how heterogeneous the effects of migration are when the skill content is considered. In particular, in line with other many studies, focused on the consequences of internal selective migration (Fratesi and Percoco 2014, for the Italian

regional context and Kubis and Schneider 2016, in Germany), the estimates highlight that regions mostly capable of attracting high-skilled individuals experienced a positive path of growth in terms of income per capita. This paper, indeed, shows how the other two kinds of flows with lower skill contents do not exert a significant effect on economic growth. Therefore, the analyses confirmed that the attractiveness of tertiary educated individuals represents a key factor able to create a regional competitive advantage.

If a consolidated literature has shown the existence of the link between interregional flows and economic growth, analogous consequences are also found when international mobility is taken into consideration. However, when attention is paid to the convergence process, the analyses suggest a different picture with respect to the literature. The final effects due to the mobility depend, indeed, on the regional composition of the migration flows. The higher human capital emigration in the centre regions has surely contributed to the convergence process. However, the peripheral areas, especially those located in the Eastern part, continue to register high human capital emigration rates that are, at times, higher than the in-migration. The situation could lead to a trend reversal with different consequences on the economic disparities. In other words, a divergence process could take the place of the previous slight convergence. These considerations are also interesting if we consider the entrance of Poland in the European Union. In this direction, future researches are necessary in order to verify if and to what extent this phenomenon represents a structural break and if it has had an effect on the evolution of both internal and international migration.

In summary, the present paper suggests paying attention to both on strategies able to attract human capital and policy oriented to promoting growth and to reducing the economic disparities. The policy maker should be focused on several actions able to sustain the ability of a territorial system to attract human capital in order to create virtuous mechanisms for the economic development. We strongly believe that the entrance of the Poland in European Union has reinforced the role of Polish regions in terms of attractiveness of migration flows.

References

- [1] Anderson, T. W., Hsiao, C. 1982. Formulation and estimation of dynamic models using panel data. *Journal of Econometrics*, 18(1): 47-82. DOI [http://dx.doi.org/10.1016/0304-4076\(82\)90095-1](http://dx.doi.org/10.1016/0304-4076(82)90095-1)
- [2] Arellano, M., Bond, S. 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies*, 58: 277-97. DOI <http://dx.doi.org/10.2307/2297968>
- [3] Barro, R.J., Sala-i-Martin, X. 1992. Convergence. *Journal of Political Economy*, 100(2): 223-51. DOI <http://dx.doi.org/10.1086/261816>
- [4] Berry, C.R., Glaeser, E.L. 2005. The divergence of human capital levels across cities. *Papers in Regional Science*, 84(3): 407-44. DOI <http://dx.doi.org/10.1111/j.1435-5957.2005.00047.x>
- [5] Blanchard, O.J., Katz, L.F. 1992. Regional Evolutions. *Brookings Papers on Economic Activity*, (1): 1-61.
- [6] Boldrin, M., Canova, F. 2001. Inequality and convergence in Europe's regions: Reconsidering European regional policies. *Economic Policy*, (32): 207-53.
- [7] Borjas, J. 1999. The economic analysis of immigration. In *Handbook of labor economics*. Edited by Ashenfelter O., Card D., Volume 3. North Holland, Amsterdam. DOI [http://dx.doi.org/10.1016/S1573-4463\(99\)03009-6](http://dx.doi.org/10.1016/S1573-4463(99)03009-6)
- [8] Bornhorst, F., Commander, S. 2006. Regional Unemployment and its Persistence in Transition Countries. *Economics of Transition*, 14(2): 269-88.
- [9] Brunow, S., Nijkamp, P., Poot, J. 2015. The impact of international migration on economic growth in the global economy. In *Handbook of the Economics of International Migration*. Edited by Barry R. Chiswick and Paul W. Miller, Volume 1, 1027-75. Elsevier, Amsterdam. DOI <http://dx.doi.org/10.1016/B978-0-444-53768-3.00019-9>
- [10] Bunea, D. 2011. Cross-country Internal Migration and Convergence in Romania. *Annales Universitatis Apulensis Series Oeconomica*, 13(2).

- [11] Cheshire, P., Carbonaro, G. 1995. Convergence/divergence in regional growth rates: an empty black box? *Department of Economics, Faculty of Urban & Regional Studies*, 89-111 pp.
- [12] Coulombe, S., Tremblay, J. 2009. Migration and skills disparities across the canadian provinces. *Regional Studies*, 43(1): 5-18. DOI <http://dx.doi.org/10.1080/00343400701654111>
- [13] Di Bernardino, C., Sarra, A. 2013. Does immigration causes the regional economic growth? The place of origin is a selective factor of territorial dynamics. *Politica Economica*, 29(2): 151-80. DOI <http://dx.doi.org/10.1429/76221>
- [14] Dolado, J., Goría, A., Ichino, A. 1994. Immigration, human capital and growth in the host country - evidence from pooled country data. *Journal of Population Economics*, 7(2): 193-215. DOI: <http://dx.doi.org/10.1007/BF00173619>
- [15] Etzo, I. 2008. Internal Migration: A Review of the Literature, *MPRA Paper*, 8783, 1-28 pp.
- [16] Fidrmuc, J. 2004. Migration and regional adjustment to asymmetric shocks in transition economies. *Journal of Comparative Economics*, 32(2): 230-47. DOI <http://dx.doi.org/10.1016/j.jce.2004.02.011>
- [17] Fingleton, B. 2001. Theoretical economic geography and spatial econometrics: Dynamic perspectives. *Journal of Economic Geography*, 1: 201-25.
- [18] Fischer, M.M., Stirböck, C. 2006. Pan-european regional income growth and club-convergence. *Annals of Regional Science*, 40: 693-721. DOI <http://dx.doi.org/10.1007/s00168-005-0042-6>
- [19] Fratesi, U., Percoco, M. 2014. Selective migration, regional growth and convergence: Evidence from Italy. *Regional Studies*, 48(10): 1650-68. DOI <http://dx.doi.org/10.1080/00343404.2013.843162>
- [20] Ghatak, S., Mulhern, A., Watson, J. 2008. Inter-Regional Migration in Transition Economies: The Case of Poland. *Review of Development Economics*, 12: 209-22.
- [21] Ghatak, S., Pop Silaghi, M.I. 2011. Why Do Not They Move from Rural to Urban Areas? *Romanian Journal of Economic Forecasting*, 1: 143-58.
- [22] Hierro, M., Maza, A. 2010. Foreign-born internal migrants: Are they playing a different role than natives on income convergence in Spain? *Applied Geography*, 30(4): 618-28. DOI <http://dx.doi.org/10.1016/j.apgeog.2010.01.004>
- [23] Kertesi, G. 2000. Migration and Commuting: Two Potential Forces Reducing Regional Inequalities in Economic Opportunities? *SOCO Project paper*, 77, Institute for Human Sciences, Vienna.
- [24] Kirdar, M.G., Saracoğlu, D.Ş. 2008. Migration and regional convergence: An empirical investigation for turkey. *Papers in Regional Science*, 87(4): 545-66. DOI <http://dx.doi.org/10.1111/j.1435-5957.2008.00178.x>
- [25] Kubis, A., Schneider, L. 2016. Regional migration, growth and convergence – A spatial dynamic panel model of Germany. *Regional Studies*, 50(11): 1789-1803. DOI <http://dx.doi.org/10.1080/00343404.2015.1059932>
- [26] Li, X., Mc Hale, J. 2006. *Does brain drain lead to institutional gain? A cross country empirical investigation.* Manuscript, Queen's University. Available at: http://leonardo3.dse.univ.it/espe/documents/Papers/D/5/D5_3.pdf
- [27] Mankiw Gregory, N., Romer, D., Weil, D.N. 1992. A contribution to the empirics of economic growth. *Quarterly Journal of Economics*, 107(2): 407-37. DOI <http://dx.doi.org/10.2307/2118477>
- [28] Maza, A. 2006. Migrations and regional convergence: The case of Spain. *Jahrbuch Fur Regionalwissenschaft*, 26(2): 191-202. DOI <http://dx.doi.org/10.1007/s10037-006-0009-9>
- [29] Niebuhr, A., Granato, N., Haas, A., Hamann, S. 2012. Does labour mobility reduce disparities between regional

- labour markets in Germany? *Regional Studies*, 46(7): 841-58. DOI <http://dx.doi.org/10.1080/00343404.2010.532118>
- [30] Østbye, S., Westerlund, O. 2007. Is migration important for regional convergence? Comparative evidence for norwegian and swedish counties, 1980-2000. *Regional Studies*, 41(7): 901-15. DOI <http://dx.doi.org/10.1080/00343400601142761>
- [31] Rappaport, J. 2005. How does labor mobility affect income convergence? *Journal of Economic Dynamics and Control*, 29(3): 567-81. DOI <http://dx.doi.org/10.1016/j.jedc.2004.03.003>
- [32] Reichlin, P., Rustichini, A. 1998. Diverging patterns with endogenous labor migration. *Journal of Economic Dynamics and Control*, 22(5): 703-28.
- [33] Shioji, E. 2001. Composition effect of migration and regional growth in japan. *Journal of the Japanese and International Economies*, 15(1): 29-49. DOI <http://dx.doi.org/10.1006/jjie.2000.0461>
- [34] Vidyattama, Y. 2016. Inter-provincial migration and 1975-2005 regional growth in Indonesia. *Papers in Regional Science*, 95: 87-S105. DOI <http://dx.doi.org/10.1111/pirs.12120>
- [35] Wolszczak-Derlacz, J. 2009. *The Impact of Internal and International Migration on Regional Convergence in Poland*, Contemporary Migrations: European and Polish Dilemma, University of Warsaw.

JOURNAL 
of Applied Economic Sciences

ISSN 2393 – 5162

ISSN - L 1843-6110