Migration to Rural Counties: An Example from the North-Eastern Poland

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Introduction

Growing urbanization has been a dominating trend throughout the world and the share of urban population has been climbing steadily across the globe. The urban population growth has been, in part, a result of the depopulation of rural areas, with some areas becoming empty. Examples of such areas are found in many countries, for example in Croatia (Stambuk, 1991). The migration to core regions characterized in the second half of the 20th century Iceland, the United Kingdom, Norway, Spain Sweden, Japan, South Korea, Taiwan and New Zealand (Vining, Jr., et al., 1982). It was taking place in Poland, East Germany, Hungary and Czechoslovakia during the same period (Vining, Jr., et al., 1982), long before the transition to the market economy of those countries in the early 1990s or joining the European Union (EU) in 2004. Depopulation phenomenon also characterizes regions defined as most lagging in development in the EU. Among the regions classified as the least developed in the EU is the region of Podlasie in Poland. The region is equivalent to the largest administrative unit of Poland called Podlaskie voivodship. Historically, the geographical region of Podlasie only in part was located in the contemporary administrative area.

The increasing density of population in urban areas, however, is associated with the declining quality of life. Increasing traffic, noise, and pollution are some of the features of many highly urbanized areas. Some cities, for example, London, England, or Berlin, Germany, introduced regulations and fees to discourage traffic in order to improve the quality of life. Another characteristic of the densely populated urban areas are high housing prices. Real estate

prices in many much desired areas have been rising for prolonged period of time and remained high despite the global economic slowdown and economic growth bordering a recession.

In response to the negative effects of living in densely populated, highly urbanized areas some residents chose to migrate outside the city limits. In the United States (especially in the North East) or central Canada, the outmigration from core areas has been taking place for some time (Vining, Jr., et al., 1982) leading to the creation of extensive suburbs.

This paper examines factors influencing the migration of residents to rural counties of north-east Poland, the Podlaskie voivodship (Map 1), classified as one of the four least developed areas of the EU. Despite the lagging economic growth and the associated limitations including the underdeveloped social and technical infrastructure (Jarosz, 2008) or lower than average wages (Florkowski, 2012), some areas of the region have witnessed migrants moving into the area. The identification of attributes of an area attracting migrants is relevant because such knowledge permits targeted assistance and support programs, including efforts by the European Commission (EC; EC, 2006) that intend to slow down the depopulation or, even, to reverse it. Once the attributes that attract or discourage migrants are established, local governments, regional parliaments[1] and the central government in cooperation with the European Commission can improve comprehension of the relative effectiveness of policy instruments in combating depopulation and outmigration. Without the necessary policy modifications, the tendency to depopulate will continue and the pauperized self-governments will be unable to locally fund the basic set of public services forcing the EC and the government to increase budgetary allocation for the destitute areas.

Depopulation trends in Podlaskie voivodship

The area under consideration has experienced slow economic growth in the past due to its location on the border between countries, which periodically claimed rights to the territory. As the border area, it was first to experience any military conflict between the neighboring countries and, in the past, subject to local conflicts between the warring factions residing on either side of the border. Frequent conflicts induced migration followed by renewed inflows of population. The last two World Wars were fought on its territory, once between Russian Empire and Prussia, later between Germany and Poland and between Germany and the Soviet Union. Since 1945, the area did not experience any widespread military conflicts, but despite officially proclaimed policy received few investments under the centrally planned economy. The transformation of the socio-economic system in the late 1980s and the adoption of the market mechanism in the country was associated with the policy encouraging regional disparities to promote economic growth. The policy maintained the infrastructure differences, wages below the national average (82 percent of the national average), and liquidation of industries established under the centrally planned system, which could not compete in a market economy.

Poland has become the EU member in 2004 and begun the implementation of programs aiming at the development of rural areas and underdeveloped regions. Policies counteracting the depopulation of rural areas have been incorporated into the changes in the EU Common Agricultural Policy (CAP) and created the so called "second pillar" or subsidies intended to increase the development of rural areas rather than exclusively focused on farming. But effects of slowing the migration as a result of the adopted programs have not been examined because of the lack of suitable data. The changes in the CAP associated with setting the rural development issues as a priority within the EU recognize that more than 50 percent of the EU population

resides in rural areas (Murawska, 2012). In the case of Podlaskie voivodship, there are overlapping issues of underdevelopment and rural residency and stem, in part, from the differences in lifestyle and conditions between urban and rural areas experienced also, but to a lesser degree, in developed regions. The differences have persisted for decades and in Poland implied the lack of or difficult access to technical infrastructure common in urban areas.

Since the adoption of the EU policy to improve the quality of life in rural areas, a substantial development of technical infrastructure has taken place in Poland. Although already prior to the program implementation, piped water was available to nearly the same percentage of urban and rural residents, regional disparities were more distinct. The percentage of rural residents with access to sewer system or, especially, gas pipelines, was very limited (Jarosz, 2008; Ciura, 2012; Murawska, 2012), while urban dwellers enjoyed considerable advantage of having access to such services.

Concepts of migration and quality of life in rural areas

The progress in the construction of technical infrastructure has been remarkable since 2005, but there are still considerable regional differences. The differences have economic implications for the competitiveness of the underdeveloped areas and limit the potential of local and regional economy. There are also environmental implications, which in other countries influence the residential decisions, which shape the local tax base. Podlasie has made substantial progress in technical infrastructure investment as compared to the country's developed regions, but despite the progress there remain large differences between urban and rural districts.

The dominant economic sector in Podlaskie voivodship is agriculture (Tałałaj, 2011) and the main industrial sector is food processing and manufacturing. Rural areas in Poland have been less developed in nearly every aspect associated with modern living conditions. The progress in

the past two decades has been substantial, and accelerated after Poland joined the EU in 2004 (Dolata, 2011), but in 2005, Podlaskie voivodship had the lowest density of sewer lines among all voivodships in the country and one of the lowest density of water pipelines.

In developed areas of the northeastern United Sates the core areas have been experiencing outmigration for a substantial period of time. The observed decreasing population of core areas was induced by the desire to improve one's living conditions as the quality of life deteriorated due to worsening environmental associated with the air and noise pollution. Increasing costs of living demonstrated in steadily rising real estate prices and, therefore, taxes, provided additional inducement consider leaving core areas. Similar trends could be observed in comparable areas in other parts of North America, Europe or developed economies of Eastern Asia.

The trend has also been observed in Podlaskie voivodship proving that some trends occur for similar reasons also in the underdeveloped regions. In Podlaskie voivodship, despite wages lagging the national average, experienced real growth of disposable income in the last two decades. Because of the persistent shortage of housing under the centrally planned economy, for many residents improving own living conditions has been a major goal. Space limitations and the rapidly rising demand led to real estate price increase in Podlaskie urban areas. Residents who want to live in own dwellings search for less expensive real estate outside the city limits. Consequently, despite the overall population decline in the region, the migration takes place within the region. Urban residents purchase or construct homes in counties bordering towns and cities to improve their living conditions, especially to have a larger living space. Under the centrally planned system, regulations defined limits of space per person restricting the size of apartments.

Although the living space might have been restricted, urban residents enjoyed, to a much larger extent than rural residents, access to utilities including water, sewer, and gas pipelines. Outside towns, water has been supplied mostly from wells, while sewer or gas pipelines have been rare. The EU programs offer technical infrastructure improvement but require matching funds from local communities and counties. However, the required match is relatively small for locations in regions classified as underdeveloped such as Podlaskie voivodship. The expansion of such services has been easier from the existing location outward, towards areas farther away from densely populated urban space and relatively expensive real estate. Counties neighboring towns take advantage of the new development because it generates tax revenues.

Data

Micro-level data used in the estimation of the migration model are gathered from the publicly accessible electronic data base (GUS, 2011). The data are for the district level (pol. powiat), but exclude the urban districts of Białystok, Łomża and Suwałki, which have been attracting population as the major urban centers of the region. Consequently, 11 districts are included.

Several measures of technical infrastructure are selected for this study include those that are required under the EU laws, for example the length of sewer lines. The construction of sewer lines in Podlaskie voivodship is a function of housing density. Many counties and districts losing population have already spaced dwellings and the distance adds to construction costs. Water pipelines are another measure of life quality in this region because the percentage of rural residents with piped water has been lower than in some other regions of the country. The living area per person is included because it tends to be larger in villages than in towns and the recent construction of family houses involved floor plans much larger than a typical apartment in town.

Developers offer a variety of designs and are quite flexible in accommodating investors'

demands.

Many young families thinking about moving to rural areas are concerned about the

quality of schooling. Access to university education is easier in cities, but the access to

elementary and middle school education in rural areas is, on average, comparable. But, within

Podlaskie voivodship differences exist. The average district expenditure per pupil are included in

the specified equation. In recent years due to low birth rates many rural schools have been closed

despite the protests of local communities. High education expenditure per student imply not only

adequate conditions in schools, but also a relatively wealthy area capable of maintaining and

improving education provided by local schools.

Several measures account for the state and potential of the local economy, which may

attract migrants. The percentage of population i post-productive age implies a depopulating area,

but also one with a weak or declining local economy. The larger the percentage of this

population segment, the more difficult is to attract investors and expect growth of the local

economy. Another measure is the local unemployment rate, which refers to the productive age

population. A high unemployment rate suggests few job opportunities, although it has to be

noted that the unemployment rate in Poland has been eight percent or higher for a decade and

remained high even in regions performing better than many districts in Podlaskie voivodship.

Two measures of local income and wealth have been included. Government transfers

represent transfers under various income aid programs. The transfers include unemployment

benefits, disability payments, and other programs. The average expenditure of the district or

county per resident measure the finances of district and the highest values indicate economically

stronger counties, but because of their location in the region, one of the EU most underdeveloped

areas, a district or a county may be a recipient of grants increasing the expenditure. But such expenditure could imply investment in infrastructure improving the quality of life of local residents and any migrants, who chose to relocate there. A direct measure of economic activity is the number of registered firms. Some of the firms ma show little economic activity, but many do because they create a job for the owner, in many instances it is a second job allowing to earn additional income. However, because not all residents establish and operate own firms, those who earn incomes closer to the national average in the region where the average income is substantially lower, presumable are in a position to purchase an existing or build own house outside the city limits implicitly demonstrating own status.

Empirical model derivation

The econometric specification is linear regression equation with exponential heteroscedastic errors, viz.,

$$y_i = x_i\beta + u_i \tag{1}$$

where the error terms is normally distributed with zero means and heteroscedastic error term

$$u_i \sim N(0, \sigma_i^2) \tag{2}$$

such that

$$\sigma_i = \exp(w_i\phi) \tag{3}$$

where the first element of w_i is a constant. As noted below, variables in the heteroscedasticity specification (3) are log-transformed which suggests that the heteroscedasticity specification really is exponential, viz.,

$$\sigma_i = \sigma_0 \tilde{O} h_i^{\alpha_i} \tag{4}$$

Several tests for heteroscedasticity are conducted. First, the result of the Breusch-Pagan test does not suggest presence of heteroscedasticity, while the modified White test indicated heteroscedasticity as a potential problem (p-value $= 0.025$). Although such contradictory test results are not uncommon, prudence suggests to proceed as if heteroscedasticity would be a problem.

Estimation requires choice of regressors (x) and variables to explain heteroscedasticity (w). I present two sets of estimates below: the benchmark ordinary least-squares estimates (restricted model) and the heteroscedastic model estimates (unrestricted model). The heteroscedasticity spec is

$$\sigma_i = \exp(4.69 - 2.78\log(\text{Income}) + 2.28\log(\text{Pipeline}) + 1.62\log(\text{Popuden})$$

which is the same as

$$\sigma_i = 109.39(\text{Income})^{-2.78}(\text{Pipeline})^{2.28}(\text{Popuden})^{1.62}$$

Note that statistical significance levels change after the heteroscedasticity specification—some gains, some losses. Based on both restricted (homoscedastic) and unrestricted (heteroscedastic) model results, likelihood-ratio (LR) test supports the heteroscedastic specification, as does Lagrange multiplier (LM) test based on the restricted (homoscedastic) model estimates.

Results

Test results suggested that the estimation results accounting for heteroscedasticity are superior to the restricted model estimates (Appendix Table 1). Table 2 shows estimates of both models for comparison and indicates potential errors that would arise from interpreting the restricted model results. The difference in results applies to the coefficient magnitude and variable statistical significance.

The results indicate the positive association between the dependent variable and the length of water and sewer pipelines suggesting that investment in technical infrastructure improving life and environmental quality matters in attracting migration. Environmental quality encompasses much broader array of factors than only the sewer system, but this service is critical also to life quality. It implies convenience, improved safety, and protection of surface and ground water, which the younger generation has been concerned about to a larger extent than previous generations.

The increase in the living area per person is also positively associated with migration. The desire to have additional living space runs strong among people, who have been denied a free choice in this regard in the past. The often cramped apartments in housing projects (pol. *bloki*) are acceptable, but those who can afford prefer a more independent living and are ready to move out of urban areas to villages in search of such opportunities.

Young residents and their families attach importance to the availability and quality of local schools. An increasing expenditure per student is an indication of the education quality and attracts migration as confirmed by the statistically significant relationship (Table 2). Some of the education expenditure originates from local revenues. Local governments have the right to set real estate taxes. With the expanding portfolio of services, local governments search for revenues and the migrants, who move to their new residence in a county, but likely having a job outside the county, are viewed as sufficiently wealthy to be able to pay higher taxes. In many communities the real estate tax increases at a rate exceeding the inflation rate. Results suggest that the tendency does not go unnoticed and lowers the migration.

Concluding comments

This paper identifies factors and attributes of counties in the EU region classified as one of the most lagging in development that are associated with migration. The results support expectations of creators of the EU rural development support programs that as a results of an array of subsidies and grants, the quality of life of rural residents improves. Program supporting the technical infrastructure expansion show that as a result of such investment, rural areas can attract migrants and, possibly, stop or even reverse the depopulation.

Much of the infrastructure investment depends on the initiative of local governments because grants and subsidies require match from local sources. The recently placed restrictions by Poland's central government on the ability of local governments to manage their own finances through raising revenues and borrowing could slow the speed of changes in infrastructure and negatively affect the quality of life in rural areas. As a result the national government would have deal with the effects of continuing depopulation and underdevelopment of several regions in Poland.

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Table 1.
Variable definitions and sample statistics.

Variable	Definition	Mean	SD	Min.	Max.
Migrants	Number of migrants	435.32	176.03	17.0	819.0
Income	Income in zlotys	2176.11	326.37	1597.56	3015.30
PIPELINE	Length of water pipes in the county in km	729.54	241.92	311.70	1200.40
POPUDEN	Population density in a county, person/sq. km	38.20	9.98	25.0	61.0
LIVINGA	Average living area per person in square meters	25.87	2.50	21.20	31.20
SEWER	Length of sewer lines in km	91.24	46.87	19.50	209.60
REALTAX	Real estate tax revenue (county)	1187.65	464.48	3584445	.20
EDUCEXP	County education expenditure	3852.85	975.69	15628867.0	.62
TRANSFER	Unemployment benefits and other aid in zlotys	236.18	91.81	878291.0	5301492
POSTPOPU	Number of postproductive residents per 100 residents	31.12	4.89	23.60	41.90
FIRMS100	The number of registered firms per 100 residents	45.34	141.63	3.53	545.21
AVGWAGE	Percent of average wage as nation's average	82.56	9.98	29.80	107.50
UNEMPLOY	County unemployment rate, in percent	8.92	3.19	4.20	17.20

Source: Based on GUS data.

Table 2
Estimates of linear regression equation with heteroscedastic and homoscedastic errors.

Variable	Heteroscedastic model		Homoscedastic model	
	Estimate	SE	Estimate	SE
Constant	−1920.420	1324.882	−1566.750	1459.577
log(Income)	−198.318	126.332	−179.736	131.022
log(Pipeline)	154.423**	72.097	174.021**	72.011
log(Population density)	281.299***	83.284	222.480**	84.924
log(Living area)	441.728*	250.826	289.816	351.193
log(Sewer)	57.523*	33.184	52.325	35.517
Realtax	−0.096**	0.046	−0.119**	0.050
EDUCEXP	0.061***	0.022	0.041*	0.024
TRANSFER	−0.271	0.408	−0.040	0.320
POSTPOPU	0.859	5.633	1.742	6.795
FIRMS100	−1.014	0.632	−1.068***	0.126
AVGWAGE	1.106	1.038	3.027**	1.379
UNEMPLOY	4.593	4.550	0.854	6.015
Heteroscedasticity equation				
Constant	4.695	7.435		
log(Income)	−2.780***	0.863		
log(Pipeline)	2.284***	0.452		
log(Population density)	1.619***	0.608		
Adjusted R^2			0.777	
$F(12,52)$			19.550	
Log likelihood	−360.773		−372.349	

Note: Heteroscedasticity error specification is

$$\log(\sigma_i) = \delta_0 + \delta_1 \log(\text{Income}) + \delta_2 \log(\text{Pipeline}) + \delta_3 \log(\text{Population density}).$$

* Significant at α = .10.
** Significant at α = .05
*** Significant at α = .01.

Appendix

Table 1. Tests for homoscedasticity.

Test	Chi-squared	df	p-value
LR	23.15	3	< 0.0001
Wald	34.00	3	< 0.0001
LM	13.60	3	0.0035
LM (White)	11.97	2	0.0025

Map 1. Podlaskie Voivodship Location in Poland.