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RENATA JAWORSKA*

Health Inequalities Across The European Union Regions: A Beta-Convergence Approach[1]

Abstract

The European Union is currently facing a serious problem concerning the occurrence of significant health inequalities observed between particular member states as well as within these states. Substantial efforts are being made to achieve an economic and social cohesion and the reduction of health inequalities between the EU regions is an important element of this process.

This work is devoted to the study of the variations of health status (measured by life expectancy) across the EU regions of NUTS II level. We apply existing tools developed in economic growth literature to study a mortality convergence. Using the idea of unconditional convergence model developed for economic growth, we can confirm a decrease or increase of regional health inequalities. The main research hypothesis is as follows: whether regions with lower initial life expectancies have experienced the largest increases in life expectancies. To verify the hypothesis of beta-convergence we use spatial econometric models which additionally allow to take the geographic dependence among the surveyed regions into consideration. Due to the heterogeneity of the surveyed spatial units we also verify the hypothesis of the club beta-convergence.

Keywords: *health inequalities, club convergence, beta-convergence, European Union regions*

* University of Lodz, Faculty of Economics and Sociology, Department of Spatial Econometrics

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1. Introduction

The issue of public health has been present in the European Union since its very beginning and has been gradually growing in importance. Although the average population health status has been improving on a continuous basis for the last few decades, the differences in health status between the inhabitants of various EU regions and between groups in the most advantageous and disadvantageous social situation still remain substantial, and in some cases they have even increased (Commission of European Communities 2009).

Therefore, the European Union is facing a serious problem consisting in the existence of significant health inequalities both between its member states and within these states. The differences in health status are influenced by several socio-economic factors. The economic conditions affect the living conditions in various ways, which in turn affects the health status.

To reduce health inequalities, the UE has undertaken activities detailed in the EU policy instruments - strategic documents and health programs. The most important ones include:

- the Europe 2020 strategy (through the promotion of a permanent economic growth and social cohesion);
- the 'Together for Health" strategy: a strategic approach towards the EU for 2008-2013";
- the "Health for Economic Growth" program (2014-2020);
- Communication from the Commission "Solidarity in health: reduction of health inequalities in the EU" (2009);
- EU cohesion policy.

The main goal of our study is an assessment of the existence of convergence of health status across the EU regions. First, we apply economic growth theory to study health status convergence using two frameworks of convergence studies: an unconditional beta-convergence model and a two-regime convergence model for a club-convergence process.

Secondly, we extend the conventional econometric approach for beta-convergence model to a spatial econometric framework. If regional data are used in regression framework, one has to take into consideration a spatial autocorrelation (Anselin 1988, p.57; Fingleton 2003; Eckey et.al. 2006, p. 2). Spatial convergence models allow one to take into account relations existing between the analysed regions and the impact of a particular region on the neighbouring regions.

Conclusions drawn from the conducted analyses may provide guidance and valuable instructions for the pursuance of regional and health policies at the EU level. Their practical application by relevant institutions at the central (EU) and regional levels could contribute to a better use of the structural funds, to the improvement of health protection systems and, ultimately to the improvement of the health status of the inhabitants - especially in the regions with the most difficult economic and social situation.

2. The literature review

A significant number of papers have been dedicated to study regional income convergence. The beta-convergence approach proposed by Barro and Sala-i-Martin (1990, 1992) is the most frequently used one. Beta-convergence has been studied in many papers. The convergence hypotheses were advanced by Solow (1956) and documented by Baumol (1986) and Barro and Xavier-Sala-i-Martin (1995). However, spatial econometric approach has been applied to regional convergence in recent years (cf. Baumont et.al. 2003; Fischer and Stirböck 2006; Eckey et.al. 2006).

The issue of health inequalities, due to the growing importance of this problem, is being dealt with not only in the EU policies and programs, but it also raises interest among the scientists. From the point of view of the EU cohesion policy, growing regional disparities in public health status lead to both theoretical and empirical in-depth research. The issue of health inequalities occurs quite frequently in the literature. The population health status is a complex and difficult to measure category. One of the best widely available indicators of public health is life expectancy. To show that life expectancy can be modelled using the theory of economic growth, there must exist close association of health with income and growth (Mayer-Foulkes 2001). The crucial study in this field is Preston (1975) paper, in which he has indicated that LE is positively correlated with income. For instance, Barro (1991) has found life expectancy indicator to be an important variable of economic growth model. Arora (2001) has found cointegration between economic growth and health in 100-125 year time series for seven advanced countries.

To analyse health inequalities some researches use sigma-convergence approach based on a variance tendency (cf. Edwards and Tuljapurkar 2005). Decrease in a dispersion (e.g. measured by the standard deviation or variation coefficient) over the period means that regions converge. In a different approach Gini coefficient is used as a measure of dispersion (c.f. Peltzman 2009; d'Albis et.al. 2006).

In recent years we can also find some papers devoted to the reduction of regional health inequalities with applying a beta-convergence methodology. The topic of club-convergence has been explored by Mayer-Foulkes (2001). He analysed convergence clubs in cross-country life expectancy dynamics. Life expectancy was modelled in terms of physical and human capial and technology, the basic economic variables described by economic growth theories. On the international scale also one can find research into the convergence of the public health status on the local level (Gächter and Theurl 2011).

One of the recent works, which is a contribution to the literature on convergence in health status, is a paper by d'Albis et.al. (2012). Authors have applied econometric tools commonly used in the economic growth literature to assess the existence convergence across high-income countries. They used both sigma- and beta-convergence methods.

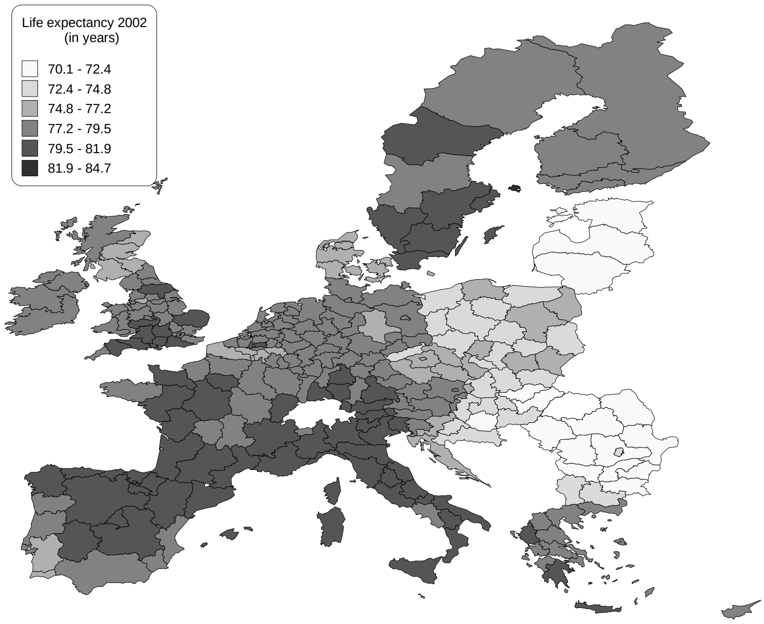
From among the Polish researchers Jankowiak (2010) attempted to assess the convergence - only in relation to the health protection systems in the EU countries. Other recent Polish works explain the evaluation of the European Union regional convergence (see Markowska and Strahl 2012).

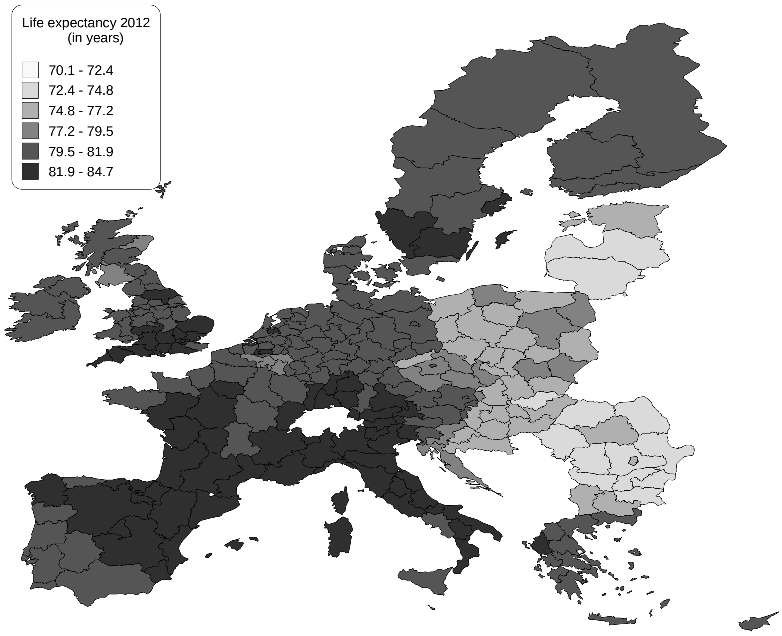
3. The database

We use data for the years 2002-2012 at the NUTS-2 level for all European Union countries. This data came from Eurostat and the ISTAT (Italian National Institute of Statistics – data for Provinces of Emilia-Romagna and Marche). When choosing the spatio-temporal scope, one was guided by the criterion of data availability and comparability. A period of time longer than the indicated one, would allow one to better determine the occurrence of certain trends, especially those in the social sphere. However, this would impose a spatial limitation on the analysis. Thus changes in the NUTS classification (e.g. in the case of Germany, Italy, and Croatia), and in particular, changes in the boundaries, merger and separation of new subregions, were taken into account by recalculation of the variable values, according to the NUTS classification in 2010. Generally, we examine regional convergence of 265 regions in 28 EU countries:

Austria (9), Belgium (11), Bulgaria (6),Croatia (3), Czech Republic (9), Cyprus (1), Denmark (5), Estonia(1),Finland (5), France (22), Germany (38), Greece (13), Hungary (7),Ireland (2) , Italy (21), Latvia (1), Lithuania (1), Luxemburg (1), Malta (1),the Netherlands (12), Portugal (5), Poland (16), Romania (8), Slovak Republic (4), Slovenia (2), Spain (16), Sweden (8), UK (37). Some islands (e.g. French overseas Departments, Canary Islands (Spain), Madeira, Azores (Portugal) have been excluded.

Figure1. Life expectancy at birth in 2002 and 2012

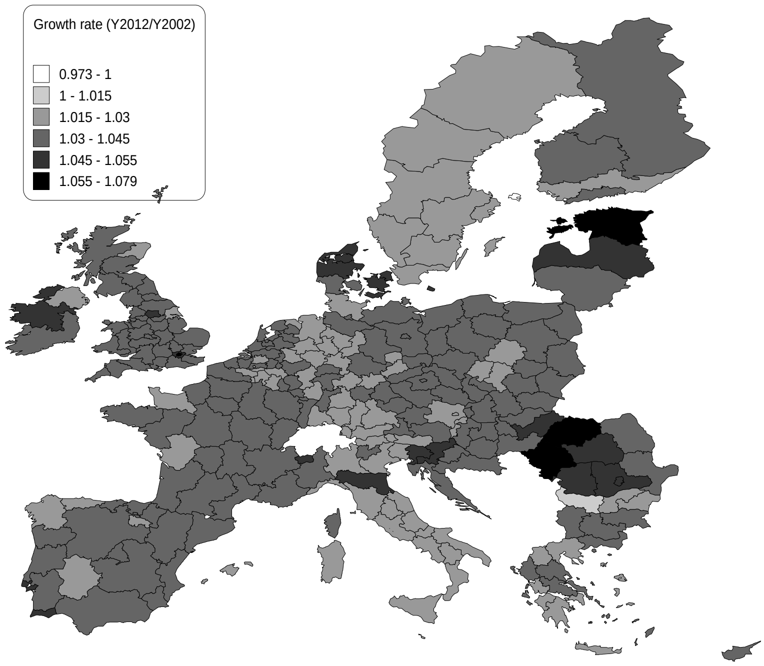




Source: own elaboration based on the Eurostat and ISTAT data.

The regional distribution of life expectancy (in two selected years – 2002 and 2012) is displayed in Fig. 1. The distribution of the variable, as one can expect, is spatially differential. The lowest values of life expectancy are characteristic particularly for the new member states: Bulgaria, Romania and also Poland, Lithuania, Latwia and Estonia. Besides, we can see some clusters of high and low values of the variable, which can indicate a spatial autocorrelation process.

Figure 2. Life expectancy growth rate between 2002 and 2012



Source: own elaboration based on Eurostat and ISTAT data.

Generally regions with lower initial state for life expectancy (especially some regions of Eastern Europe) have achieved greater increases. It can point to a convergence process.

4. Methodology

Income convergence refers to the situation in which relatively poorer regions grow faster than their rich counterparts. In its strongest version (known as absolute convergence), an implication of this hypothesis is that, in the long run, countries or regions should not only grow at the same rate, but also reach the same income per capita. Convergence can be conditional (conditional beta-convergence) or unconditional (absolute beta-convergence). Conditional convergence implies that a country or a region is converging to its own steady state while the unconditional convergence implies that all countries or regions are converging to a common steady-state.

To analyse the dynamics in health inequalities Barro-style methodology for convergence analysis was used. The unconditional β-convergence model can be formally expressed by formula (Kusideł 2013, pp. 47-49):

$$ln\left(\frac{y_{it0+T}}{}\right) = a + bln(y_{it0}) + u_{it0.t0+T}, \tag{1}$$

where: Y_{it0} – the final level of log-normal *per capita* GDP; Y_{it0+T} – the initial level of log-normal *per capita* GDP; T – interval between observations of the dependent variable during the initial and final year.

There is absolute beta-convergence when b is negative and statistically significant, where b parameter is estimated as:

$$b = -\left(1 - e^{-\beta T}\right), \tag{2}$$

To measure the speed at which the steady-state is approached it is used a convergence rate given by:

$$\beta = -\frac{ln(1+b)}{T}, \tag{3}$$

Given the convergence rate β, we can easily calculate half distance to steady state (half-life) that may be obtained by the below given formula:

$$hl = -\frac{ln2}{\beta}, \tag{4}$$

Adapted for life expectancy the absolute beta-convergence equation, has a following form:

$$ln\left(\frac{s_{ito+T}}{}\right) = \alpha + bln(s_{it0}) + \mu_{it0.t0+T}, \tag{5}$$

s_{it0} - life expectancy values in logarithms for *i*-region in initial year .

s_{it0+T} - life expectancy values in logarithms for *i*-region in final year;

We consider two types of models with spatial interactions:

1. The case of Substantive Spatial Dependence (spatial lag model):

$$\boldsymbol{g} = \alpha \boldsymbol{S} + \rho \boldsymbol{W} \boldsymbol{g} + \varepsilon, \tag{6}$$

where: ***W***- *(n,n)* spatial weight matrix (euclidean distance-based), $\boldsymbol{g} = \left(\frac{s_{it0+T}}{s_{it0}}\right)$- (*n*,1)-vector of growth rate of life expectancy over the given time period, **S** – vector of observations on life expectancy variable in logarithms in initial year, *ρ* – spatial autoregressive parameter, **ε** – error term.

2. The case of Spatial Error Dependence (spatial error model):

$$\boldsymbol{g} = \alpha \boldsymbol{S} + \varepsilon, \tag{7}$$

$$\varepsilon = \lambda \boldsymbol{W} \varepsilon + \boldsymbol{\mu}. \tag{8}$$

where: **g, W, S** are defined as before, ***μ*** – (*n*,1) is a vector of errors, *λ* is an autoregressive parameter in the error dependence model.

European regions are different because of economic and social level, the differences are large especially between old and new Member States. When we have a heterogenous sample, one need to cluster regions to smaller group called clubs. To test club convergence we estimate a spatial regime model proposed by Baumont et. al. (2003, p. 146) written as follows:

$$ln\left(\frac{s_{ito+T}}{s_{ito}}\right) = a_1 D_1 + a_2 D_2 + b_1 D_1 ln(s_{it0}) + b_2 D_2 ln(s_{it0}) + \varepsilon \tag{9}$$

$$\varepsilon \sim N(0, \sigma^2, I)$$

where: D_1, D_2 – dummy variables describing two spatial regimes previously defined. D_1 equals to 1 if region *i* belongs to club A and 0 if region *i* belongs to club B. D_2 equals to 1 if region i belongs to club B and 0 if belongs to club A;

$\left(\frac{s_{ito+T}}{s_{ito}}\right)$ - life expectancy growth rate beetwen final year and initial year;

s_{it0} - life expectancy values for *i*-region in initial year.

5. Discusssion

In the literature there are several methods to analyse convergence clubs. In the recent European convergence studies researchers define convergence clubs with ESDA techniques.[2] This allows you to identify clusters of neighbouring regions with high and low values of the variable ("hot spot" and "cold spot"). For instance, Fingleton (2003) use global indicators of spatial association (Moran's *I* statistic). Some researchers employ local indicators (LISA) (Baumont et. al. 2006) such as Getis and Ord's (G*) statistic (see Fischer/Stirböck 2006).

We use Moran's *I* statisitic to identify spatial regimes in the data according to Baumont et. al. (2003). The statistic of Moran *I* coefficient (Moran 1950) is defined as:

$$I = \frac{N}{S_0} \frac{\sum_i \sum_j w_{ij}(y_i - \bar{y})(y_j - \bar{y})}{\sum_i (y_i - \bar{y})^2} \tag{10}$$

where: where *N* is the number of spatial units indexed by *i* and *j*, $\bar{y}$ is the mean of the *y* variable, w_{ij} are the elements of the weight matrix W*, and S_0 is the sum of the elements of the weight matrix: $S_0 = \sum_i \sum_j w_{ij}$. The expected value of Moran's *I* is defined as:

$$E(I) = -\frac{1}{N-1} \tag{11}$$

If I > E(I) we have positive spatial autocorrelation. For our study area (265 regions) E(I) equal -0,0038. Values of the Moran's *I* statistic are shown in table 1.

Table 1. Moran's I statistic based on life expectancy variable in all surveyed years

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
I	.618	.616	.640	.637	.638	.638	.626	.637	.639	.632	.633

Source: own calculations.

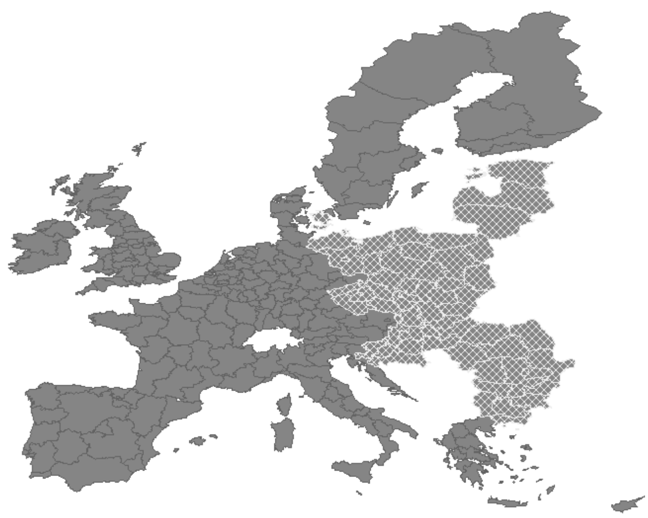
Moran's *I* points to possible positive spatial autocorrelation in all surveyed years. Broadly speaking, a positive spatial autocorrelation means that high values of the variable are neighbouring high values and low with low. The resuls are clusters of regions: low-low values, high-high values, low-high and high-low.

[2] Anselin (1994) define ESDA (Exploratory Spatial Data Analysis) as the collection of techniques to describe and visualise spatial distributions, identify atypical locations (spatial outliers), discover patterns of spatial association (spatial clusters), and suggest different spatial regimes and other forms of spatial instability or spatial non-stationarity.

Figure 3. Spatial regimes in the initial (2002) life expectancy by Moran's scatter plot

Club A (H-H quadrant of Moran scatterplot)

Club B (L-L quadrantof Moran scatterplot)



Source: own elaboration based on the Eurostat and ISTAT data using euclidean distance-based weight matrix.

Figure 3 shows a spatial distribution of two defined spatial regimes – Northwest regime (Club A) and Eastern regime (Club B). The 157 EU regions are located in H-H quadrant of Moran scatterplot, 59 regions are located in L-L quadrant and 49 other regions are of type L-H and H-L, which means no spatial dependence. Since these 49 regions have been excluded, our new sample includes 216 regions which belong to the Club A (H-H) and Club B (L-L). We noticed a polarization pattern across the EU regions in view of life expectancy. This polarization pattern is strongly similar to income polarization between rich regions in the north and poor regions in the south (see Fingleton 2003, p. 131).

The next step was an empirical analysis beginning with the ordinary regression model (5). Firstly we have estimated stationary model by Ordinary Least Squares for the entire sample (see first column of Table 1). The estimated coefficient b indicates that life expectancy variable in initial year (lnS_{2002}) is significant with appropriate sign on the coefficient estimate. It shows that beta-convergence has taken place in the period 2002-2012, which means regions with lower lower initial life expectancy have obtained the largest increases in life expectancies.

Table 1. Estimation results of unfiltered stationary model

	OLS		**ML (lag/error)**	
	coefficient	t-value	coefficient	z- value
a (constant)	0,48***	8,54	0,39***/0,65***	5,36/7,99
b (lnS_{2002})	-0,10***	-7,97	-0,087***/-0,14***	-5,29/-7,59
λ(spatial error)			0,63***	5,66
ρ (spatial lag)			0,39***	3,03
converg. speed (annual)	1,05%		0,91% / 1,6%	
half-life	66 (years)		76 / 46 (years)	
Diagnostic measures	R^2 = 0,19 Log likelihood = 932,36 AIC criterion = 1860 Moran *I* = 0,13*** LM (error) = 42,89*** Robust LM (error) = 45,12*** LM(lag) = 13,15*** Robust LM (lag) = 15,37***		R^{*2} = 0,22/0,27 Log likelihood = 936,7/943,9 AIC criterion = -1867/-1883	

*Significant at the level of 0,1; **Significant at the level of 0,05; ***Significant at the level of 0,01

Source: own calculations.

Estimation of the rate of convergence is above 1 percent per year and it is below the standard convergence speed of 2 percent for regional economies (see Fischer and Stirböck 2006). The Half-distance to the steady-state is equal to 66 years in this case.

In the previous step we found the evidence of spatial dependence in the analyzed phenomenon. The presence of spatial autocorrelation can invalidate the inferential basis by OLS. It can violate one of the basic assumptions of OLS estimation – the assumption of uncorrelated errors (Fischer and Stirböck 2006). The diagnostic measure of the Moran *I* statistic is highly significant, suggesting a problem with spatial autocorrelation. Thus, we need to estimate a convergence model with spatial interactions. The results of Maximum Likelihood estimation of the spatial lagged model (6) and spatial error model (7) are displayed in the second column of Table 1.

ML estimation has given quite similar results wit *b*-parameters equal -0,087 (spatial lag model) and -0,14 (spatial error model). The *b*-parameters are also significant and have a negative sign, which is to be expected. As we see in Table 1 both LM tests of the lag and error are significant, confirming presence of spatial dependence. Relative to OLS-estiamtes, ML-estimates have achieved a higher log likelihood indicating a better quality of the models with spatial dependency.

To distinguish between spatial error and spatial lag model one can use robust LM tests. Robust measures of both error and lag model are still significant but the Robust LM (error) test has the highest value, which speaks in favor of the spatial error model. In addition higher value of pseudo-R^2 and higher log likelihood show that the overall fit of spatial error model is better.

Given the previous two clubs of regions, we have estimated the two-regimes club-convergence model.

Table 2. Estimation results of two-regimes convergence model

	Club A		**Club B**	
	coefficient	t-value	coefficient	t- value
a	0,86***	3,99	0,63***	3,95
b	-0,19***	-3,81	-0,14***	-3,76
conv. speed (annual)	2,11%		1,51%	
half-life	33 (years)		46 (years)	
Global tests	R^2=0,22 AIC= -1553,13			

*Significant at the level of 0,1; **Significant at the level of 0,05; ***Significant at the level of 0,01 .

Source: own calculations.

The results presented in Table 1 highly support the view of two-club convergence of health status in the European Union regions. In the case of Club A (Western Europe) the rate of convergence is above 2 %. The associated half-life is 33 years, which means that regions take 33 years for half of the initial level of life expectancy and the club specific steady-state level to disappear. The estimated convergence speed in Club B is equal about 1,5 % and it is slower than in Club A. The outcome is quite surprising because regions with higher life expectancy at the start obtain a higher speed of convergence. Broadly speaking, the process of social convergence is stronger in wealthier regions.

Studies in the field of income club-convergence indicate quite contrary conclusions (see Fischer and Stirböck 2006). According to these researchers the estimate of the convergence rate of the initially poorer regions turns out to be higher than the one of the club of initially wealthier regions.

4. Conclusions

The paper investigated health convergence for the EU regions over the period of 2002-2012. A beta-convergence process has taken place in the EU regions in the above-mentioned period. Regions with lower initial life expectancies have experienced the largest increases in life expectancies. However, the process has not been the same for all regions. Higher convergence speed is typical for more developed regions (club A) located in the south-west Europe.

From an econometric point of view, a simple single-club description by OLS method has proved to be misspecified. The level of public health (measured by life expectancy) in the EU varies spatially, with a tendency for the occurrence of spatial relationships which needed to extend cross-section data model to spatial interactions.

Adaptation of the economic growth theories to public health status has proved to be successful. Some similarities between the income distribution and life expectancy distribution across the EU regions have been confirmed. The proposed beta-convergence method can be successfully applied to the access of regional health inequalities.

References

Aghion P., Howitt P. (1992), *A model of growth through creative destruction*, 'Econometrica', vol. 60(2), pp. 323-351.

Anselin L. (1994), *Exploratory spatial data analysis and geographic information systems*, [in:] Painho M. (ed.) *'New tools for spatial analysis*', Luxembourg, Eurostat, pp. 45–54.

Anselin L. (1988*), Spatial econometrics: methods and models*, Kluwer Academic Publishers.

Barro, R. J., Sala-i-Martin, X. (1992), *Convergence*, 'Journal of Political Economy', No. 100, pp. 223-251.

Arora S. (2001), *Health, Human Productivity and Long-Term Growth, Journal of Economic History,* "The Journal of Economic History", Vol. 61, Issue 03, pp. 699-749.

Barro, R. J., Sala-i-Martin, X. (1990), *Economic Growth and Convergence across the United States*, Working Paper 3419, National Bureau of Economic Research, New York.

Baumol W.J. (1986), *Productivity growth, convergence, and welfare: What the long-run data show,* The American Economic Review, No. 76(5), pp. 1072-1085.

Baumont C., Ertur C., Le Gallo J. (2003), *Spatial Convergence Clubs and European Regional Growth,* [in:] Fingleton B. (ed.), *European Regional Growth. Advances in Spatial Science*, Springer-Verlag, Berlin, pp. 136-151.

THE WHITE BOOK (2007), Together for the sake of health. Strategic approach for EU for the years 2008-2013, Commission of the European Communities, Brussels.

d'Albis H., Esso L.J., Pifarre i Arolas H. (2012), *Mortality Convergence Across High-Income Countries: An aconometric Approach*, CES Working Papers [Documents de Travail du Centre d'Economie de la Sorbonne].

Eckey H-F., Dreger H., Türck M. (2006), *European Regional Convergence in a Human Capital Augmented Solow Model*, Volkswirtschaftliche Diskussionsbeiträge, No. 88, available at: http://hdl.handle.net/10419/32145 [access: 01.06.2014].

Edwards R., Tuljapurkar S. (2005), *Inequality in life spans and a new perspective on mortality convergence across industrialized countries*, 'Population and Development Review', No. 31(4), pp. 645– 74.

Europe 2020. Strategy for intelligent and sustainable development supporting social inclusion, (2010), The European Commission, Brussels.

Fingleton B. (2003), *European Regional Growth. Advances in Spatial Science*, Springer-Verlag, Berlin.

Fischer M.M., Stirböck C. (2006), *Pan-European Regional Income Growth and Club-Convergence. Insights from a Spatial Econometric Perspective*, 'Annals of Regional Science', No. 40, pp. 693-721.

Gächter M., Theurl E. (2011), *Health status convergence at the local level: empirical evidence from Austria*, 'International Journal for Equity in Health', No. 10:34.

Holland W., Mossialos E., Belcher P., Berkel B. (2002), *Polityka zdrowia publicznego w krajach Unii Europejskiej*, Warszawa. [Public health policy in European Union countries, Warsaw].

Illsley R, Le Grand J. (1993), *Regional inequalities in mortality*, ‘Journal of Epidemiology and Community Health’ 47.

Jankowiak M. (2010), *Konwergencja ochrony zdrowia w krajach Unii Europejskiej*, [w:] „Polityka Społeczna”, nr 7(436) 2010, Instytut Pracy i Spraw Socjalnych. [Health protection convergence in the European Union countries, [in:] "Social Policy", no. 7(436) 2010, Institute of Labour and Social Affairs]

Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Solidarity in Health, reduction of inequalities in EU (2009), Commission of the European Communities, SEK(2009) 1396, Brussels.

Kusideł E. (2013), *Konwergencja gospodarcza w Polsce i jej znaczenie w osiąganiu celów polityki spójności*, Wydawnictwo UŁ.

Macroeconomics and health: investing in health for economic development (2001), Report of the Commission on Macroeconomics and Health WHO, Geneva, report available at the website: http://whqlibdoc.who.int/publications/2001/924154550X.pdf (2.08.2008).

Markowska M., Strahl D. (2012), *Evaluation of European Union Regions Convergence Regarding Innovation*, ‘ARGUMENTA OECONOMICA’, No. 1 (28), pp. 41-67.

Mayer-Foulkes D. (2001), *Convergence Clubs in Cross-Country Life Expectancy Dynamics*, Discussion Paper 2001/134, WIDER Development Conference, 25-26 May 2001, Helsinki.

Moran P. A. P. (1950), *Notes on Continuous Stochastic Phenomena*, Biometrika 37, pp. 17–23.

Pietrzak B. (2012), *Wykorzystanie przestrzennego modelu regresji przełącznikowej w analizie regionalnej konwergencji w Polsce*, ‘Ekonomia i Prawo’, T. 11, No. 4, pp. 167-185.

Preston S. (1975), *The Changing Relation between Mortality and Level of Economic Development*, Population Studies, 29(2), pp. 231-248.

Solow R.M. (1956), *A contribution to the theory of economic growth*, ‘The Quarterly Journal of Economics’, No 70(1), pp. 65-94.

Statistical Data of Eurostat: http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

Statistical Data of ISTAT: http://www.istat.it/en/

Suchecka J. (2014), *Statystyka przestrzenna. Metody analiz struktur przestrzennych*, Wydawnictwo C.H. Beck, Warszawa.

Suchecki B. (2010). *Ekonometria przestrzenna. Metody i modele analizy danych przestrzennych*, Wydawnictwo C.H. Beck, Warszawa.

Streszczenie

NIERÓWNOŚCI ZDROWOTNE WŚRÓD REGIONÓW UNII EUROPEJSKIEJ: PODEJŚCIE BETA-KONWERGENCJI

Unia Europejska stoi obecnie przed poważnym problemem, jakim są znaczne nierówności zdrowotne między państwami członkowskimi oraz wewnątrz tych państw. Prowadzone są działania na rzecz na osiągania spójności gospodarczej i społecznej, których ważnym elementem jest wyrównywanie nierówności zdrowotnych pomiędzy regionami UE.

Niniejsza praca poświęcona jest zbadaniu nierówności zdrowotnych (mierzonych przeciętnym dalszym trwaniem życia) wśród regionów Unii Europejskiej poziomu NUTS II. W celu oceny konwergencji umieralności zaaplikowano wpracowane na gruncie teorii wzrostu gospodarczego narzędzia. Zastosowanie modelu konwergencji absolutnej pozwoli na stwierdzenie zmniejszania bądź pogłębiania się regionalnych nierówności zdrowotnych. Główna hipoteza badawcza brzmi: czy regiony o niższych początkowych wartościach długości życia doświadczyły większych wzrostów w oczekiwanej długości życia. Aby zweryfikować hipotezę o beta-konwergencji wykorzystano przestrzenne modele ekonometryczne, które ponadto pozwalają uwzględnić zależność geograficzną wśród badanych regionów. Ze względu na heterogeniczność badanych jednostek przestrzennych weryfikacji poddano także hipotezę o beta-konwergencji klubowej.

***Słowa kluczowe**: nierówności zdrowotne, konwergencja klubowa, beta-konwergencja, regiony Unii Europejskiej*