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# ECONOMETRIC APPROACH TO THE REGIONAL INTEGRATION ANALYSIS

**Abstract:** In Ukraine, an accounting database harmonized with statistics, aimed at all categories of users, had to be developed. A possibility to harmonize official accounting systems is stipulated by peculiar common characteristics: the use of monetary indexes; the use of economic categories in conceptual device; orientation at external information users; aggregation (consolidation, generalization) of received data; initiatives concerning constant increasing of quality of information. Related characteristics peculiar to accounting systems together with absence of conceptual contradictions between these systems allow to talk about possibility of harmonization of accounting information.

**Keywords:** econometric approach, regional, integration, analysis.

## 1. Introduction

The global industrialisation upswing, international division of labour, capital expansion, and foreign trade stimulate the developing countries' merging into the system of global economic relations. The paper deals with the study of the economic growth factors' role in regions. The coordination, cooperation and networking are considered the vivid questions of regional integration. One could mention the existence of different integration concepts for country's economic development. Some scientists point to the negative consequences of these processes, including uneven and unfair distribution of common goods among countries and regions. The use of economic complexity, bounded rationality and socio-economic dynamics provides a trans-disciplinary approach to deal with a broad range of regional integration problems. The pluralistic approach to the regional integration will be directed to know the economic convergence regions and divergence, unevenness in the development of transition countries. It provides the causes, the estimation of regional imbalances. Moreover, the paper is aimed at formulating the basic measures of future structural adjustment following the consequences of the European Union enlargement.

The pace of Ukrainian integration into the global economy is affected by the economic, political, and social changes in the world, by the regional divergences and convergences in the country. The progress in reforming process within the regions

depends on the success of economic reforms implementation, and institutional infrastructure formation. The analysis of two groups of factors: general sources of economic growth and transition economy specific sources of growth, is directed to estimate the effects of regional integration in Ukraine. The first group of indices includes fixed capital accumulation, human capital accumulation, economically active population growth, R&D spending and spillovers, macroeconomic stability, monetary indices, foreign trade, and foreign direct investment. Transition specific factors combine reform indicators, including industrial output, labour productivity, capital intensity, technological change, regional differences.

The regional imbalances' assessment is determined by gross regional product per capita, regional employment, and spending on education. The pluralistic approach to regional integration is directed to analyse regional imbalances, and define factors smoothing out its negative effects. In Eastern European countries these effects are significant, that means the European enlargement should lead to fast process capital, labour, technology accumulation and knowledge diffusion from regional to national, global levels. The regional imbalances improvement stimulates regional development, and provides the economic growth.

The modern tendencies of global economic development demonstrate the world trade increase, inter-regional, inter-firm trade widening and world capital transfers acceleration. Closer integration of neighbouring regions stimulates creation of a larger regional market for trade and development. The uneven countries' development, and environment degradation in some regions of the world negatively affected this process. The predominance of one type of cultural values leads to the destruction of national identity within the country. The developed countries maximize the consequences of regional integration effect by rising profit gains.

The globalization is accompanied with the regional development effects in the various kinds of economic activities. It includes the isolation of separate groups of countries and the regional unions foundation. This process stimulates the economic integration, on the one hand, and impedes the globalization process by increasing regional groups isolation, contradictions and competitiveness among separate countries, on the other. The integration into the global economic cooperation system is based on the use of advantages in international division of labour and the foreign economic relations development.

The most discussed question of regional integration in the European Union deals with the "deepening" and "widening" of this process, and existence of imbalances in the economic development. The transparent regional policy in the areas of the political participation, anti-discrimination, labour market access, etc. are proclaimed for the European Union countries. Economic opening-up plays a key role in the regional integration into the world economy. Trade liberalization affects the faster country's growth. On average, trade development can be a powerful force for poverty reduction, especially over longer horizons, where the cumulative effects of growth on incomes of the poor are larger.

Fujita, Kumagai, and Nishikimi examine the various aspects of integration related to the structure of intra-regional trade, industrial location patterns – especially of multinational enterprises, the formation of industrial agglomeration and the development of political and institutional frameworks for integration [7]. Economides and Salop (1992) consider that the competition and integration are complementary goods which could be combined for the creation of composite goods and systems [3]. The authors' views confirm that the regional integration is the complex process, and its essence could be understood on the basis of the integrated analysis including the influence of the basic factors.

One could differentiate between system integration and social integration, whereas the former denotes the cohesion of a system. Esser (2000) considers that social integration indicates the inclusion of individual actors in a social system [4]. Social integration is determined by the acceptance of migrants in institutions, networks and positions in a society. The process of integration should be understood as an interactive dialectic social process between immigrants and the receiving society that spans generations. A pool of shared values and standards (e.g. the rule of law) is stressed as the basis for multicultural coexistence [1, pp. 1, 2].

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## 2. The basic theoretical approaches to regional integration

The various approaches of the economic analysis are directed to explain the economic process and to apply in models for stimulating regional development. The essence of the regional integration is determined as the process in which countries organize regional unions, cooperate with each other and coordinate any forms of activities in order to stimulate economic prosperity, strengthen trade relation, develop infrastructure, and stimulate mutually profitable relations among each other. The economic modelling is the process of the substitution of one object by another in order to provide information about the main features of the original object. Forrester (1961) distinguishes the following models: abstract and physical; dynamic and statistic; nonlinear and linear; stable and unstable; etc. [5, p. 39]. He considers that an industrial organization is a complex of interlocking network of information channels controlling physical processes such as hiring of employees, building of factories, and production of goods [5, p. 54].

The analysis of the latest publications shows that the basic regional integration approaches could be generalised by the following criterions:
– comparison of the per capita income,
– evaluation of the wage and the capital rate of return,

–   assessment of the exogenous and the endogenous factors of cross-border regional integration,
–   study of the number unemployed from registration in labour offices, etc.

The application of the models demonstrates the existence of broad scope of approaches dealing with the specific problem solution at the regional level. The statistical modelling includes the collection and selection of database, estimation process, and results' assessment. The choice and construction of the model suggest the assessment of the economic variables, estimation of the significant coefficients, and determination of the basic factors. The utilization of the existing models' results suggests their usage for policy makers recommendations.

## 3. Statistical modelling of regional integration in Ukraine

The modelling has been based on annual data of gross regional product per capita in Ukraine from 2001 to 2005 for 27 Ukrainian regions. In detail the following variables are available and are considered where index $i$ runs over all 27 regions, and index $t$ over all time periods considered (years).[1] The theoretical framework of the empirical analysis is based on the hypothetical equation:

$$GRP_{it} = F(FCI_{it}, IPI_{it}, CPI_{it}, FDI_{it}, AW_{it}, NT_{it}, UR_{it}, RTR_{it}, WTR_{it}, EMP_{it}, RIN_{it}),  (1)$$

where: $GRP_{it}$ – Gross Regional Product per capita (UAH);
$IPI_{it}$ – Industrial Production Index, where 2000 = 100% (%);
$FCI_{it}$ – Fixed Capital Investment per capita (UAH);
$CPI_{it}$ – Consumer Price Index (%);
$FDI_{it}$ – Foreign Direct Investment per capita (UAH);
$AW_{it}$ – Average Nominal Wage per Worker (UAH);
$NT_{it}$ – Number of Telephones per 100 Families;
$UR_{it}$ – Unemployment Rate (%);
$RTR_{it}$ – Retail Trade Turnover per capita (UAH);
$WTR_{it}$ – Wholesale Trade Turnover (million UAH);
$EMP_{it}$ – Employment of Working People from 17 to 70 years (thousand people);
$RIN_{it}$ – Real Income per one Citizen (UAH).

In accordance with data of the State Statistic Committee of Ukraine, GRP is determined as the sum of the value added of all kinds of activities, including net taxes. The industrial production index is calculated as the value of produced products (works, services) in the corresponding prices. Consumer price index (inflation index) is considered the index of the price change and tariffs on goods and services bought for consumer's consumption. Wholesale trade turnover is a value provided by

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[1] Data from Regional Statistical Surveys Ukraine in 2006, State Statistical Committee in the Ukraine, 2007.

enterprises for goods' sales to another enterprises, organizations and their use in Ukraine. Retail trade turnover includes retail turnover of enterprises which are engaged in retail trade activities, and sales within the markets and by entrepreneurs.

The use of SURE (Seemingly Unrelated Regression Estimation) model is aimed at the analysis of a system of multiple equations with cross-equation parameter restrictions and correlated error term. The SURE model gives more accurate estimation and is used in case of not correlated variables estimation. The dependence of the gross regional product per capita estimates correlation from the following factors: fixed capital investment per capita, wholesale trade turnover, employment of working people, real income per one citizen. The results of estimation from 2001 to 2005 could be seen in Table 1.

**Table 1.** Results of Gross Regional Product Estimations from Exogenous Variables (SURE)

| Regressor | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|
| INT | 2007.9 (414.3) | 2667.3 (438.2) | 3676.1 (659.1) | 1948.6 (1004.5) | 2036.2 (1569.7) |
| IFC | 0.3 (0.12) | 0.4 (0.1) | 0.3 (0.1) | 0.16 (0.1) | 0.05 (0.19) |
| WTR | 0.01 (0.004) | 0.02 (0.01) | 0.02 (0.001) | 0.01 (0.01) | 0.02 (0.01) |
| EMP | −0.5 (0.2) | −0.3 (0.2) | −0.5 (0.3) | −0.16 (0.5) | −0.08 (0.6) |
| RIN | 0.5 (0.1) | 0.3 (0.09) | 0.18 (0.14) | 0.95 (0.2) | 0.92 (0.27) |
| R-Squared | 0.46 | 0.48 | 0.43 | 0.53 | 0.61 |
| DW-statistic | 2.06 | 2.02 | 2.0 | 2.06 | 2.0 |

Source: author calculations.

The significance of the coefficient is tested at the 5 per cent level. The standard error is given in the parentheses. The estimation results demonstrate the existence of the significant relationship between GRP per capita and fixed capital investment per capita, wholesale trade turnover, real income per one citizen for 2001 and 2002. The analogous relationship shows the insignificant relationship of GRP per capita with employment of working people for all estimated periods.

The insignificant relationship of GRP per capita with real income per one citizen for 2003, and fixed capital investment for 2004, 2005 are caused by the existence of the regulatory impediments for growing business. A systemic assessment of product-market regulation in Ukraine evaluates three components: state control; barriers to entrepreneurship, and barriers to trade and investment, and suggests that regulatory reform could contribute to greater efficiency of both resource allocation and production, accelerating convergence of Ukrainian regions.

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## PODEJŚCIE EKONOMICZNE
## DO ANALIZY INTEGRACJI REGIONALNEJ

**Streszczenie:** Rozwój regionalny jest procesem złożonym i zależy od różnorodnych czynników: ekonomicznych, politycznych, społecznych. Integracja regionalna zależy od jej zakresu oraz stopnia współpracy i wymiany między regionami. Można jej dokonać na poziomie lokalnym (regionów kraju) i międzynarodowym (związków regionalnych). Istnieją różne modele na poziomie regionalnym, w których wykorzystuje się odmienne wskaźniki ekonomiczne. Ocena kształtowania się tych wskaźników wykazuje istnienie istotnych różnic regionalnych na obszarze Ukrainy. Modelowanie ekonometryczne służy weryfikacji podziału kraju na regiony przemysłowe o wysokiej urbanizacji i zacofane regiony rolne na Ukrainie.