

1. EVALUATING THE COMPETITIVENESS OF THE COUNTRIES IN THE BALTIC SEA REGION

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Introduction

In the last decade, economic literature has provided many discussions about the concept of “competitiveness” and a theoretical framework for evaluating the competitive positions of nations (Porter, 1990, 1998 and 2002; Aiginger, 1998; Ezeala-Harrison, 1999; Garelli, 2002 and 2003; Blanke, Paua, and Sala-i-Martin, 2003). Emphasis is also laid on the role of competitiveness in transition and integration processes (Sachs, Zinnes and Eilat, 2000a and 2000b; Zeman, 2000; Warner (ed), 2002) and to the regional aspects of competitiveness (Karppi, 2001; Johansson, Karlsson and Stough (ed), 2002). These discussions and research papers form a theoretical basis for evaluating the competitiveness of countries and regions and elaborating proposals for adopting appropriate policies.

In order to analyze a country’s competitive position in the world economic system and to evaluate the level of international competitiveness, several methods have been devised. The arguments in favour of different evaluation methodologies are at least twofold. Firstly, the concept of a country’s competitiveness is still elusive,

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particularly at the level of a single country. But the fact that there are problems with defining competitiveness does not mean that this concept should be rejected or that empirical analysis and evaluation of a country's competitiveness should be ignored. On the contrary, the use of different methodological approaches for evaluating competitiveness will give additional information and thus help to better understand and develop this concept. Secondly, the evaluation results depend on both the aggregated statistical indicators and the information about people's perceptions. Also the choice and quality of this information have a remarkable impact on the results. Therefore it is wise to compare the evaluation results in order to form an opinion about the competitive position of a country's economy and to elaborate policy proposals for improving it.

There are two thorough and comprehensive annual reports of the nations' competitiveness: the Global Competitiveness Report (GCR), which is prepared by the World Economic Forum (WEF, Geneva) and has been published annually since 1979, and the World Competitiveness Yearbook (WCY) developed by the International Institute for Management Development (IMD, Lausanne) and published since 1989. Both reports provide comprehensive information about the comparative strengths and weaknesses of the leading economies of the world (according to the WCY approach — the key economies). The fundamental objective of these reports is to evaluate the level of economic competitiveness and to rank countries on the basis of the aggregated competitiveness indices. It is reasonable to expect that this information supports private investment decisions, entrepreneurship and social progress.

This chapter will give an overview of the evaluation of the Baltic Sea region countries' competitiveness obtained by way of various methodological approaches. The emphasis is on analyzing the competitive position of the Baltic Sea region countries, using the methodological approaches elaborated by 1) WEF), 2) IMD, 3) HIID — Harvard Institute for International Development, Cambridge, MA (benchmarks competitiveness in transitional econo-

mies). Additionally to the results derived from the above-mentioned sources, the evaluation results based on factor analysis are presented. The study aims to test the hypothesis that the BSR countries have a good competitive position among the leading and emerging world economies despite the non-homogeneity of the region.

The chapter is structured as follows. Part I is a short introduction to the concept of competitiveness. Part II describes some acknowledged methodological approaches for evaluating competitiveness. Part III emphasizes the evaluation results of the Baltic Sea region countries' competitiveness obtained by means of different methodological approaches. The empirical part of the paper is mainly based on the data provided by international organizations (the World Bank, the International Monetary Foundation and the World Economic Forum) and national statistical agencies.

1.1. About the Concept of Competitiveness

According to the most intuitive definition of the concept of competitiveness, it is a country's share of world markets for its products. This makes competitiveness ability a zero-sum game: each country's gains come at the expense of the others. However, the market-share view of competitiveness is deeply flawed. The world economy is actually not a zero-sum game (see also Porter, 2002, p. 55–56). As a matter of fact, not only do countries compete, but also cooperate and collaborate in order to achieve better conditions for sustainable growth.

The main goal of economic development is to raise the standard of living. A nation's standard of living is determined by the productivity of its economy and the conditions for supporting its long-term growth. The productivity of domestic industries has a significant influence on the cost of living and the cost of doing business. Low costs of business are important preconditions for export

growth. A country's economy is competitive if it is able to sell the produced goods and services at the world market and thereby to boost its economic growth.

According to Stephane Garelli (2003 p. 711–713), the concept of competitiveness is the result of a long history of thinking, which has helped to define the various aspects of this modern and complex idea. Several researchers have made a decisive contribution to the development of this concept since the 18th century. Adam Smith (1723–1790) identified four input factors (land, capital, natural resources, and labor) that create a basis for the development of a country's competitiveness. David Ricardo (1772–1823) with his Law of Comparative Advantage outlined the rules about how countries should compete. The German sociologist Max Weber (1864–1920) analyzed the relationship between the values, religious beliefs and economic performance of nations. Entrepreneurship as a factor of competitiveness was first stressed by Joseph Schumpeter (1883–1950), who underlined that progress is a result of disequilibria which favour innovation and technological improvement. The importance of education, technological innovation and know-how was highlighted by Robert Solow in his work "Technical Change and the Aggregate Production Function" (1957). Thus, the framework of developing the concept "competitiveness" is comprehensive, stressing the multifaceted nature of a country's competitiveness.

A creative framework for discussions of the concept "competitiveness" and a set of factors contributing to a country's competitiveness is offered in the book by Michael Porter "The Competitive Advantage of Nations" (1990). Porter aggregates the previous ideas about competitiveness into a systematic model called the competitiveness diamond. He offers an analytical framework for theories of comparative advantage that distinguish between three levels of aggregation: the firm, the industry and the nation. The national environment for the development of a selected industry is characterized by four sets of variables: 1) factor conditions, 2) demand

conditions, 3) industry structure and firm strategies, 4) the related industries.

These interacting determinants are considered to be the main factors that influence a firm's ability to establish and sustain a competitive advantage at international markets. In addition, two "external" determinants are introduced: the influence of a chance and the role of the government. The above six factors constitute the analytical framework for understanding the competitive position of a nation. Porter (*ibid.*) also notes that a meaningful indicator of competitiveness at the national level is productivity which is defined as the value of the output produced by a labour unit. At the same time, competitiveness is much more than simply having efficient and low-cost firms. There are potential spillovers between firms and network effects that can yield competitiveness synergies. The quality of the government, geography and culture are also important features of competitiveness. Governments may influence firms, particularly through investments in the infrastructure, including education.

Karl Aiginger (1998, pp. 159–169) stresses that the ultimate goal of a state and its people is to maximize social welfare functions in which income, social contributions and environmental preservation are incorporated. This leads to a rather comprehensive definition of competitiveness, with three immediate implications. The first is that low costs are not a goal of economic policy and not even an indicator of long-term competitiveness ability. The second is that the external balances contribute directly or indirectly to well-being, but are small relative to consumption. The third is that competitiveness is a dynamic issue, with aspiration levels changing over time, while investments in human capital, technology and information are the means that change the attainable welfare and the level of competitiveness. This approach to creating a framework for evaluating competitiveness accords with the main goal of economic development, i.e. to raise the standard of living.

Thus, the competitiveness of a country means that its economy can produce such goods and services that meet the test of international markets, while its citizens enjoy a standard of living that is both rising and sustainable in the long run. This viewpoint matches with the competitiveness definition presented in the United States Agency for International Development (USAID) recent study of the national competitiveness building process (USAID, 2003).

The most widely used indicator for evaluating the living standard and the level of economic development is a country's per capita Gross Domestic Product (GDP), sometimes adjusted to Purchasing Power Parity (PPP). But GDP does not include many items that people would generally consider as a part of their standard of living. For instance, this is the case of the state of environment, personal security, education and other attributes of the standard of living.

Jeffrey Sachs, Clifford Zinnes and Yair Eilat (2000b) emphasize in their study about benchmarking competitiveness in the transitional economies that a country can have a high GDP due to vast natural resources or a good starting point (initial conditions), which, however, does not imply that the country should score highly on competitiveness. Also, a country can have a low GDP growth rate due to the fact that it is close to its steady state which does not imply that the country should receive a low score for competitiveness. Competitiveness correlates well, but not perfectly, with GDP and GDP growth.

Competitiveness is a way to use uniform criteria to assess whether a country is doing everything it can to promote sustained improvements in its population's well-being, given the increasing competition in the world markets it faces (*ibid.*, p. 2). It is impossible to evaluate the level of competitiveness using only one indicator, particularly if we try to elaborate comparative evaluations for the countries with different historical and political backgrounds and levels of economic development (for instance, the post-socialist countries and the developed countries of the Baltic Sea region).

A set of variables that characterize various aspects of competitiveness as a multifaceted concept must be used.

According to the goal declared by the Lisbon summit in March 2000 the European Union has to be the most competitive and dynamic knowledge-based economy in the world by 2010. (WEF. The Lisbon Review, 2002). The countries can develop competitive and sustainable economic growth if they improve productivity and specialize in the products and services where they are most productive and innovative. Foreign direct investments and joint ventures help integrate national economy into international production system and to create conditions for improving technologies and human resources. Knowledge is starting to be the most critical competitiveness factor.

The development of knowledge needs trans-border cooperation of the countries and deepening regional integration. Not only do countries compete, but also cooperate to improve their competitive positions in the world market. That also stresses the importance of the Baltic Sea region countries' cooperation in order to support competitive economic development of all the countries in the region. No longer is the economic development of a country only a matter of national specialization and competitive power. It is also related to regional cooperation based on competitive geographical advantages and the synergy of the countries which are on different levels of economic development and have different innovative capacities.

In conclusion, due to the multifaceted nature of the concept, the level of a country's competitiveness can be expressed by a set of various measurable and directly immeasurable indicators. Therefore it is evident that different methodological approaches considering information about the comparative strengths and weaknesses of the leading world economies can yield different results about the competitive position of a country. Thus a comparison of the country's rankings obtained by various methodologies would undoubtedly provide a comprehensive picture of this country's

and/or region's competitive power and would also give reliable information for policymaking.

1.2. Methodological Approaches to Evaluating Competitiveness

Based on the above considerations about the concept of competitiveness and in order to evaluate the BSR countries' competitive position among the leading world economies, four methodological approaches will be discussed in the paper:

1) *The WCY methodology* — the World Competitiveness Yearbook of the International Institute of Management Development. It included 59 countries in 2002, 8 of them the Baltic Sea region countries. Latvia and Lithuania were not included in the set of the countries (IMD, 2003 and 2000).

2) *The GCR methodology* — the Global Competitiveness Report of the World Economic Forum. It included 102 countries in the Report 2003–2004 and 75 countries in the Report 2001–2002. All ten Baltic Sea region countries were included (WEF, 2003; Porter, et al., 2002).

3) *The HIID methodology* — the Harvard Institute for International Development and the (USAID) study of competitiveness in transitional economies. It included 25 transitional economies, 5 of them the Baltic Sea region countries (Estonia, Latvia, Lithuania, Poland and Russia) (Sachs, Zinnes and Eilat, 2000a and 2000b).

4) *The factor analysis based methodology* — the approach is elaborated in this chapter. The study includes data of 50 countries (47 of them the WCY 2000 countries), also including data of all ten Baltic Sea region countries. Factor analysis as a data reduction method enables the researcher to elaborate additional aggregated indices characterizing a country's competitiveness level and to rank countries according to that.

1.2.1. Theoretical framework and data

The theoretical foundations of the international competitiveness evaluation methodologies are essentially similar. They integrate the main considerations about the concept of competitiveness, emphasizing its multifaceted nature and the need to characterize a country's competitiveness within various dimensions and categories by means of a comprehensive set of multilateral indicators. The latter describe various aspects and conditions of a country's competitiveness. On the basis of this information the country's competitiveness ranking is elaborated.

The methodologies differ from one another basically in how they choose and group the initial indicators and how this information is aggregated into overall competitiveness indices and rankings. It is necessary to use two types of data in order to capture competitiveness firstly, as it is measured (hard data or statistical data) and secondly, as it is perceived (survey data or soft data).

Thus, there are two groups of indicators used in the GCR, WCY and HIID&USAID studies:

- 1) Statistical information published by international and national statistical agencies;
- 2) Data of surveys of foreign research agencies of the countries.

The surveys are designed to complement the hard data: "There are some statistics that only become available with a lag, and by asking top managers their opinions about these matters, we can supplement the hard data with their up-to-date perceptions about competitiveness" (IMD, 2000a,b, p. 2). Survey data provide additional information that characterizes experts' perceptions of business and macro environment in the countries. This information makes it possible to analyze the ability of nations to provide an environment in which enterprises can compete. Businessmen can use this information in order to make investment decisions, while government agencies can use it to compare their countries' performance with other countries.

The motivation for the use of both types of data in a study of transitional economies is twofold (Sachs, *et al*, 2000b, p. 3): 1) it allows summarizing a large amount of data in a tractable way. The combination of statistical indicators with survey information provides an easy way to capture the competitiveness concept in the case where a single specific variable fails to do it; 2) this approach helps to overcome problems of scarcity and quality of the data.

Data scarcity has been the major obstacle of any study of economies in transition. In addition, much of the data have suffered from a multitude of reporting biases and measurement problems, often related to the newness of government collection agencies as well as to corruption. In the recent years, access to information and the quality of data has improved, particularly in the countries that are involved in the EU eastward enlargement process.

1.2.2. The World Competitiveness Yearbook methodology

The theoretical framework of the WCY methodology relies on four dimensions shaping a country's competitiveness environment (WCY, 2000a, p. 10–12; Garelli, 2003, pp. 704–706): 1) attractiveness vs. aggressiveness; 2) proximity vs. globality; 3) assets vs. processes; 4) individual risk taking vs. social cohesiveness. These dimensions also determine countries' development strategies and participation in international division of labour.

Additionally, some cultural aspects and its value system determine a country's competitiveness. Not only do nations compete with products and services, but also with education and value systems. Stephane Garelli notes (2003, pp. 707–708) that countries go through four distinct phases: 1) hard work: people are totally dedicated to the country's and corporate objectives and work many hours (e.g. Korea); 2) wealth: people work hard, but they pay more attention to increasing their own incomes (e.g. Singapore); 3) social participation: people are less interested in working hard and

more involved in shaping their society (for example, USA and Europe in the late 1960s); 4) self-achievement: people are more interested in developing their private lives rather than pursuing societal change (for example, the USA and Europe today).

Regarding its theoretical framework, the WCY methodology looks at the relationship between 1) a country's national environment in which the key role is played by the state, and 2) the wealth creation process assumed by enterprises and individuals. Based on these possible relationships and the theoretical framework, the WCY methodology focuses on the outcome of the interaction of four competitiveness components or factors: economic performance, government's efficiency, business efficiency and infrastructure (Table 1). These four competitiveness factors or components are described by 20 sub-factors and 321 criteria, which are used for evaluating a country's competitiveness and for elaborating the competitiveness rankings of the WCY data-set countries.

The sub-factors do not include the same number of criteria but each sub-factor has the same weight in the overall consolidation results, which is 5%. Of the 321 criteria, 127 statistical indicators or criteria are used to determine the overall competitiveness rankings and the additional 78 criteria present valuable background information which is not used in the calculation of the rankings. Further, 116 criteria from the survey data are used in calculating the overall rankings, representing the weight of approximately of one-third.

In sum, the WCY methodology emphasizes the multifaceted nature of the competitiveness concept and aggregates a set of indicators, which are compiled on the basis of the theoretical framework of the methodology, into an overall competitiveness index and rankings of the countries included in the WCY database.

Table 1. Competitiveness factors used in the WCY methodology

Economic performance	Government's efficiency	Business efficiency	Infrastructure
Macroeconomic evaluation of the domestic economy (5 sub-factors): domestic, economy, international trade, international investment, employment, prices. (75 criteria)	Extent to which government policies are conducive to competitiveness (5 sub-factors): public finance, fiscal policy, institutional framework, business legislation, societal framework. (81 criteria)	Extent to which enterprises are performing in an innovative, profitable and responsible manner (5 sub-factors): productivity, labour market, finance, management practices, attitudes and values. (69 criteria)	Extent to which basic, technological, scientific and human resources meet the needs of business (5 sub-factors): basic infrastructure, technological infrastructure, scientific infrastructure, health and environment, education. (96 criteria)

Source: Compiled on the basis of the WCY 2003 methodology (Rosselet-McCauley, 2003)

1.2.3. The Global Competitiveness Report methodology

The GCR methodology focuses on two complementary approaches to analyzing competitiveness. The first, called the Growth Competitiveness Index (GCI), was developed by John McArthur and Jeffrey Sachs and was presented in the WEF Global Competitiveness Report 2001–2002 (McArthur and Sachs, 2002). The second, called the Business Competitiveness Index (BCI) was developed by Michael Porter and first introduced in the Global Competitiveness Report 2000 (WEF, 2003).

The BCI is based on the conceptual framework and statistical approach which follow those of the previous WEF reports (WEF, 1999) and is fully comparable with the previous microeconomic

competitiveness index (MCI) results. These two indices, GCI and BCI are based on the combination of both hard data and soft or survey data, and they consist of a set of sub-indices. The GCI rankings are used more widely than the BCI rankings for evaluating the competitive position of the GCR countries among the leading world economies.

The main sub-indices' categories of GCI and BCI are presented in Table 2.

The GCI's main goal is to analyze the potential of the world's economies to attain sustained economic growth over the medium and long term. The GCI is founded on three central ideas (Sala-i-Martin, 2003).

First, the process of economic growth can be analyzed within three important broad categories: 1) the macroeconomic environment, 2) the quality of public institutions, and 3) technology (Table 2).

Table 2. Sub-indices used in the GCR

Growth Competitiveness Index	Business Competitiveness Index
Technology index	Company operations and strategy
Public institution index	Quality of the national business environment.
Macroeconomic environment index	

Source: Compiled on the basis of the Global Competitiveness Report 2003–2004 (WEF, 2003)

It is hard to achieve sustained growth in the conditions of a non-favourable macro environment. But macroeconomic stability alone cannot increase the growth rate of a country. The growth also depends on the efficiency of public institutions. The businesses have to deal with these institutions (for instance property rights have to be guaranteed, etc). The third category, technological progress, is the ultimate source of long-term economic growth. Both

publicly available hard data and data from the WEF's survey are used in order to estimate these three indices of GCI and to calculate the overall GCI.

The second idea stresses that the origin of technological advance as a source of growth may be different across countries. For economies that are already close to the technological frontier, innovation is the main source of technological improvements. For those that are far away from the frontiers, technological improvements can be achieved partly through innovation and partly by copying or adopting the knowledge previously developed in the leading economies. In order to calculate the GCI, the sample of countries is separated into two groups: the "core" and the "non-core" innovators. The threshold of 15 patents per a million inhabitants is chosen to separate the countries into these two groups (WEF, 2003).

The third central idea emphasizes the different importance of the competitiveness determinants in the core and non-core innovators' countries. In the core innovators' countries macroeconomic environment and institutions usually support innovations. At the same time, the state and quality of competitiveness determinants are often critical for the non-core innovators and for them technological innovation has often been the declining factor of growth. Along these lines, the GCI assigns a larger weight to the technology index for core innovators than it does to the public institution index and the macroeconomic environment index. On the other hand, for non-core innovators' countries, equal weights are assigned to these three indexes.

The Business Competitiveness Index (BCI) is constructed primarily on the basis of the information drawn from the WEF's survey data. Additionally, some statistical indicators are used, for instance, patenting rates, Internet and fixed telephone penetration. To derive the overall BCI, two sub-indices are computed: 1) company operations and strategy, and 2) the quality of the national business environment (Table 2). The weight for calculating the overall BCI on the basis of sub-indices is sometimes determined from the

coefficients of a multiple regression, where the per capita GDP is a dependent variable and the sub-indices are independent variables.

The GCR methodology differs from the WCY methodology mainly in the way of choosing and grouping the initial information about the indicators that characterize the conditions of competitive development of a country.

1.2.4. The HIID methodology for evaluating the competitiveness of economies in transition

The third methodological approach to evaluating competitiveness — the HIID (the Harvard Institute for International Development) methodology — offers the possibility to analyze the international competitiveness of economies in transition. The HIID competitiveness study mainly follows the theoretical and methodological approaches of GCR and is based on the WEF's competitiveness definition presented in the Global Competitiveness Report 1999 (WEF, 1999): competitiveness is the ability of a national economy to achieve sustained high rates of economic growth.

The heuristic model of transition forms a theoretical framework for evaluating transitional countries' international competitiveness. This model puts emphasis on the initial conditions of transition and the ability of the countries to improve the competitive positions of their economies.

According to Jeffrey Sachs, Clifford Zinnes and Yair Eilat, there are three main types of initial conditions in transition (Sachs, Zinnes and Eilat, 2000a):

- 1) "Fixed" conditions are those that are invariant and cannot be changed (geography, topography, natural resource endowment, culture, history, climate, etc.).
- 2) "Hard" conditions are primarily those that can be changed but not quickly (the quality of institutions (private, public and market), industrial structure, ownership, public attitudes, com-

position of economic output, level and quality of human and physical capital stocks, etc.).

- 3) “Soft” conditions primarily refer to government policy, such as tax code, including also international relations and agreements. These conditions can be changed easily.

Similarly to the GCR and WCY methodologies, the initial information used for calculating the overall competitiveness index and the indices of the overall competitiveness index components or factors consists of statistical data of international and national organizations and of survey data.

The components of the HIID overall competitiveness index are:

- openness of the economy,
- government’s efficiency,
- infrastructure,
- technology,
- financial sector,
- efficiency of institutions,
- management and labour.

The initial information is aggregated into rankings according to these seven competitiveness components and into overall competitiveness rankings of the countries.

The HIID study of the 25 economies in transition is based on the information of the year 1998. Thus, the results of this study first of all characterize the initial positions of post-socialist economies in developing their competitiveness in the framework of EU eastward enlargement and globalization processes.

1.2.5. Using factor analysis for evaluating competitiveness

The fourth approach to evaluating countries’ competitiveness developed in this paper is based on the use of factor analysis. Factor analysis as a data reduction method is usually applied in

order to 1) reduce the number of variables, and 2) detect structure in the relationship between the variables (to classify the variables). In economic studies, factor analysis is mainly used in data reduction to identify a small number of factors that explain most of the variance observed in a much larger number of initial variables.

The factor analysis procedure offers a high degree of flexibility (StatSoft, 2004). It consists of seven methods of factor extraction (principal components, principal axis factoring, unweighted least squares, generalized least squares, maximum likelihood, alpha factoring and image factoring), five methods of rotation (varimax, equamax, quarimax, direct oblimin, promax), and three methods of computing factor scores (regression, Bartlett, Anderson-Rubin).

The method of principal components is used in this study. This method is often preferred as a method for data reduction, while other methods are mostly preferred when the goal is to detect structure.

The basic model of factor analysis is the following:²

$$(1) \quad X_j = a_{j1}F_1 + a_{j2}F_2 + \dots + a_{jm}F_m + d_jU_j$$

X_j — initial variables, $j = 1, 2, \dots, n$;

F_i — generalized indicators or factors, $i = 1, 2, \dots, m$;

a_{ji} — factor loading, correlation between factor F_i and variable X_j (factor matrix — $A (a_{ji})$);

U_j — specific factor;

d_j — factor loading of the specific factor ;

n — the number of initial variables;

m — the number of factors, ($m \ll n$).

² Preconditions:

- the initial variables (X_j) are normalized and standardized,
- factors (F_i) are non-correlated (orthogonal and standardized).

The variance of the initial variable X_j :

$$DX_j = a_{j1}^2 + a_{j2}^2 + \dots + a_{jm}^2 + d_j^2 = 1$$

a_{ji}^2 — variance of the initial variable X_j explained by the factor F_i .

Factor matrix that helps to explain the relationship between the initial variables and aggregated indicators (factors) is presented in Table 3.

In order to assess how much of the variance of the initial variables is captured by the factors, eigenvalues and communalities are calculated.

Eigenvalue (P_i^2) expresses the variance of the initial variables X_i that is explained by the factor F_i :

$$(2) P_i^2 = a_{1i}^2 + a_{2i}^2 + \dots + a_{ni}^2, i = 1, 2, \dots, m.$$

Communality (h_j^2) expresses the variance of the initial variable X_j that is explained by all the factors F_i :

$$(3) h_j^2 = a_{j1}^2 + a_{j2}^2 + \dots + a_{jm}^2, j = 1, 2, \dots, n.$$

Table 3. Factor matrix

	F_1	F_2	...	F_m	Communalities (h_j^2)
X_1	a_{11}	a_{12}		a_{1m}	h_1^2
X_2	a_{21}	a_{22}		a_{2m}	h_2^2
...
X_n	a_{n1}	a_{n2}		a_{nm}	h_n^2
Eigenvalue (P_i^2)	P_1^2	P_2^2	...	P_m^2	

The factors are extracted step by step. Each factor is defined to maximize the variability that is not captured by the preceding factors. If the remaining variability is significantly small, the extraction of factors is finished. This procedure defines the number of factors to be extracted (m). The consecutive factors are independent of one another.

Rotation procedures enable us to modify the structure of the factor matrix and to get a rotated factor matrix that simplifies interpreting the factor structure. After rotation, the pattern of a factor matrix is usually much clearer.

On the basis of the factor model it is also possible to calculate factor scores for each case/observation (country in this paper). A high positive factor score indicates that the level of this factor is above the cases' (countries') average. A negative indicates that the level of this factor is lower than the cases' average. If the factor score is around zero, then this factor has reached the average level of the cases (countries).

The competitiveness study carried out in this paper is based on the WCY-2000 criteria list and data presented according to this criteria classification (IMD, 2000a,b). The criteria list consists of six sub-groups of indicators: 1) domestic economy, 2) internationalization, 3) government, 4) infrastructure, 5) management, and 6) science and technology.

Factor analysis makes it possible to elaborate the generalized (aggregated) competitiveness indicators (factors) — instead of the large number of initial variables characterizing the competitiveness environment of the countries. Based on the factor scores, it is possible to find the countries' overall competitiveness rankings and the rankings by the factors F_i . These rankings provide additional information for analyzing competitiveness and comparing the evaluation results by means of different methodological approaches.

1.3. Evaluation Results

The aim of this part of the study is twofold. First, to construct aggregated competitiveness indicators using a factor analysis based methodology. Second, to compare the competitive position of the Baltic Sea region countries on the basis of competitiveness index

rankings elaborated by means of different methodological approaches. The comparison of evaluation results gives additional information for a better understanding of the multifaceted nature of the competitiveness concept as well as for assessing the competitive position of the Baltic Sea region countries among the leading world economies. This information is valuable for policymaking on various levels and fields (investments decisions and business policies, social and regional policies etc.).

1.3.1. Factor analysis based evaluations

In order to obtain the aggregated indicators of the Baltic Sea region countries' international competitiveness using factor analysis, the data of the international and national authorities are used (IMD (2000a,b), WDI (1999), IMF (1999 and 2000), Statistical Yearbook of Estonia (2000 and later issues), Estonia, Latvia, Lithuania in Figures, 2000 and later issues). The database includes data of 47 WCY-2000 countries and additionally of three Baltic States (Estonia, Latvia and Lithuania). Thus, the data of all ten Baltic Sea region countries are included in this database. These data characterize the macroeconomic environment of a country's competitiveness.

The following initial indicators (variables) are chosen on the basis of the WCY criteria list of 2000: GDP (*GDP*), GDP per capita (*GDPPC*), GDP growth (*GDPGR*), total export (*EXP*), total import (*IMP*), share of export to GDP (*EXPGDP*), share of import to GDP (*IMPGDP*), FDI flows (*FDI*), FDI flows per capita (*FDIPC*), overall productivity, PPP (*PRODUCTIV*), real short-term interest rate (*INTEREST*), population growth (*POPGR*), labour force growth (*LABFGR*), share of health costs to GDP (*HEALTH*), density of the road network (*ROAD*), R&D expenditure per capita (*R&DPC*), the share of high technology export to GDP (*HTECH*), internet connections per 1,000 people (*INTERNET*), telephone lines per 1,000 people (*TELEPH*).

The rotated factor matrix of the countries' competitiveness indicators is presented in Table 4.

Factor F_1 explains 36.6% of the total variation of the initial variables; factor F_2 explains 21.0%, factor F_3 12.0% and factor F_4 7.7% (see eigenvalues in Table 4). The total variance of the initial variables explained by the factors F_i ($i=1,2,3,4$) is 77.3%.

Table 4. Factor loadings of the rotated factor matrix

Initial variables	F_1	F_2	F_3	F_4
<i>GDP</i>	0.130	0.956**	-0.110	-0.012
<i>GDPPC</i>	0.878**	0.360**	0.146	-0.072
<i>GDPGR</i>	0.178	0.162	0.491**	-0.036
<i>EXP</i>	0.262	0.880**	0.041	-0.053
<i>IMP</i>	0.228	0.960**	0.000	-0.023
<i>EXP/GDP</i>	0.062	-0.176	0.936**	-0.001
<i>IMP/GDP</i>	0.014	-0.192	0.873**	-0.228
<i>FDI</i>	0.184	0.896**	-0.052	0.037
<i>FD/PC</i>	0.606**	-0.003	0.349**	0.107
<i>PRODUCTIV</i>	0.902**	0.254*	0.000	-0.052
<i>INTEREST</i>	-0.606**	-0.100	-0.268*	0.155
<i>POPGR</i>	-0.165	0.000	-0.030	0.960**
<i>LABFGR</i>	-0.193	-0.056	-0.043	0.941**
<i>HEALTH</i>	0.558**	0.345**	-0.502**	-0.161
<i>ROAD</i>	0.398**	0.074	0.536**	-0.311**
<i>R&D/PC</i>	0.777**	0.245*	-0.008	-0.204
<i>HTECH</i>	0.051	-0.027	0.915**	0.202
<i>INTERNET</i>	0.520**	0.558**	-0.140	-0.014
<i>TELEPH</i>	0.897**	0.189	0.051	-0.161
<i>Eigenvalue (P_i^2)</i>	0.366	0.210	0.120	0.077

Source: authors' calculations.

Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization, rotation converged in 5 iterations; ** — significant at the 0.01 level (2-tailed); * — significant at the 0.05 level (2-tailed)

An important stage in using factor analysis as a data reduction method is the economic interpretation of the new aggregated indicators — factors F_i .

The first aggregated competitiveness indicator — factor F_1 — has the most significant factor loadings by the initial variables of productivity (*PRODUCTIV*), telephone lines per 1,000 people (*TELEPH*), R&D expenditure (*R&DPC*), GDP per capita (*GDPPC*) and FDI flows per capita (*FDIPC*). All these initial variables characterize the level of economic development of a country. In the countries with a high level of economic development real short-term interest rates are often lower. That fact also explains the negative factor loading between the variable *INTEREST* and factor F_1 . Based on these considerations, factor F_1 could be named as the factor of *the level of economic development*. The level of economic development is the most important component that influences a country's international competitiveness. But of course, it is not only economic development that determines the level of a country's international competitiveness.

Factor F_2 has statistically significant and high factor loadings by the total GDP (*GDP*), FDI flows (*FDI*), export (*EXP*) and import (*IMP*). Thus, the factor F_2 could be named as the factor of *the size of economy*.

The third factor F_3 has statistically significant and high factor loadings by the share of export and import in GDP (*EXPGDP* and *IMPGDP*), and the share of high technology export in GDP (*HTECH*). This factor could be named as the factor of *openness of economy*.

The fourth factor has statistically significant and high factor loadings by the population and labour force growth indicators (*POPGR* and *LABFGR*). This factor could be named as the *factor of demographic situation*.

Figure 1 presents the factor scores of the four aggregated competitiveness indicators (factors F_i , $i=1,2,\dots,m$).

According to the factor scores of the the aggregated indicator named as the indicator of the level of economic development (F_1), it is possible to distinguish between two groups of the Baltic Sea region countries (Figure 1):

- 1) the developed countries of the region (Norway, Finland, Denmark, Sweden, and Germany) where the level of economic development is above the average level of the WCY countries (the factor scores are positive). The best positions among the countries of the region belong to Norway and Finland.
- 2) the former socialist countries (Estonia, Latvia, Lithuania, Poland and Russia), whose level of economic development is below the WCY countries' average (the factor scores are negative).

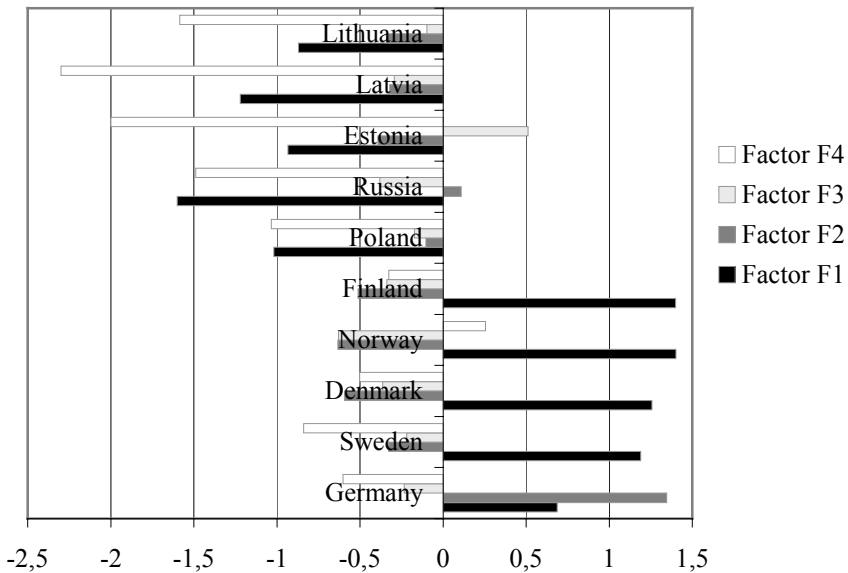


Figure 1. Factor scores of the factors F_i ($i=1,2,3,4$) in the Baltic Sea region countries.

According to the size of economy, two Baltic Sea region countries (Germany and Russia) are above the WCY countries' average. The factor scores of the factor F_3 (openness of economy) is above the WCY-2000 only in the case of Estonia (+0.512), and the factor scores of the factor F_4 (demographic situation) in the case of Norway (+0.255).

Table 5 contains the Baltic Sea region countries' aggregated competitiveness rankings elaborated on the basis of the factor analysis (rankings 1 and 2). Also WCY-2000 rankings among the 47 countries are included in this table.

Table 5. Factor analysis based competitiveness rankings and WCY-2000 rankings of the Baltic Sea region countries

Country	Factor scores, non weighted (50)*	Ranking 1	Factor scores, weighted (50)*	Ranking 2	WCY-2000 rankings (47)*
Germany	1.194	11	0.470	7	8
Finland	0.225	20	0.353	11	3
Sweden	-0.195	23	0.289	15	9
Denmark	-0.198	24	0.265	17	12
Norway	0.397	18	0.336	13	16
Poland	-2.328	42	-0.507	40	40
Russia	-3.362	45	-0.743	46	47
Estonia	-2.814	43	-0.523	41	–
Latvia	-4.132	46	-0.741	45	–
Lithuania	-2.892	44	-0.534	43	–

Sources: Author's calculations

* — in brackets are the number of countries in the datasets.

In order to calculate the factor analysis based competitiveness rankings presented in Table 5, two approaches are used:

- 1) *Rankings 1*. It is assumed that four aggregated factors, which characterize the level of economic development (F_1), the size

of economy (factor F_2), the openness of economy (F_3) and the demographic situation (F_4) have equal shares in forming the overall competitiveness index.

- 2) *Rankings 2*. Unequal shares are used in forming the overall competitiveness index of a country. The factor scores are weighted by the variation explained by the factors F_i ($i = 1, 2, 3, 4$) (eigenvalues, see Table 4). The weights are 0.366 for the factor F_1 , 0.210 for the factor F_2 , 0.120 for the factor F_3 and 0.077 for the factor F_4 .

Figure 2 illustrates the evaluation results of the Baltic Sea region countries' competitiveness positions using the non-weighted and weighted sums of factor scores.

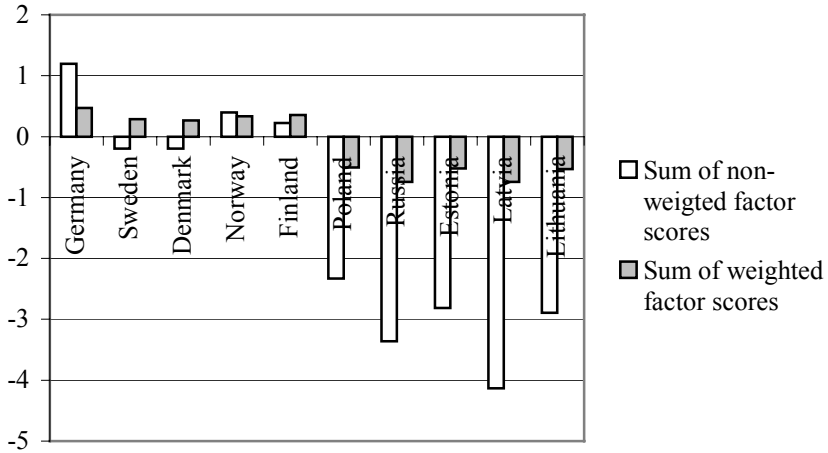


Figure 2. The non-weighted and weighted sums of factor scores of competitiveness factors in the Baltic Sea region countries.

The share of the first factor in explaining the variability of the initial variables is more than four times higher than, for instance, the impact of the fourth factor. Thus, due to significant differences between the factors F_i ($i=1, 2, 3, 4$) in describing the variance of initial indicators of a country's competitiveness environment, the

second approach (weighted approach) is more appropriate for elaborating the overall competitiveness indexes and for evaluating the Baltic Sea region countries' competitiveness among the leading world economies.

The evaluation results that base on the weighted sum of the factor scores support the statement that according to the level of international competitiveness, the Baltic Sea region countries are distinguished into two groups (Figure 2):

- 1) the developed countries of the region whose evaluated level of competitiveness is above the average of the countries chosen in the WCY database,
- 2) the post-socialist countries of the region whose evaluated level of competitiveness is below the average of the WCY-2000 database countries.

According to the overall competitiveness index, the best competitive position among the Baltic Sea region countries belongs to Germany followed by Finland and Norway.

In conclusion, the factor analysis based overall competitiveness index rankings and also factor scores of the aggregated competitiveness indicators serve to give information about the macro environment that create conditions for developing countries' competitiveness. These conditions also influence economic development in the long run. Thereby they have a lagged impact on the competitiveness rankings. The factor analysis based evaluation results elaborated in this paper mainly characterize the competitive position of the Baltic Sea region countries at the time when thorough negotiations with the EU eastward enlargement candidate countries started.

1.3.2. Comparison of the evaluation results

Not only do the WCY, GCR and HIID competitiveness rankings describe the macro environment, but they also characterize how experts assess the macroeconomic conditions and how these condi-

tions have been supported by the institutional framework of the countries.

Table 6 presents the HIID competitiveness evaluation results of the Central and East European countries, including also the Baltic States and Russia as the Baltic Sea region transitional economies. The rankings are elaborated considering seven competitiveness components (openness of economy, government's efficiency, technology, financial sector, institutions' efficiency, infrastructure, management and labour), which form the basis for calculating overall competitiveness rankings.

Table 6. Competitiveness rankings of the CEE and Baltic Sea region transitional countries among 25 post-socialist countries

Country	Over. rank	Open.	Gov.	Infr.	Tech.	Fin.	Lab.	Inst.
Hungary	1	1	3	1	2	1	3	2
Czech R.	2	3	1	3	1	2	1	3
Poland	3	4	2	2	3	5	4	1
Estonia	4	2	4	7	4	4	7	4
Slovenia	5	7	5	4	5	13	2	5
Lithuania	6	6	8	5	10	9	5	7
Latvia	7	5	6	11	8	6	13	6
Slovakia	8	8	9	12	6	3	6	8
Croatia	9	12	7	8	7	10	14	14
Bulgaria	10	10	13	6	9	16	17	9
Russia	11	16	11	15	11	7	11	11
Romania	12	9	19	13	12	8	19	12

Source: Sachs et al. 2000b, p. 19, and pp. 29–34

These rankings are elaborated using both statistical and survey data of 1998. Thus, the HIID methodology based competitiveness evaluation results characterize the competitiveness position of the Baltic Sea region transitional countries among 25 post-socialist countries at the beginning of the EU enlargement processes.

When the EU eastward enlargement processes started, Poland's strong competitive advantages were its well-developed institutions, good infrastructure and efficient government, while Estonia's competitive advantage was primarily the openness of its economy. Estonia's other competitive advantages were its good government, well-developed technology, financial sector and institutions. At the same time, Lithuania's competitive advantages included its good infrastructure and well-trained labour force, while Latvia's advantage was openness of its economy.

Comparing the results of the use of different methodological approaches for evaluating competitiveness of the Baltic Sea region transitional countries, it is possible to conclude that at the beginning of the EU enlargement processes the leading positions belonged to Poland and Estonia. The positions of Lithuania and Latvia were also competitive for the EU integration processes. Russia had the weakest position among the Baltic Sea region transitional economies. Russia's economy is large, but closed with underdeveloped infrastructure, technology and government.

Tables 7 and 8 present the GCR and WCY competitiveness rankings of the Baltic Sea region countries for the years 2001–2003. In this time, the number of countries included in the WCY and GCR databases has grown and therefore the ranks are not directly comparable without taking into account the size of the samples. These rankings characterize the competitive position of the Baltic Sea region countries during the negotiations for EU accession.

Since 2002, the WCY methodology has distinguished the countries into two groups: the big countries (population over 20 million) and small countries (population under 20 million). Dividing countries into two groups on the basis of their size accords with the evaluation results obtained with factor analysis. The size of economy as an important factor of a country's competitiveness was likewise identified using factor analysis for evaluating competitiveness.

Table 8 presents the WCY countries' competitiveness rankings after dividing the countries into two groups depending on their population numbers.

Table 7. GCR and WCY competitiveness rankings of the Baltic Sea region countries in 2001–2003*

Country	GCR2001 (75)**	GCR2002 (80)**	GCR2003 (102)**	WCY2001 (49)**	WCY2002 (49)**
Germany	17	14	13	12	15
Finland	1	1	1	3	2
Sweden	9	3	3	8	11
Denmark	14	4	4	15	6
Norway	6	8	9	20	17
Poland	41	50	45	47	45
Russia	63	66	70	45	43
Estonia	29	27	22	22	21
Latvia	47	43	37	–	–
Lithuania	42	39	40	–	–

Source: WEF 2002 and 2003; IMD 2003.

* — GCR rankings are based on the growth competitiveness index (GCI).

** — the number of countries in the datasets.

Despite some differences between the rankings of the countries' competitiveness evaluation results obtained by various methodological approaches it is possible to conclude that the Baltic Sea region countries have a good competitive position among the leading economies of the world. In addition to the macroeconomic conditions (these are mainly described by the factor analysis based methodology), also the institutional framework, value system and various other socio-economic conditions (these are mainly expressed by the survey data) have a significant impact on a country's competitiveness. That also explains some differences between the evaluation results based on different methodological approaches.

Table 8. WCY competitiveness rankings of the Baltic Sea region countries in 2002 and 2003 among the big (B) and small (S) economies

Country	2002 (B) (27)*	2003 (B) (30)*	2002 (S) (22)*	2003 (S) (29)*
Germany	4	5	–	–
Finland	–	–	2	1
Sweden	–	–	7	7
Denmark	–	–	4	3
Norway	–	–	12	12
Poland	22	27	–	–
Russia	21	26	–	–
Estonia	–	–	16	17
Latvia	–	–	–	–
Lithuania	–	–	–	–

Source: IMD2003.

* — the number of countries in the datasets.

Big economies (B) — population over 20 million; small economies (S) — population 20 million or less.

In the condition of European integration and globalization processes, the competitive position of the small countries of the Baltic Sea region seems to be better than that of the large countries. In the recent years, small developed and small post-socialist countries have remarkably improved their competitive positions among the leading world economies. On the other hand, the economic development and improvement of competitiveness of the region's large countries has been modest. Small countries are more flexible in adjusting their economies according to the requirements of integration and globalization. At the same time, they are more sensitive than big economies to global shocks and changes in the world's economic and political environment. Their competitive positions among the leading world economies are probably less stable in the long-run.

Conclusions

The use of various methodological approaches for evaluating competitiveness enabled us to compare the competitive positions (competitiveness rankings) of the Baltic Sea region countries with the leading world economies included in the World Competitiveness Yearbook and Global Competitiveness Report databases, as well as with 25 post-socialist economies. Additionally, factor analysis as a data reduction method was used in order to elaborate aggregated indicators — factors describing macroeconomic conditions for development of competitiveness. As the results of factor analysis, the following aggregated competitiveness indicators (factors) were extracted: 1) the level of economic development; 2) the size of economy; 3) openness of economy; 4) the demographic situation.

The results of using different methodological approaches for evaluating competitiveness indicate that additionally to the macroeconomic conditions, the competitiveness positions of the countries are characterized by other conditions not directly expressible by the macroeconomic indicators. Thus, the multifaceted nature of the competitiveness concept is evident. Therefore, for elaborating the countries' competitiveness rankings, it is important to rely on a combination of statistical indicators and people's perceptions about the competitive environment of a country.

Based on the results of the empirical analysis developed in this study, it is possible to conclude that the Baltic Sea region countries have a good competitive position among the world's leading economies. According to the competitiveness rankings, the Baltic Sea region countries can be divided into two groups: 1) the well-developed market economies (Germany, Finland, Sweden, Norway and Denmark) that have a position among the top twenty of the most competitive countries of the world; and 2) the post-socialist countries (Estonia, Latvia, Lithuania, Poland and Russia), whose competitiveness rankings among the leading world economies start after the 20th position.

The best competitive positions belong to the small countries of the region, e.g. Finland, Denmark and Sweden. Estonia, the smallest country of the region, has the best competitive position among the Baltic Sea region's transitional economies. The recent developments, influenced by the globalization and EU enlargement processes, require flexibility, openness and ability to adjust with quick changes and challenges. The big countries of the region, such as Poland, Russia and also Germany are less flexible and their governments' efficiencies are lower.

It is possible to argue that the Baltic Sea region countries succeeded to achieve good competitive positions among the leading world economies also due to the conditions created by a dynamic interdependence between transition and integration processes. This makes the region attractive for foreign direct investments, stimulates movement of capital and cross-border flows of innovation and technology.

The development of mutually beneficial economic co-operation with capital abundant countries such as Germany and the Scandinavian countries has positively influenced the economic environment of the Baltic Sea region transitional economies creating conditions that supported quick restructuring of their economies. The Baltic Sea region has been used by the transitional countries as a niche for penetrating international markets and establishing an institutional framework for the EU eastward enlargement processes. The developed countries of the region have learnt lessons about how to penetrate new markets, how to develop economic cooperation with Russia and other former socialist countries and how to adjust to the EU eastward enlargement processes.

Evidently the Baltic Sea region's lessons in integrating countries with different economic and political backgrounds are valuable in supporting the EU eastward enlargement and the reintegration of the new member countries into Europe. These lessons are also valuable for adjustment to the requirements and challenges of globalization.

The role of using proper value systems and social policy models (e.g., the Anglo-Saxon model as a risk taking approach versus the Continental European model as an approach oriented towards social cohesiveness) will grow in the course of creating conditions for improving competitive and sustainable development of the countries. The long-term impact of social policy models on economic growth and sustainable and competitive development are still the subject of discussions. Therefore, additional empirical studies are needed in order to test the hypotheses about these relationships and to develop proper political measures.

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