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COMPARISON OF COUNTRY RISK, SUSTAINABILITY AND ECONOMIC SAFETY INDICES

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Abstract. Country risk, sustainability an economic safety are becoming more important in the contemporary economic world. The aim of this paper is to present the importance of comparison formalisation of country risk, sustainability, and economic safety indices for strategic alignment. The work provides an analysis on the relationship between country risk, sustainability an economic safety in EU countries, based on statistical data. Investigations and calculations of rankings provided by Euromoney Country Risk Index, European Economic Sustainability Index as well as for Economic Security Index were made and the results of EU country ranking based on three criteria were provided. Furthermore, the data for the Baltic States was summarised and the corresponding index of consistency for random judgments was evaluated.

Keywords: country risk, sustainability, economic safety, EU region.

JEL Classification: G11, G14, G23.

ŠALIES RIZIKOS, TVARUMO IR EKONOMINIO SAUGUMO RODIKLIŲ PALYGINIMAS

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Santrauka. Šalies rizikos, tvarumo ir ekonominio saugumo įvertinimas tampa vis labiau svarbus šiuolaikiniame ekonominiame pasaulyje. Šio straipsnio tikslas – formalizuoti šalies rizikos, tvarumo ir ekonominio saugumo rodiklių palyginimo procesą siekiant strateginių tikslų. Straipsnyje analizuojamas sąryšis tarp šalies rizikos, tvarumo ir ekonominio saugumo ES šalyse remiantis statistiniais duomenimis. Tiriamas ir skaičiuojamas šalių rangavimas pagal *Euromoney* šalies rizikos indeksą, Europos ekonomikos tvarumo indeksą, taip pat pagal Ekonominio saugumo indeksą. Pateikiamas apibendrintas reitingavimas pagal tris kriterijus. Be to, Baltijos šalių duomenys yra atskirai išanalizuoti ir apibendrinti.

Reikšminiai žodžiai: šalies rizika, tvarumas, ekonomimis saugumas, ES regionas.

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Introduction

Every year it becomes more and more difficult to analyse and predict changes in the financial, economic, and political sectors of business. The importance of country risk analysis is now more understandable and potential for it is growing by establishing a growing number of country risk rating agencies, which combine a wide range of qualitative and quantitative information regarding alternative measures of economic, financial and political risk with associated composite risk ratings. However, the accuracy of any rating agency with regard to any or all of these measures is open to questioning. In the study, Hoti (2005a) provides a qualitative comparison of country risk rating systems used by seven leading rating agencies, as well as a novel analysis of four risk ratings using univariate and multivariate volatility models for nine East European countries. These ratings are compiled by the International Country Risk Guide, which is the only risk rating agency to provide consistent monthly data on a large number of countries since 1984. The empirical results enable a comparative assessment of the conditional means and volatilities associated with county risk returns, defined as the rate of change in country risk ratings, across the aforementioned nine East European countries.

Over the past two decades, interest has grown in developing indicators to measure sustainability. Sustainability is presently seen as a delicate balance between the economic, environmental and social health of a community, nation and of course the earth. At present, measures of sustainability tend to be an amalgam of economic, environmental and social indicators. Economic indicators have been used to measure the state of the economy for much of this century. Social indicators are largely a post-war phenomenon and environmental indicators are more recent still. Interest in developing these indicators largely began when their respective became stressed, aiming to monitor performance and indicate any required ameliorating action. Whereas economists have no difficulty deriving objective and quantitative indicators, sociologists had and still have great difficulty in deriving indicators, because of intangible quality of life issues. Environmental scientists have less difficulty when limiting themselves to abundance of single species rather than biodiversity and ecological integrity.

Sustainability, however, is more than just the interconnectedness of the economy, society and the environment. Although, these are important, they are largely the external manifestations of sustainability. The internal, fundamental and existential dimensions are neglected. Sustainability, therefore, may be something more grand and noble: dynamics, a state of collective grace, a facet of Gaia or even of the Spirit. Rather than asking how we can measure sustainability, it may be more appropriate to ask how we measure up to sustainability.

1. Definitions of country risk

For some researchers, country risk refers to the "probability of occurrence of political events that will change the prospects for profitability of a given investment" (Haendel *et al.* 1975). One of approaches adopts a practical stance and analyses risk as a negative outcome. With this meaning, risk will exist if it implies a possible loss or at least, a potential reduction of the expected return, as stated by Meldrum (2000).

The concept of risk has different meanings and could be understood either as a performance variance or just as the likelihood of a negative outcome that reduces the initially expected return. The concept of downside risk was already mentioned in Markowitz (1959); though, it is mainly because of computational difficulties in handling this type of model as well as the assumption of normally distributed returns that the variance was favoured as a measure of risk. The paper of Nawrocki (1999) reviews the literature and presents the advantages of using a downside risk approach in view of a total risk stance.

Roy (1952) and Bawa and Lindenberg (1977) had already integrated the notion of downside risk into portfolio theory, but Estrada (2000) and Reuer and Leiblein (2000) have emphasised the usefulness of the downside risk approach for studying emerging markets and international joint ventures. Quer, Claver and Rienda (2007) have introduced an integrated approach by comparing the impact of country risk and cultural distance on entry mode choice. Busse and Hefeker (2006) have also analysed the risk and its influence of foreign direct investments.

Literature analysis of the last 40 years revealed changes in country risk analysis emergent from an increasing number of companies conducting their business abroad. This situation results in specific risks, no matter the source of risk or the nature of the industry. Without a doubt, specific features of each investment or transaction type must be taken into account. Country risk analysis (CRA) tries to define the potential for these risks in order to decrease the expected return of a cross-border investment. Such definition re-joins the very early articles of Gabriel (1966) or Stobaugh (1969) where the investigation was made on difference in investment climate at home and abroad – in a foreign country. It highlights the specific risks associated with doing business abroad, outside the national borders of the company's country of origin. Sometimes, the economic level of country's development is not so important, as even economically developed countries can face a degree of country risk. As Finnerty (2001) noted "many project finance professionals would argue that natural resource projects in the United States are exposed to political risk because of the proclivity within the United States to change the environmental laws and apply the new laws retroactively".

A comprehensive formulation of country risk theory is yet in progress. Until now, research literature has usually been indicating the implicit assumption that for a given country, imbalances in the economic, social and political fields are likely to increase the risk of investing. Because of the multiplicity of risk sources, the complexity of their interactions and the variety of social sciences involved, an underlying theory of country risk is still missing. Such a conceptualisation would greatly help in identifying variables at stake. It would make it possible to test the respective relevance of various approaches on offer. So far, most of the research has merely consisted of a classification and description of various potential sources of risk, and the assessment methods have turned these elements into numerical variables without any scientific justification. Fitzpatrick (1983) writes on the subject "the literature is found to define political event risk rather than political risk". Citron and Nickelsburg (1987) have proposed a country risk model for foreign borrowing as well as estimated the one that incorporates a political instability variable. The proposed model predicts high probabilities of default for most of the actual default dates for six countries looking from the historical perspective. This is suggestive of how to understand the phenomenon of foreign debt default. There are many studies related to country risk, its financial integration in a country, the impact on economic and other aspects of country's welfare (Cathy, Goldberg 2009; Kesternich, Schnitzer 2010; Benítez *et al.* 2007; Bordo *et al.* 2009; D'Argensio, Laurin 2009).

2. Evaluation of country risk

The country risk of one country could be expressed by a single index, which shows the degree of the overall risk to invest in or loan to this country. Two types of indices that represent the degree of country risk – discrete and continuous – exist. Discrete type includes several risk levels, which are predefined and every country is in one level. The number of risk levels may vary from 1 to 20. The single index representing the degree of country risk is a set of different factors about the country. The main interested factors are political and economic–financial ones, and the total number of factors used may vary from less than ten to more than twenty.

Ratha *et al.* (2011) suggest predicting sovereign ratings for developing countries that do not have risk ratings from agencies (such as Fitch, Moody's, and Standard and Poor's). It is important to determine the volume and cost of capital flows to developing countries through international bond, loan and equity markets. Sovereign rating also acts as a ceiling for the foreign currency rating of sub-sovereign borrowers and can be important for their access to international debt and equity capital. Shadow ratings for several developing countries that have never been rated could be generated and result in a finding that unrated countries do not always remain at the bottom of the rating spectrum. Several of them will be in a similar range to that of the emerging market economies with capital market access.

Chen, Gang and Jianping (2008) proposed a new approach for country risk evaluation, which is based on the multicriteria decision aid method MH DIS (Multi-Group Hierarchical Discrimination). They took a sample consisting of 40 main oil-producing countries and used it to estimate the performance of the method in classifying the countries into two groups. A comparison with multiple discriminant analysis, logit analysis and probit analysis were also performed. The results indicated the superiority of the MH DIS method as opposed to these traditional discrimination techniques already applied in country risk assessment. Similarly, Cathy and Goldberg (2009) introduced their point of view on country risk and financial integration by presenting a case study. Marshall *et al.* (2009) have estimated and determined the country risk of an emerging market as well as dynamic conditional correlation by using GARCH model, which could be one of alternatives for country risk evaluation.

In her paper, Schroeder (2008) also surveys the history and current status of country risk assessment. The goal is to understand why it is that country risk assessors have such poor track record in anticipating the onset of financial crises. The development of the field reflects changes in the composition of international capital flows. These changes have confounded a definition of country risk, especially if a definition is centred on a particular event. It is then argued that the field has reached an impasse, and this impasse is related to the methods of abstraction and the current crisis of vision within the science of economics. This crisis of vision, as it pertains to theories of financial crises, has led to increased reliance on quantitative methods in the field of country risk. Thus, it is very important to find the object of country risk assessment, which is not to monitor for a particular event or symptom of financial crisis but rather to monitor for a particular state of the economy. Besten (2007) has introduced an analysis on similar risk assessment approaches for European countries.

3. Euromoney Country Risk Index

Euromoney Country Risk (Euromoney… 2013) evaluates the investment risk of 186 countries across 15 criteria (or factors) to determine the risks of default on a bond, losing direct investment or to global business relations, by polling more than 400 international economists and other risk experts. The qualitative scores are averaged and combined with three basic quantitative values to give an overall ECR score on a 100-point scale, where 100 is the

safest and 0 – the riskiest. Evaluation includes such risk as: default on a bond, losing direct investment, risk posed to global business relations, etc., by taking a qualitative model, which seeks an expert opinion on risk variables within a country (70% weighting) and combining it with three basic quantitative values (30% weighting).

Factors included in the ranking of countries by risk:

– Political risk;
– Economic performance/projections;
– Structural assessment;
– Debt indicators;
– Credit ratings;
– Access to bank finance;
– Access to capital markets.

Euromoney assigns a weighting to six categories (Euromoney… 2013). The three qualitative expert opinions are political risk (30% weighting), economic performance (30%) and structural assessment (10%). The three quantitative values are debt indicators (10%), credit ratings (10%) and access to bank finance/capital markets (10%).

The qualitative average. The qualitative average is produced by combining evaluations of political, economic and structural assessments from experts around the world. When applying political, economic and structural assessments to a 100 point scale for the qualitative average only (rather than the full Euromoney Country Risk score), the following weighting is used: political 43%, economic 43% and structural 14% (Euromoney… 2013).

Qualitative assessments. Economic risk: participants rate each country of which they have knowledge from 0–10 across 6 sub-factors to equal a score out of 100. The categories of economic risk scored are as follow: bank stability/risk; GNP outlook; unemployment rate; government finances; and monetary policy/currency stability. Political risk: participants rate each country of which they have knowledge from 0–10 across 5 sub-factors to equal a score out of 100. The categories of political risk scored are as follow: corruption; government non-payments/non-repatriation; government stability; information access/transparency; institutional risk; regulatory and policy environment. Structural risk: participants rate each country of which they have knowledge from 0–10 across 4 sub-factors to equal a score out of 100. The categories of structural risk scored are as follow: demographics; hard infrastructure; labour market/industrial relations; and soft infrastructure. Individual experts must apply a value to each sub-factor before their score is accepted into the system. Individual experts can also modify sub-factor weights to modify their effect on the overall score of 100. The weight of an individual sub factor can be lowered to a minimum of 10% and to a maximum of 30%. This allows the system to capture a second attribute alongside of the evaluation of that category, which is the estimated effect of the category. For instance, a user may judge that the single most important issue facing a given country is maintaining the stability of its currency, thus deciding to increase the weighting of the monetary policy/currency stability category from 20% to 30%. Within each sub factor, ECR also asks experts for further information on the reasons behind each individual score, and these fall under the category of related factors. These are more like poll points, and do not directly affect the score. Instead, they inform a change made to a sub-factor score and weight. For example, within the economic risk category of bank stability lie four further related factors: regulatory risk, trading exposures, asset quality and undercapitalisation. Individual experts are able to add more related factors and ignore the ones that are not applicable (Euromoney… 2013).

The quantitative score factors. Access to bank finance/capital markets: participants rate each country's accessibility to international markets on a scale of 0–10 (0 = no access at all and 10 = full access). These scores are averaged and then weighted to 10%. *Debt indicators*: calculated using the following ratios from the World Bank's Global Development Finance figures: total debt stocks to GNP (A), debt service to exports (B); current account balance to GNP (C). Developing countries that do not report complete debt data score a zero. *Credit ratings:* nominal values are assigned to sovereign ratings from Moody's, Standard & Poor's and Fitch IBCA. The ratings are converted into a score using a set scoring chart. This score is then averaged and the score is weighted to 10%. The higher the average value, the better (Euromoney… 2013).

4. Indicators and indices of sustainability

For the past two decades, there have been many local, regional, state/provincial, national and international efforts to find useful sustainability indicators. The key feature of some of these suggested indicators is that they are defined through public participation. Therefore, these indicators are meaningful to a respective community. However, indicators based on asymmetric information and the heterogeneous interests of stakeholders often make them incomparable, and therefore, less usable in other environments. International Institute for Sustainable Development (IISD) hosts and manages the compendium of sustainable development indicator initiatives around the world. Currently, the site provides information on 669 initiatives (IISD 2006).

The UN Commission on Sustainable Development (UNCSD) from its working list of 134 indicators derived a core set of 58 indicators for all countries to use. The CSD is currently updating this set of indicators. A universal

set of indicators can be defined but local sustainability concerns should be addressed in assessing the sustainability of an economic activity (Meadows 1998). Recent initiatives include the development of aggregate indices, headline indicators, goal-oriented-indicators, and green accounting systems. Early composite indices include Measure of Economic Welfare (MEW), Index of Social Progress (ISP), Physical Quality of Life Index (PQLI), and Economic Aspects of Welfare (EAW) and challenges the concept of distinguishing economic welfare from noneconomic welfare (Dewan 2006).

Indices developed in the 1990s to measure the aggregate performance of the economy or the sustainability include Human Development Index (HDI) by the UNDP (1990), Sustainable Progress Index (SPI), Ecological Footprint, Material Input Per Service Unit (MIPS), Index for Sustainable Economic Welfare (ISEW), Genuine Progress Indicator (GPI), Genuine Savings Indicator (GSI), Barometer of Sustainability, and Environmental Pressure Indicators (EPI) (Dewan 2006).

The Consultative Group on Sustainable Development Indicators (CGSDI) at IISD as part of their effort to create "an internationally accepted sustainable development index" produced the Dashboard of Sustainability, a performance evaluation tool, in 2001.

More recently developed indices include Total Material Requirement, Eco-efficiency Indices, the Compass of Sustainability, Environmental Sustainability Index (ESI) and Environmental Performance Index (EPI). Most of these indices are not used by policy-makers due to measurement, weighting, and indicator selection problems. However, some of them are popular among different stakeholders (Dewan 2006).

Two distinct methodologies can be found in all of these. Mainstream economists use monetary aggregation method, whereas scientists and researchers in other disciplines prefer to use physical indicators. Economic approaches include greening the GDP, resource accounting based on their functions, sustainable growth modelling, and defining weak, and strong sustainability conditions. For example, recently developed ISEW and GPI are corrections of the National Income (NI) accounts for environmental and some other non-market activities to reflect Hicksian income (Dewan 2006).

Some of the indicators that are unaccounted for, or not accounted for as costs, in the GDP, but are included in either ISEW or GPI as 'defensive expenditures' are private expenditures on health and education; costs of commuting, urbanization and auto accidents; costs of different types of pollution, depletion of non-renewable resources and long term environmental damage; the value of volunteer work; and the costs of crime, family breakdown, underemployment, etc. (Dewan 2006).

5. The European Economic Sustainability Index (EESI)

In light of the unprecedented turmoil in the eurozone and the uncertainty over what the future holds, it is important to not only understand the current pressures on public finances but also the medium- to long-term factors which will affect the economic stability and sustainability of EU countries in the future. The long-term competitiveness of European economies, their governance and their ability to carry out structural reforms to cope with long-term challenges will all influence whether countries have a sustainable economy in the long-run. This will also determine the success or failure of the euro. To assess the economic sustainability of Europe's economies, the EPC has developed an index to assess simultaneously the short-, medium- and long-term economic sustainability of EU countries relative to each other. This index is constructed using six domains: deficits, national debt, growth, competitiveness, governance/corruption, and cost of ageing.

To examine economic sustainability in more detail, the European Policy Centre developed the European Economic Sustainability Index (EESI) in 2010. This Policy Brief updates the EESI with the most recent data. Not only does it take into account deficits (average 2011–2012) and debt levels (2011), but also considers growth forecasts (average 2011–2012). Furthermore, the EESI is oriented towards the long term: it incorporates the Global Competitiveness Index (2011), the Corruption Perceptions Index (2011) and the Labour Market Adjusted Dependency Ratio (2011). These indicate how an economy is likely to perform in the future. All these different factors are combined in the EESI to produce a relative ranking for all EU-27 countries.

Of course, no index can fully capture how a country's economy is likely to perform. There are always issues linked to each component of such an index: what are the appropriate indicators? Any analysis that fails to take into account indicators of long-term performance is both incomplete and misleading. The trajectory of the crisis will also depend on these long-term factors. A poor performance in the index doesn't mean there is no chance of economic sustainability in the long term. Rather, the index suggests that those countries at the bottom of the ranking need to focus more on implementing the kind of reform that boosts efficiency and growth. It also suggests that these countries will need to do more to invest in future growth, and some of this investment will need to come from their stronger European partners.

One of the key questions surrounding any index is its sensitivity to any changes in the weight of its various domains. If more emphasis is put on short-term indicators (deficits and growth) and less on long-term indicators (Corruption Perceptions Index and Global Competitiveness Index), it tends to improve the position of the CEE-MS: for example, Latvia's and Bulgaria's rankings would improve

significantly. At the same time, Ireland, France and the UK would all fall significantly in the rankings.

These indicators have been chosen to reflect a balance between short-, medium- and long-term pressures on economic sustainability. They have to be available in all EU Member States and ideally –updated on a regular basis. They also have to enable a clear ranking i.e. there has to be a clearly identifiable performance scale which enables a ranking from high performance to low performance.

Table 1. Six indicators, which are included in EESI

Indicator domain	Description	Reason for inclusion
GDP growth (a)	Annual change in GDP (average of two years)	Short-term indicator of economic performance and of ability to repay debt
Debt levels (b)	Total government debt measured as a percentage of GDP – part of the so-called Maastricht or Convergence Criteria of Economic and Monetary Union	Medium- to long-term indicator of public finance performance
Deficit/ surplus (c)	Government's net borrowing requirement, i.e. the difference between revenues and expenditure – part of the so-called Maastricht or Convergence Criteria of Economic and Monetary Union	Short-term indicator of public finance performance
Global Competitive Index (World Economic Forum) (d)	A composite indicator, capturing microeconomic and macroeconomic foundations of competitiveness, defined "as the set of institutions, policies, and factors that determine the level of productivity of a country. The level of productivity, in turn, sets the sustainable level of prosperity that can be earned by an economy (e)	Long-term index of competitiveness and future growth potential
Corruption Perception Index (f) (Transparency International)	"Measures the perceived level of public-sector corruption in 180 countries and territories around the world. The CPI is a "survey of surveys", based on 13 different expert and business surveys" (g)	Underlying index of governance/ rule of law and proxy for public sector efficiency
Future cost of ageing	Long-term expenditure projections covering pensions, health care, long-term care, education and unemployment transfers for all Member States (h)	Very long-term indicator of public finance pressure and proxy for structural reform

Source: compiled by the authors.

6. Theoretical approach to economic security

A successful state is a state that exports more than imports. Historically, the main reason for export promotion was the only way for a state to accumulate substantial amounts of gold, which was the symbol of power. Having power meant being stable and secure. No enemy would attack a rich state as riches meant power. Gold guaranteed peace and stability. Mercantilist view on economic stability and security emerged from the point of view of a state. The powerful rich state was a warrantor for stability and welfare. This method of trade is known as zero sum game (only one can gain) (Udovic 2011).

Reassuming this we can point out that for mercantilists, the crucial security was state security and they did not acknowledge other types of security or other possible insecurities (such as environmental, political, personal ect.). They also realised that the political instability emerged from economic instability, because the primary goal of a state was trade and economic welfare. If the latter was not achieved then people were unsatisfied. Discontentment (that arose from economic instability) provoked riots, wars and revolutions. Svetličič and Rojec (2002) explain, "security depends equally on reality and perception and it is today understood and guaranteed as "economic and political stability, social cohesion, democracy and employment. Security is a state of mind and that it strongly depends on others and not only on oneself."

Simple explanation (obviously, subject to many possible objections) is that "economic security is a never-ending (and not a standstill) process, firstly determined by macroeconomic environment, which is strictly connected with and effects the mezo level (firms and enterprises); and determines the micro level (individual needs) economic security. This last, through perception that (personal) economic security exists, and is fixed and stable, directly and indirectly exerts influence on the macroeconomic environment, which becomes, for the sake of confidence, even more stable, secure and consecutively reproduces the economic security feelings through "hard macroeconomic indexes" (inflation rate, employment …) back to the micro economic level. The circle of reproduction is infinite" (Udovic 2011).

Damijan (1996) established its own criteria called Aggregate value of state (AVS), which is composed of three variables: (1) percentage of the state area in the entire world area, (2) percentage of the population in the entire world population and (3) percentage of the national GDP in the global GDP. The result is not the sum, but the weighted sum with weights 0.108; 0.205 and 0.976 (Udovic 2011).

7. Analysis of indices

The main task is to find out the relationship between country risk, economic sustainability, and economic security (Fig. 1).

In order to prove the relationship, each ratio from the box was analysed. The ratios taken are Euromoney country risk index for evaluation of country risk, European economic sustainability index for evaluation of economic sustainability, and aggregate value of state index for evaluation of economic security. All ratios of European Union member states for 2011 were analysed.

The results of aggregated valuation of three indices and ranking by each index are presented in Table 2.

We consider n elements to be compared, $C_1 \ldots C_n$ and denoting the relative "weight" (or priority or significance)

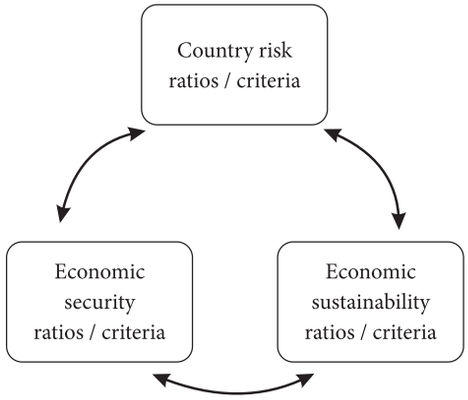

Fig. 1. Interdependence between ratios (Source: compiled by the authors)

Table 2. EU countries ranking based on three criteria: Euromoney Country Risk Index, European Economic Sustainability Index and Aggregate Value of State Index for 2011

No.	EU country	Euromoney Country Risk Index		European Economic Sustainability Index		Aggregate Value of State Index	
		Overall score	Rank	Overall score	Rank	Overall score	Rank
1	Austria	84.36	7	0.26	7	0.5766	10
2	Belgium	76.78	10	0.05	9	0.4109	9
3	Bulgaria	53.77	24	–0.17	18	0.3158	25
4	Cyprus	75.56	11	–0.01	11	0.2813	24
5	Czech Republic	74.52	13	–0.10	13	0.2070	16
6	Denmark	89.07	2	0.51	2	0.1064	13
7	Estonia	57.50	22	0.36	5	0.0868	23
8	Finland	87.31	4	0.51	2	0.0851	11
9	France	81.42	8	0.00	10	0.0693	2
10	Germany	85.73	6	0.32	6	0.0617	1
11	Greece	49.72	26	–0.88	26	0.0534	12
12	Hungary	58.75	21	–0.21	19	0.0457	17
13	Ireland	63.38	19	–0.15	16	0.0446	15
14	Italy	70.60	17	–0.47	25	0.0381	4
15	Latvia	52.38	25	–0.14	14	0.0303	21
16	Lithuania	57.18	23	–0.04	12	0.0250	19
17	Luxembourg	90.86	1	0.37	4	0.0250	22
18	Malta	74.49	14	–0.24	21	0.0123	27
19	Poland	71.15	16	–0.14	15	0.0084	8
20	Portugal	60.73	20	–0.23	20	0.0078	14
21	Romania	49.59	27	–0.26	22	0.0070	26
22	Slovakia	73.82	15	–0.31	24	0.0060	18
23	Slovenia	74.92	12	–0.15	17	0.0048	20
24	Spain	66.53	18	–0.27	23	0.0033	5
25	Sweden	88.72	3	0.76	1	0.0020	7
26	The Netherlands	86.97	5	0.46	3	0.0018	6
27	United Kingdom	80.21	9	0.16	8	0.0011	3

Source: compiled by the authors based on http://www.euromoneycountryrisk.com; http://www.epc.eu and Damijan's criteria (1996).

of C_i with respect to C_j by a_{ij} and forming a square matrix A = (a_{ij}) of order n with the constraints that $a_{ij} = 1/a_{ji}$, for $i \neq j$, and $a_{ii} = 1$, all i. Such a matrix is said to be a reciprocal matrix.

The weights are consistent if they are transitive, that is $a_{ik} = a_{ij}a_{jk}$ for all i, j, and k. Such a matrix might exist if the a_{ij} are calculated from exactly measured data. Then, find a vector ω of order n such that $A\omega = \lambda\omega$. For such a matrix, ω is said to be an eigenvector (of order n) and λ is an eigenvalue. For a consistent matrix, $\lambda = n$.

As the field of interest is the Baltic States, we have summarised the data (Table 3).

These indices should be compared with each other, for the reason a Table 4 with three attributes is presented as a matrix.

The eigenvector of the relative importance or value of each index is (0.089; 0.642; 0.270). Thus, sustainability index is the most valuable, while the country risk index and economic security index are behind.

The next stage is to calculate λ_{max} to lead to the Consistency Index and the Consistency Ratio. First, multiply on the right the matrix of judgements by the eigenvector, obtaining a new vector. The calculation for the first row in the matrix is: 6´0.089+1´0.642+3´0.270 = 1.983 and the remaining two rows give 0.661 and 0.330. This vector is of three elements (1.983; 0.661; 0.330); the product A_ω according to the AHP theory is $A\omega = \lambda_{max}\omega$, so now it is possible to get three estimates of λ_{max} by simply dividing each component of (1.983; 0.661; 0.330) by the corresponding eigenvector element. This gives 1.983/0.089 = 22.33 together with 1.03 and 1.23. The mean of these values is 8.20 and that is our estimate for λ_{max}. If any of the estimates for λ_{max} turns out to be less than n, or 8 in this case, there has been an error in the calculation, which is a useful sanity check.

The Consistency Index for a matrix is calculated from $(\lambda_{max} - n)/(n - 1)$ and, since $n = 3$ for this matrix, the CI is 2.6. The final step is to calculate the Consistency Ratio for this set of judgments using the CI for the corresponding value from large samples of matrices of purely random judgments using the table below, derived from Saaty's book (2010), in which the upper row is the order of the random matrix, and the lower is the corresponding index of consistency for random judgments.

For this case, it gives 2.6/1.41 = 1.84. Saaty (2010) argues that CR > 0.1 indicates that the judgments are at the limit of consistency though had to be accepted sometimes. It means that calculated results are rather relevant for making of conclusions.

8. Concluding remarks

1. The aim of this study was to develop a system, which based on existing research, mainly on indices and multicriteria evaluation methodology, could be used for complex valuation of country risk, sustainability and economic safety. It was demonstrated that the proposed aggregation system of three indicators – Euromoney country risk index, European economic sustainability index and Aggregate value of state index of 27 EU countries – offers the possibility to compare and benchmarking of each country according to the complex valuation of main risk drivers.

2. The proposed complex valuation system of country risk, sustainability and economic safety could be used to evaluate and standardise country risk, sustainability, and economic safety as a ratio system, reference point and multiplicative form appropriately suitable for cases, where there are several alternatives (EU countries or the Baltic States), and several objectives.

Table 3. Baltic States indices

EU country	Country risk index	Sustainability index	Economic security index
Estonia	57.50	0.36	0.0868
Latvia	52.38	–0.14	0.0303
Lithuania	57.18	–0.04	0.0250

Source: compiled by the authors.

Table 4. Matrix with weights for each country

Indices	Estonia	Latvia	Lithuania	Root of product of values	Eigenvector
Country risk index	6	1	3	0.363	0.089
Sustainability index	2	1/3	1	2.621	0.642
Economic security index	1	1/6	1/2	1.101	0.270
Total				3.931	1.000

Source: compiled by the authors.

Table 5. Indices of consistency for random judgments

1	2	3	4	5	6	7	8	9	10
0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

Source: Saaty T. L., 2010.

3. Later studies could explore new methods for country risk assessment and sustainability evaluation (for example, MOORA and MULTMOORA) and compare results to those received by using the method. Additionally, a new investigation on the interrelationship between country risk, sustainability and economic safety could be introduced.

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