Conceptual framework of economic resilience and vulnerability at national and regional levels

Authors:*

Gheorghe ZAMAN,
Valentina VASILE

Abstract: The paper is focused on the conceptual framework of economic resilience and vulnerability at national level taking into consideration both external and internal factors (shocks) including the countries' dimensional peculiarities. A special attention is paid to the resilience and vulnerability ratio of a country and to the importance of the magnitude of economic and social competitivity indices in an international comparative context for Romania.

Keywords: economic resilience; vulnerability risks; external/internal shocks

JEL Classification: E32; F41; F42

The economic science of sustainability and complexity added a new component, **economic resilience (ER)** which means identifying the ways and manners of solving the issues related to increasing the capacity of averting or recovering the negative effects of **external shocks.** In other words, ER deals with diminishing the probability of failure or of economic risks presupposing approaches that are combined analytically and predictably, both *ex-post* and *ex-ante*.

The term of resilience is taken over from the field of physics and engineering and means the characteristic size of materials behaviour to stress due to shocks, the relationship between the constant mechanical works consumed for shock flexion

* *Prof. Gheorghe ZAMAN, Corresponding Member of Romanian Academy, Ph.D. in economics, Senior Researcher, Institute of National Economy, Romanian Academy, e-mail: gheorghezaman@ien.ro; Prof. Valentina VASILE, Ph.D. in economics, Senior Researcher, Institute of National Economy, Romanian Academy, e-mail: val.vasile.ien@gmail.com.*

of a specimen and the surface of the cross section in which the respective tear occurred (dexonline.ro).

Later on the term was used in psychology (Sübert A., 1970) meaning the capacity of an individual to face traumas or major changes in his/her life/activity. The phenomena related to famine, diseases, war situations, crisis or natural disasters have generated the necessity of taking over this term in economics as well.

Thus, in psychology, resilient individuals are characterised by confidence in their own capacities and skills, a positive perception of the self, flexibility, the tendency towards optimism, the existence of life-meaning, the capacity of solving issues, of determining objectives and priorities, and active socialisation.

The survival of individuals, of communities in the fight against shock events led to expressions of the way in which mankind manage to face, to dominate, to conquer, and master extreme difficulties, to recover and even to become stronger and more balanced as compared to the previous situations.

As a result of the challenges, difficulties and rapid changes within the economy and society, the identification and strengthening of those skills required for solving, and overcoming those challenges turned increasingly important and appreciated at professional level.

As for resilience it is maintained that it represents an **innate** potential quality of each individual which differs from one individual/economy to another both in space and time, but which might be gained, developed and strengthened.

The resilience refers rather to identifying new internal resources of the individual or of the economy, and in our case, to facing situations of imbalance, shock or disaster, catastrophic events, and extreme natural phenomena etc. This aspect is very important in the case of an economy which is based on the relationships between internal and external factors of economic growth, between environmental and socio-human factors.

Within the economy resilience becomes a fundamental characteristic at micro- and macro levels, in deterministic and stochastic terms of economic models for facing the shocks of various factors of sudden influence.

The Multidisciplinary Centre for Earth Engineering Research defines ER as inherent and adaptive answers (reactions) to hazards that give individuals and communities the opportunity to avoid potential losses at the level of economic agents, households, markets, at national and regional level.

In the economic literature we encounter more and more frequently terms of mitigating the unfavourable influences on long term.

As opposed to the ante- or pre-event character of mitigating negative effects of an event, economic resilience is focused on the ingenuity and endowment with resources **employed during and after the occurrence of the event.**

Frequently, mitigation lays emphasis on the new technologies, for instance, the ones of early warning, public/private insurance institutions, market regulation etc.; resilience has additionally a more marked **behavioural component** because the organisations and individuals don't act identically or passively to disasters and shocks as in the case of normal events or usual business.

Measuring ER is of particular importance for substantiating strategic decisions related to diminishing losses triggered by economic crises and disasters because the resilience of supply chains of individual companies can contribute to the resilience of an entire region. Failing to include resilience in estimating, losses, leads to inflationist evaluation of business disruptions due to shocks or to losing opportunities.

Even though the term of economic resilience is frequently used, the clear definition is rarely encountered, among others also because there is no comfortable consensus among experts with respect to the contents, specificity and encompassing area.

According to Pendall, Foster and Cowell (2009, pp.2, 6) there are two meanings of the ER notions which are not necessarily interfering. A first understanding is based on the analysis of economic balances and aims at the ability of an economic system to return to the pre-existing state.

The second understanding of the term is based on the theory of complex adaptive systems and refers to the ability to adjust and change a system as respose (reaction) to sudden pressures, shocks and negative impacts.

In the case of the two understandings, two important aspects of ER stand out, that is:

a) the capacity to return to a previous (optimum) state of balance without fundamentally the structure of the system;

b) the response, reaction capacity of the system to external or internal shocks without returning to the initial state but recovering and stabilising on a new balance.

In our opinion, none of the two aspects should be neglected. On one hand, the first aspect is focused on maintaining or returning the system to its intrinsic,

defining and fundamental values of the past, but valid for the present and future, which would be translated in the terms of the statement of "taking over the tradition/the valuable, valid heritage". On the other hand, it is about validating Schumpeter's formulae of "creative destruction" under the new circumstances as a support for growth and technological and socio-economic renewal in a constructive way and not a "demolishing" one (as it happened with many activities of the Romanian industrial branches during the transition period).

The special literature counts a relative low number of papers that approach the ER issue at regional and national level (Blanchard şi Katz, 1992; Briguglio *et al*., 2006; Feyer, Socudate şi Stern, 2007) in the understanding of returning to the previous level and dynamics of production, employment, wages and foreign trade growth after a period of recession.

From the conceptual, but also empirical viewpoint, the specialised literature distinguishes between large-sized countries and small- and medium-sized ones with respect to ER features regarding both the resilience and recovery capacity from shocks, but also to internal and external vulnerabilities and events (Crowards, 2000, Atkins *et al*., 2000, Cordina, 2004).

Resilience and economic vulnerabilities

The development of various thinking trends with respect to the new category of ER emerged from the need to grasp and substantiate policies, means, instruments and mechanisms to prevent, mitigate, counteract, diminish and combat the negative effects of various categories of environmental and/or economic-financial shocks was equaly accompanied by the notion of economic vulnerability (EV).

In general, by a country's economic vulnerability we undestand in subsidiary the multitude of (inherent) features with permanent or temporary character on which the decision making cannot exercise directly and in a decisive manner, more or less predictable. It is about material catastrophes, extreme natural phenomena, climate changes, and I conditions at the world level etc.

Vulnerabilities are stemming from the existence and functioning of an economy, but it cannot be considered as a factor of government under-performance.

Defining the vulnerabilities as inherent features and of resilience as changes generated by implementing some strategies and policies represents an incontestably applicative approach.

If the vulnerability index which does not mean an intended involvement of a government is quasi-constant in time, the R index refers to what may be done in a country for mitigating/exacerbating its permanent vulnerability.

The computation and corroboration of EV and ER indicate the global risk to be caused by external/internal shocks as a result of the inherent vulnerabilities more or less compensated by public policies.

According to experts (Bruglio L., 2004, Cordina G., 2004, Crowards T., 2000, Ferrugia N., 2004), the index can be determined as automatic average of the following four indices: **economic** openness (the rate of international trade in GDP); concentration of exports (lack of diversification); dependence on strategic imports.

The ER significance differs by the size of countries, the smallest ones being most vulnerable as against the large-sized ones (*divide et impera*) which can better cope with the external shocks.

ER originates in the Latin term "resiliere" which means "to leap back" and refers to the ability of an economic activity regarding:

- **rapid recovery after a shock**;
- **resistance to the effects of a shock;**
- **avoiding shocks in general** (immunity, separation – firewall or shock-absorption)

The components of the ER index, in the hypothesis of absorbing or combating shocks include:

– **macroeconomic stability** (the share of budgetary deficit in GDP, the sum between the inflation rate and the unemployment one, the share of external debt in GDP);

– **efficiency of the microeconomic market**[x)] refers to the size of government, legal structure and security of the ownership right, access to healthy money (!), freedom of international trade, regulations in the field of labour, business and credit;

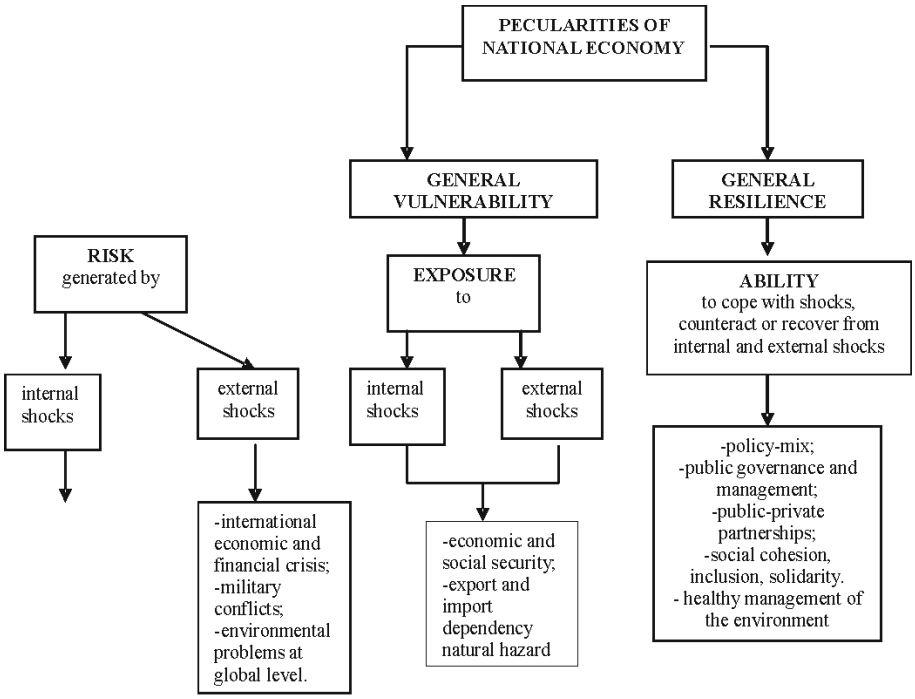
– **good governance** (legal independence, impartiality of judges, copyright protection, military intervention in justice, political system);

– **social development** (education, employment, cohesion, qualification, health).

[x)] *Each of the microeconomic market components can be de-aggregated in several specific relevant or common components for various countries.*

Between the components of the ER index there is a strong interdependency. A more comprehensive index of economic resilience should take into consideration both external and internal shocks to the economy. That is why we consider the inclusion of the elements of internal (domestic) shocks that could happen within a national economy and have direct/indirect relations with external ones.

Figure 1. Risks associated to adverse effects of internal and external shocks



Resilience - vulnerability relationship

We consider that a different analysis of economic resilience and vulnerability at different levels of aggregation (local, regional, national and international) could be only a starting stage of study. An in-depth analysis of the relationship resilience vulnerability needs a simultaneous, corroborated study of both notions. Most specialists consider them as very closely interrelated, although some of them don't sustain such an opinion.

The main objective of our study is the relevance of different categories of countries where the economic resilience is **higher, equal or lower** than economic vulnerability. According to our calculations (Table 1), based on the convention of four dimensions of the R/V relationship we distinguish three categories of countries where resilience is higher than vulnerability and another category where the vulnerability index exceeds the size of the resilience index. The first three categories (A, B, C) of countries reflect a better situation in comparison with the fourth category of countries dominated by vulnerabilities.

The R/V ratio intervals are established in a decreasing order.

Table 1 - Resilience/vulnerability (R/V) ratio by size and countries

A. R/V>3 Very High Economic Resilience (VHER) Brazilia (over 300), China (over 300), USA (13.65), Mexico (10.08), Italy (7.39), Germany (6.98), Canada (6.82), United Kingdom (5.79), Japan (5.36), Switzerland (4.47), Argentina (4.28), Australia (4.04), France (3.98),
B. 2≤R/V≤3 High Economic Resilience (HER) Austria (3.50), Poland (2.77), New Zeeland (2.68), Portugal (2.62), South Africa (2.59), Spain (2.32), Ireland (2.22), Sweden (2,01).
C. 1≤R/V≤2 Moderate Economic Resilience (MER) Netherlands (1.98), Denmark (1.84), Belgium (1.82), Peru (1.77), Czech Republic (1.76), Hungary (1.74), Uruguay (1.74), Indonesia (1.66), Chile (1.62), Slovenia (1.57), India (1.49), Costa Rica (1.45), El Salvador (1.36), Russian Federation (1.32), Thailand (1.28), Iceland (1.25), Romania (1.25), Israel (1.23), Paraguay (1.23), Hong Kong (1.19), Norway (1.18), Slovak Republic (1.16), Turkey (1.02), Lithuania (1.01).
D. 1>R/V Weak Economic Resilience (WER) Trinidad Tobago (0.98), Singapore (0.97), Malaysia (0.94), Bolivia (0.92), Morocco (0.91), Mauritius (0.87), Luxembourg (0.87), Philippines (0.79), Colombia (0.75), Iran (0.74), Kuwait (0.74), Sri Lanka (0.74), Greece (0.73), Cameroon (0.73), Croatia (0.71), Estonia (0.70), Panama (0.67), Latvia (0.67), Dominican Republic (0.56), Albania (0.56), Venezuela (0.55), Jordan (0.55), Barbados (0.55), Cyprus (0.53), Malta (0.52), Bangladesh (0.49), Egypt (0.48), Jamaica (0.48), Honduras (0.44), Belize (0.34), Nepal (0.33), Kenya (0.32), Uganda (0.31), Papua New Guinea (0.29), Madagascar (0.17), Nicaragua (0.12), Nigeria (0.09), Senegal (0.08), Pakistan (0.04), Côte d'Ivoire (0.00).

Source: own calculations based on primary data from the study of Bruglio (2006).

In Table 1, we distinguish four categories of countries, depending on the size of the economic resilience/vulnerability ratio, as follows:

- a number of 13 countries with very **high economic resilience (VHER)** exceeding more than three times economic vulnerability; the first three positions belong to China, Brasilia and the USA;
- **high economic resilience** (HER) is recorded only by eight countries with a R/V ratio size between 2 and 3: this groups of eight countries has an important significance for different regions of the world economy;
- 24 countries (including Romania) belong to **moderate economic resilience (MER)** group where the vulnerability level is lower than that of resilience;
- 39 countries have a **higher vulnerability index** as compared to the low size of resilience (WER); this category includes developing countries with a lower level of economic development, which are more exposed to internal and external shocks.

It is worth mentioning that the results of our calculations refer to the past.

Considering the rapid changes in contemporary world economy, especially as a result of the international financial and economic crisis, an up-dating of our figures could reveal changed ranks of countries as a consequence of a new size of resilience/vulnerability indexes.

Romania's economic resilience and vulnerability indices in an international comparative context

For a better decision–making process it is necessary to take into account the place of Romania in the international hierarchy of resilience and vulnerability indices. In this sense we considered Romania's indices equal to 1.00 and calculated the gaps for other countries.

According to Table 2, out of a total of 87 countries, in 19 countries the resilience index was lower than Romania's index. All these countries are developing countries with a weaker capacity of resistance to economic external shocks.

In 35 countries, most of them emergent and developing economies, the resilience index was higher (1.00 – 2.00 interval).

In another group of 35 countries, most of them developed countries, the resilience indices were to 3,88 times higher than that of Romania 2.

As a conclusion it is worth mentioning that a higher economic resilience index than in Romania was recorded in 70 countries pend in 19 countries, the resilience indices were lower than that of Romania. The unfavourable ranking of

the Romanian economy resilience is mainly explained by the low level of competitiveness and productivity of production factors.

Table 2 - Romania's resilience index in an international comparative context

Romania = 1.00 Resilience index intervals									
R<1.00		**1.00<R<1.50**		**1.50<R<2.00**		**2.00<R<2.50**		**2.50<R<3.88**	
Cote d'Ivoire	0.00	Romania	1.00	Tunisia	1.52	Malta	2.01	Germany	2.71
Pakistan	0.05	Belize	1.04	Barbados	1.54	Trinidad and Tobago	2.02	Belgium	2.73
Senegal	0.15	Bolivia	1.07	Jordan	1.55	Kuwait	2.09	Netherlands	2.80
Nigeria	0.24	Indonesia	1.12	Slovak Republic	1.60	Luxembourg	2.09	Australia	2.88
Cameroon	0.24	India	1.17	Dominican Republic	1.66	Israel	2.11	Denmark	2.90
Nicaragua	0.29	Sri Lanka	1.19	Peru	1.66	Czech Republic	2.11	Finland	2.92
Madagascar	0.30	Egypt, Arab Rep.	1.23	Argentina	1.66	Mauritius	2.13	Austria	2.93
Nepal	0.42	Russian Federation	1.23	Cyprus	1.72	Malaysia	2.14	Iceland	2.95
Papua New Guinea	0.57	Brazil	1.23	Jamaica	1.73	Japan	2.20	Switzerland	3.08
Bangladesh	0.60	Croatia	1.32	Thailand	1.79	Spain	2.25	Canada	3.10
Kenya	0.64	China	1.36	Mexico	1.80	Italy	2.35	United States	3.17
Uganda	0.71	Paraguay	1.42	Lithuania	1.83	Chile	2.38	Ireland	3.20
Turkey	0.72	Iran, Islamic Rep.	1.46	Latvia	1.85	United Kingdom	2.38	Hong Kong	3.28
Albania	0.74	South Africa	1.48	Greece	1.85	Sweden	2.40	New Zealand	3.32
Colombia	0.74	Philippines	1.50	Slovenia	1.86	Costa Rica	2.45	Singapore	3.88
Honduras	0.92			Poland	1.88	Portugal	2.45		
Morocco	0.97			El Salvador	1.91	Estonia	2.47		
Venezuela	0.98			Uruguay	1.94	Norway	2.48		
				Panama	1.95				
				Hungary	1.98				
				France	1.99				
19 countries		**14 countries**		**21 countries**		**18 countries**		**15 countries**	

Source: own calculation based on primary data from Briguglio L. et al., 2008, "Economic Vulnerability and Resilience. Concepts and measurements", UN University, WIDER, World Institute for Development Economics and Research, May.

Romania's vulnerability index (Table 3), was higher than that recorded in 18 countries, among which Brazil, China, the USA, and lower than that recorded in the rest of 68 countries, mainly developing and emergent economies.

The highest vulnerability size, more than 2.5 has been registered in 26 countries with a coefficient of vulnerability over 2.5 times as against Romania.

Table 3 - Romania's vulnerability index in an international comparative context

Romania = 1.0 Vulnerability index intervals									
V<1.0		**1.0<V<1.0**		**1.0<V<2.0**		**2.0<V<2.0**		**2.0<V<3.8**	
Brazil	0.00	Romania	1.00	Bangladesh	1.52	Sri Lanka	2.01	Cote d'Ivoire	2.54
China	0.00	Sweden	1.01	New Zealand	1.55	Tunisia	2.07	Trinidad and Tobago	2.59
Mexico	0.22	Austria	1.05	Nepal	1.59	Costa Rica	2.12	Honduras	2.59
United States	0.29	Portugal	1.17	Albania	1.67	Israel	2.15	Norway	2.64
Italy	0.40	Russian Federation	1.17	Pakistan	1.69	Senegal	2.25	Nicaragua	2.81
Germany	0.49	Peru	1.17	Slovak Republic	1.73	Lithuania	2.26	Malaysia	2.85
Argentina	0.49	Spain	1.21	Thailand	1.76	Venezuela	2.26	Uganda	2.90
Japan	0.51	Colombia	1.23	El Salvador	1.76	Madagascar	2.26	Iceland	2.95
United Kingdom	0.51	Morocco	1.32	Netherlands	1.77	Croatia	2.33	Luxembourg	2.99
Canada	0.57	Finland	1.39	Ireland	1.80	Philippines	2.35	Mauritius	3.07
France	0.63	Uruguay	1.40	Chile	1.84	Iran, Islamic Rep.	2.47	Greece	3.18
South Africa	0.71	Hungary	1.43	Belgium	1.86	Papua New Guinea	2.47	Egypt, Arab Rep.	3.19
Indonesia	0.84	Paraguay	1.44	Cameroon	1.93	Kenya	2.48	Nigeria	3.29
Poland	0.85	Bolivia	1.45	Denmark	1.98			Hong Kong	3.46
Switzerland	0.86	Slovenia	1.49					Barbados	3.48
Turkey	0.88	Czech Republic	1.50					Latvia	3.49
Australia	0.89							Jordan	3.52
India	0.98							Kuwait	3.55
								Belize	3.73
								Dominican Republic	3.73
								Panama	4.06
								Cyprus	4.08
								Estonia	4.41
								Jamaica	4.48
								Singapore	4.71
								Malta	4.85
18 countries		**15 countries**		**14 countries**		**13 countries**		**26 countries**	

Source: See Table 2.

Interdependence between resilience, vulnerability and global competitiveness index .

A problem to be diccussed is the relationship between economic **resilience (R), vulnerability (V) and global competitiveness index (GCI)***. Some specialists are in favour of a close link between the three indicators because GCI includes the total number of R and V subindicators. Other specialists share the opinion that each indicator has its importance and relevance which requires a separate analysis to which some considerations on the interference of the three indicators should be eventually added.

Table 4 - Romania's Rank (R), Vulnerability and GCI*

Country / Romania	Resilience		Vulnerability		Global competitiveness index	
	Rank	Score	Rank	Score	Rank	Score
	70	0.258	68	0.206	76	4.13

*) *GCI = Global Competitiveness Index.*

From the theoretical point of view it can be confirmed that both R and V, to a greater or lesser extent could influence the size of GCI the components of which are the following:

- **basic requirement** with subindicators: institution; infrastructure; macro-economic environment; health, primary education;
- **efficiency enhancer** with subindicators: higher education and training; goods market efficiency; labour market efficiency; financial market development; technological readiness; market size;
- innovation and sophistication factors.

* *See The Global Competitiveness Report 2013-2014, Global Competitiveness Index 2013-2014.*

Table 5 - Romania's position by components of global competitiveness index

a. Basic Requirements 2013-2014

Country position	Basic Requirements		1. Institution		2. Infrastructure		3. Macro-economic environment		4. Health primary education	
	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Romania	**87**	**4.32**	**114**	**3.34**	**100**	**3.33**	**47**	**5.14**	**84**	**5.47**
Singapore (highest position)	1	6.30	3	6.04	2	6.41	18	6.01	2	6.72
Guineea (lowest position)	148	2.87	132	3.06	147	1.73	142	3.11	139	3.59

b. Efficiency Enhancers in Romania

Eficciency enhancers	Romania	SUA (highest position)	Mauritania (lowest position)
Rank	63	1	147
Score of which:	4.13	5.66	2.71
5. Higher education and training			
Rank	59	7	146
Score	4.41	5.75	2.07
6. Goods market efficiency			
Rank	11.7	20	141
Score	3.89	4.93	3.38
7. Labour market efficiency			
Rank	110	4	143
Score	3.96	5.37	3.23
8. Financial market development			
Rank	72	10	140
Score	3.95	5.26	2.71
9. Technological readiness			
Rank	54	15	125
Score	4.14	5.72	2.71
10. Market size			
Rank	46	1	134
Score	4.44	6.94	2.16

c. Innovation and sophistication factors

Country position	Total indicator		11. Innovation		12. Sophistication	
	Rank	Score	Rank	Score	Rank	Score
Romania	**63**	**3.32**	**101**	**3.62**	**97**	**3.01**
Switzerland (highest position)	1	5.72	2	5.75	2	5.70
Angola (lowest position)	148	2.52	143	2.89	147	2.15

Source: Global Competitiveness Report 2013-2014, World Economic Forum.

Concluding remarks

- Economic resilience (R) and vulnerability (V) are complex and interrelated categories, able to recover from external shocks and the exposure to adverse event respectively;
- R and V metrics need special complex quantitative and qualitative approaches aiming at constructing of composite indices at national, regional and microlevels;
- "Brisbane Action Plan" for developping a comprehensive growth strategy presented at the Brisbane Summit in 2014 aims at improving the ways to strengthen economic growth and resilience, at immunizing against adverse events and shocks, at global and local levels;
- R and V require complex adaptive systems, in response to stress and strain, a new examination of the economic equilibrium and dynamics, new stability domains and factors;
- R and V indices calculated for a large member of countries are analysed in their interconnectivity and interdependence, as they are different for developed and developing countries, for small and large economies and provide useful value judgments for working out and implementing sustainable development strategies;
- The multidimensional nature of R and V has to be more effectively coupled with the global competitiveness, public-private partnership and international coordination and cooperation, in the framework of sustainability and complexity sciences, which requires a transition from linear to non-linear approaches;

– Further developments of the theoretical and practical dimension of economic R and V require a substantial improvement of statistical data and economico-social information, collecting and processing, in order to analyze the in-depth synergistic and co-evolutionary relationship between risks and uncertainty under the circumstances of increasing international economic interdependence of globalization and deepening economic, social and environmental discrepancies and inequalities.

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*** "AG 20 Agenda for Growth and Resilience in 2014" (http://www.g20.org/g20priorities/g20_2014_agenda)