PROMOTING THE SUSTAINABLE DEVELOPMENT OF SMALL ISLAND DEVELOPING STATES: INSIGHTS FROM VULNERABILITY AND RESILIENCE ANALYSIS

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Abstract - *This article suggests a generic method to compute a composite index of vulnerability and resilience from a sustainable development perspective: the Net Vulnerability-Resilience Index. A worldwide application shows that both vulnerability and resilience are policy responsive. From the worst to the ideal, the state of vulnerability-resilience can be an uncontrolled vulnerability, a contained vulnerability, an unstable resilience or a stable resilience. We show that contrary to the well-established conclusion, Small Island Developing States are not specifically more prone to vulnerability than other countries. Small Island Developing States must concentrate their efforts on a better international economic integration that should be compatible with the preservation of their natural resources.*

Key-words - COMPOSITE INDEX, GRAPH THEORY, VULNERABILITY, RESILIENCE, SUSTAINABLE DEVELOPMENT

JEL Classification - O11, Q01, C02

This work has received support under the program « Agrobiosphère » (Gaia-Trop) launched by the French Government and implemented by ANR with the references ANR-12-AGRO-0009-05.

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1. INTRODUCTION

A growing interest in vulnerability and resilience issues has contributed for twenty years to the economic literature and in particular to the economic literature emanating from development economics. This body of literature analyzes the state of vulnerability and resilience (VR) of countries, given the idea that vulnerability harms development. Vulnerability is commonly defined as the exposure of a system (*i.e.,* a country) to exogenous shocks. Vulnerability refers to permanent or quasi-permanent features that are intrinsically (*i.e.,* structurally) deterministic, in contrast to resilience, which is the ability of a system to absorb shocks or to withstand its impact (Adrianto and Matsuda, 2004; Briguglio, 1995; Dabla-Norris and Bal Gündüz, 2014; Guillaumont, 2009, 2010; Guillaumont and Wagner, 2013; Rose and Krausmann, 2013). Resilience falls within the building capacity of a country that involves its policy-makers.

Various composite VR indexes computed at the macro scale have been suggested (among others, Briguglio, 1995; Briguglio *et al.*, 2009; Atkins *et al.*, 2000; UWI, 2002; Guillaumont, 2009, 2010) and have diversely informed the debate that contributes to the production of the standard "Economic Vulnerability Index (EVI)" produced by the United Nations (2008, 2014). These indexes also note the high vulnerability of Small Island Developing States (SIDS). These empirical and methodological works legitimate the common idea according to which international aid should be specifically dedicated to SIDS.

This idea was formerly endorsed in the Earth Rio 1992 Summit. Two years later, the Global Conference on the Sustainable Development of SIDS hosted in Barbados in 1994 reaffirmed this position. Ten years after the first Rio Earth Summit, the United Nations Development Program report discussed *the* growing v*ulnerability of Small Island Developing States* (UNDP, 2002). During the same year, the Johannesburg Summit on Sustainable Development reaffirmed that SIDS are a special category in terms of environment and development. The UN report noticed that the vulnerability of the majority of SIDS has increased significantly since the 1994 Barbados Conference and that SIDS should pay greater attention to their ability to build resilience. In 2005, the Mauritius conference reiterated that "the acknowledged vulnerability of small island developing States continues to be of major concern and that this vulnerability will grow unless urgent steps are taken" (Mauritius declaration, p. 2) and then recognized that progress has been made. At the Rio+20 Summit, it was noted that SIDS should take innovative steps to pursue their commitment in sustainable development strategies and vulnerability management. "We [also] call for a strengthening of United Nations system support to Small Island Developing States in keeping with the multiple ongoing and emerging challenges faced by these States in achieving sustainable development" (*The future we want, II. B. 33*). In the same vein, the Samoa Conference on SIDS (2014) reaffirmed that "Small Island Developing States remain a special case for sustainable development in view of their unique and particular vulnerabilities and that they remain constrained in meeting their goals in all three dimensions of sustainable development" (*Report of the Third International Conference on SIDS, Chapter 1, § 5*). The dimensions of sustainable development are explicitly mentioned here.

Despite the numerous injunctions dictated by the international community, which have led to a proliferation of works about vulnerability and resilience indexes, the main academic contributions (Briguglio, 1995; Briguglio *et al.*, 2009; Atkins *et al.*, 2000; UWI, 2002; Guillaumont, 2009, 2010 etc.) can be criticized at several levels:

(i) The design of vulnerability-resilience dimensions. Predominance is given to the economy, whereas the reference to sustainable development emphasized by international institutions invokes other parallel dimensions (Angeon and Bates, 2015). These indexes include implicitly at least one of the following dimensions: governance, the social dimension, the environment and peripheriсity, without integrating them all together. However, the classification of the same variable in different dimensions on several indexes is problematic unless we assume that these dimensions coupled with the economy are complementary rather than substitutable.

(ii) The selection of variables. The selection of variables may result from a discretionary choice beyond possible redundancies in a same index. For example, although the dependency of developing countries on the agricultural sector has evolved through time (Kellman and Shachmurove, 2011), the EVI that focuses on this group of countries overstates the economic sub-index structure. In addition, the EVI considers both the merchandise export concentration and the share of agriculture, forestry and fisheries, even though the instability of agricultural output may affect the instability of exports of goods and services. Specifically, the selection of variables and their inter- and intra-dimensional structure would gain from a rigorous demonstration to limit the arbitrariness of aggregate series.

(iii) The distinction between vulnerability and resilience factors. The distinction between variables is not always explicit to capture on one side resilience capacity and on the other side vulnerability propensity. This is due to indexes that mainly relate to structural vulnerability components and that do not seek to stress on resilience. For instance, the UN (2008) excludes any consideration of resilience in the calculation of the EVI (Guillaumont, 2009).

(iv) The disputable deterministic postulate. The deterministic postulate on vulnerability and resilience admits that vulnerability refers to intrinsic and structural features that cannot be changed. On the contrary, resilience is presented as greater policy leeway and thoroughly depends on political will. Angeon and Bates (2015) adopt a nuanced definition of vulnerability and resilience that accepts policy responsiveness for both concepts. This conceptual framework in line with Seth and Ragab (2012) represents a disruptive way of thinking for examining the phenomena of vulnerability and resilience. Vulnerability derives also from non-convenient political choices, actions or strategies. In that sense, vulnerability should not be conceived merely as a given asset but, as a result of policy, it may be transient. Thus, this renewed conceptual framework allows for a definition of vulnerability and resilience which admits that both of them are built.

Despite these debatable points, a consensus has emerged around analyses based on composite VR indexes according to which most of the Small Island Developing States (SIDS) have to be considered vulnerable due to deterministic

features such as "islandness"[1] (Briguglio *et al.*, 2009; Guillaumont, 2009). We can notice that the weight granted *a priori* for the intrinsic and permanent features (size, location, and economic structure) is important in these works and results from variables and methodological choices. Under these circumstances, SIDS appear as highly vulnerable, a fact that may distort the reality. The lack of sustainable concerns does not fit in the international targets of achieving inclusive growth (World Bank, 2008). Thus, conceptual and methodological refinements of VR composite indexes should reveal the effective characteristics that depict SIDS and their development propensity.

Considering the criticisms addressed to the composite VR indexes, the Net Vulnerability-Resilience Index (*NVRI*) suggested in Bates *et al.* (2014) should deserve attention. The *NVRI* provides (*i*) a holistic view of vulnerability and resilience with 5 complementary dimensions in line with sustainable development, (*ii*) a mathematical background based on an algorithm of graph theory to select the root variables that enter into its computation, (*iii*) an explicit distinction between vulnerability and resilience variables, and (*iv*) a non-deterministic view of vulnerability. Therefore, the *NVRI* is a convenient tool to reassess the vulnerability and resilience of SIDS.

Based on the advantages given by the *NVRI*, this paper sheds new light on the vulnerability-resilience of SIDS from a global sample of countries that includes developing countries, developed countries and average developed countries. As a multimetric composite index, the *NVRI* reveals the dimensions that underlie the strengths and the weaknesses of SIDS.

The holistic and non-deterministic approach involved in the *NVRI* leads to mitigate the absolute vulnerability of SIDS using the following: (1) feasible trajectories of sustainable development, and (2) the contestation of the haunting discourse on vulnerability strictly related to geophysical characteristics. Financial compensation of "islandness" becomes counterproductive if it reinforces the irresponsibility of SIDS in terms of policy orientation.

The paper is organized as follows: Section 2 discusses the computation principles and interpretation of the *NVRI*. Section 3 highlights the diversity of SIDS profiles and notes disruptive analysis about SIDS. Section 4 presents conclusions.

2. COMPUTATION PRINCIPLES AND EFFICIENCY OF THE *NVRI*

A recent survey on VR indexes (Angeon and Bates, 2015) shows that the following five dimensions: economic, social, environmental, political (governance) and peripheriсity are key. These different dimensions are documented by an initial pool of 43 variables. Bates *et al.* (2014) suggest a mathematical method to obtain a short set of variables to build the *NVRI* efficiently and robustly.

2.1. Computational principles

From the large initial set of variables that cover the five dimensions of VR, Bates *et al.* (2014) structure the networks of relationships by distinguishing a

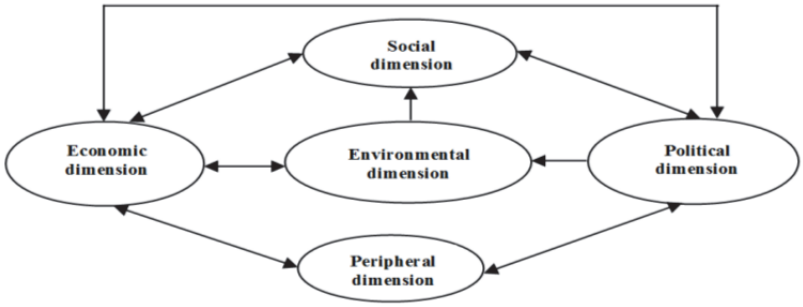
[1] Smallness and remoteness.

root set (basis of VR) and non-root sets (consequences of VR)[2]. Several implications are deduced from the Tarjan algorithm (1972) that is mobilized:

(i) The 5 dimensions of VR are fully central to analyze the VR of States

Theoretically, a non-holistic consideration of VR (*i.e.*, a conception in which at least one of the five dimensions is missing) would undermine a consistent VR quantification. The 5 dimensions are structured as follows (Figure 1):

Figure 1. Networks of the dimensions of vulnerability-resilience



Source: Bates et al. (2014).

Graph theory shows that two groups of dimensions are involved for studying vulnerability-resilience of countries: The *control dimensions* (economic and governance) influence all of the *contingency dimensions* (social, environmental and peripheral).

(ii) The multimetric NVRI is structured as in Figure 2

The variables that compose the *NVRI* are of a different nature. They are measured in levels, either in percentages or with sub-indexes extracted from the literature (*e.g.*, world governance index of Kaufman *et al.*, 2008). All of them are rescaled to have values in the interval [0, 1] using the standard "min-max" transformation. A variable x_i with no absolute extrema is standardized for any country k as follows:

For components without absolute extrema:

$$x'_{ik} = [x_{ik} - min(x_{ik})] \,/\, [max(x_{ik}) - min(x_{ik})]$$

Similarly, the transformation for a variable x_i with absolute extrema is:

$$x'_{ik} = [x_{ik} - min(x)] \,/\, [max(x) - min(x)]$$

The *NVRI* aggregates the ($j=5$) dimensions using a non-weighted arithmetic average for variables that refer to vulnerability or to resilience.

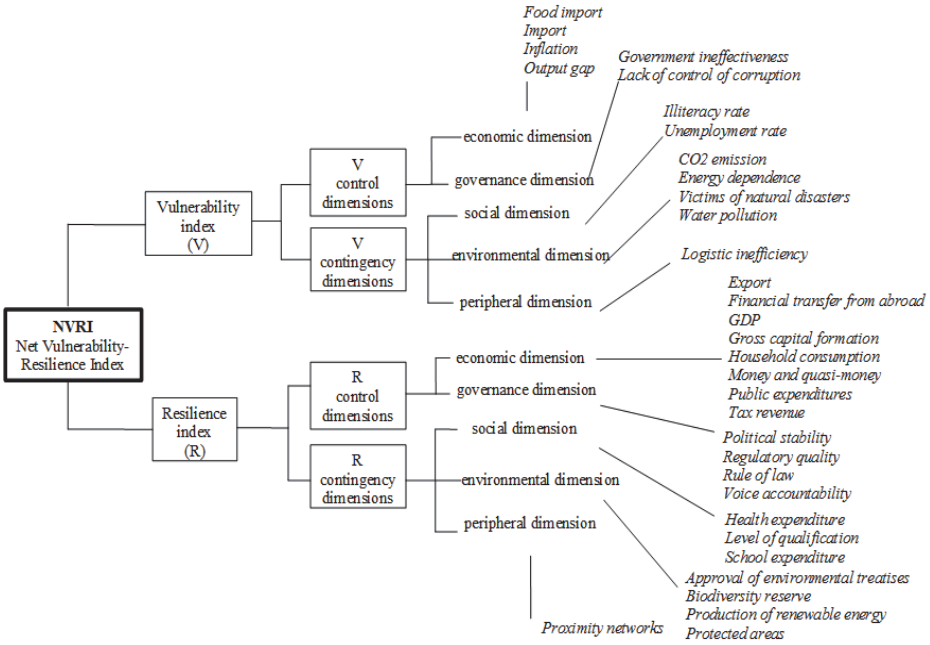
[2] Financial imbalances of States (in accordance with Benmelech and Dvir, 2011), the structure of international trade, social inequality and exclusion are consequences of the state of VR instead of sources of VR. Thus, these aspects are not required to build a composite index of VR because they are consequences of other variables that are already included in the root set of VR.

V_k or $R_k = \Sigma_j \Sigma_i x'_{jik}$

The final computation is: $NVRI_k = R_k - V_k$

Hence, $NVRI_k \in [-1, 1]$.

Figure 2. The structure of the *NVRI*



2.2. The *NVRI* efficiency

The qualities of the *NVRI* sustain its efficiency. They are summarized in 4 items:

(i) Relevance and helpfulness

The construction of a parsimonious set of variables that conveys the key messages on the state of VR provides a mathematical traceability for the selection process of variables, which limits subjectivity. Consequently, the *NVRI* includes an adequate set of variables that reflects a suitable trade-off between a small number of variables and an informational completeness on the five dimensions in line with sustainable development. Moreover, the *NVRI* is also an instrument that is easily read. A negative (*positive*) sign on the *NVRI* represents a vulnerability (*resilience*) propensity.

The *NVRI* is an intuitive and easy-to-use scoreboard to guide policy actions. This scoreboard consists of the five sub-indexes that highlight the VR dimensions and creates the context for policy strategies. Its final single value and the values of its sub-indexes must be interpreted to pinpoint the strengths and the

weaknesses of countries. Therefore, reasoning on the single value coupled with the disaggregated sub-indexes enables revelation of all of the information about implicit sources of vulnerability-resilience hidden in the single value. A same aggregated value of the *NVRI* can be obtained from various economic, political, environmental, social and peripheral configurations. To avoid spurious interpretation from the single value of the *NVRI*, which may hide important disparities, the two analysis levels are complementary and required when countries or islands are compared. Using the *NVRI*, the distinction between *control dimensions* and *contingency dimensions* is central because these two types of dimensions are not equivalent. Otherwise, a spurious interpretation of the aggregated value would be obtained due to a perception of the 5 dimensions as substitutes.

(ii) Measurability

Based on the networks of interdependencies between the VR dimensions, the *NVRI* circumvents the pitfalls of weighting arbitrarily the dimensions and their associated variables. The *NVRI* helps escape from biases of experts' elicitation *à la* Cruciani *et al.* (2012) and from the time-consuming alternative statistical computations that are reported in Nardo (2005).

(iii) Workability

The scoreboard interpretation of the *NVRI* is invariant to the sample of studied countries. Boundary lines have no ambiguous definitions to separate the four VR situations (*stable resilience*, *unstable resilience*, *contained vulnerability*, *uncontrolled vulnerability*) that depict the ongoing policy strategies.

Table 1. Profiling vulnerability-resilience of countries

<table>
<tr><th colspan="3">Stable resilience</th><th colspan="3">Unstable resilience</th></tr>
<tr><td>Control dimensions</td><td>Resilience capacity</td><td rowspan="2">Control and contingency factors complement to get resilience

[SMART STRATEGY]</td><td>Control dimensions</td><td>Resilience capacity</td><td rowspan="2">Resilience capacity trespasses vulnerability propensity

['BIGIDI' STRATEGY]</td></tr>
<tr><td>Contingency dimensions</td><td>Resilience capacity</td><td>Contingency dimensions</td><td>Vulnerability propensity</td></tr>
<tr><th colspan="3">Contained vulnerability</th><th colspan="3">Uncontrolled vulnerability</th></tr>
<tr><td>Control dimensions</td><td>Resilience capacity</td><td rowspan="2">Vulnerability propensity trespasses resilience capacity

[BOLD STRATEGY]</td><td>Control dimensions</td><td>Vulnerability propensity</td><td rowspan="2">Deficient control dimensions feed vulnerability propensity

[MYOPIC STRATEGY]</td></tr>
<tr><td>Contingency dimensions</td><td>Vulnerability propensity</td><td>Contingency dimensions</td><td>Vulnerability propensity</td></tr>
</table>

'Bigidi' is a step danced on the traditional music from Guadeloupe ("gwo-ka" drums) in which dancers are continuously imbalanced to the point of falling, without ever falling.

(iv) Flexibility

Empirical knowledge about VR is continuously updated because the appropriate measurement of the concepts is constantly debated in the literature (Montalbano, 2011). Therefore, any significant new variable can be included in the *NVRI* if it belongs to the root set of variables.

The power of the *NVRI* lies in its double interpretation, which is derived from its aggregated single value and the scoreboard for each dimension of vul-

nerability and resilience. In that sense, the *NVRI* is operational in two directions.

For any country, interpreting its *NVRI* value in terms of dimensions highlights the sources of the country's failures. Therefore, to promote resilience, policies should focus on the deficient dimensions to neutralize the sources of vulnerability. Thus, the changes that must occur to reverse vulnerability or improve resilience are suggested. In this way, the holistic understanding of VR fits with the international organizations' emphasis on sustainable concerns for inclusive growth.

Regarding the principles described above, the suggested *NVRI* is suitable for the analysis of both developed and developing countries. The following section provides an application of the index based on a worldwide sample to revisit the popular view according to which SIDS deserve specific attention due to their high degree of vulnerability.

3. REVISITING THE SIDS VULNERABILITY AND RESILIENCE

This section proves that the premise of greater vulnerability of SIDS must be reconsidered. Suppose that the SIDS are more vulnerable than other groups of countries; then, we must check (1) whether or not there are examples that contradict this assumption and (2) whether or not SIDS escape from the cantonment of *uncontrolled vulnerability*.

3.1. The mapping of vulnerability-resilience

The analysis focuses on worldwide data that span one decade of evolution (2000-2009). To obtain time series for the variables listed in Figure 2, the following sources were used: United Nations, World Bank, International Monetary Funds, the International Environmental Agreements Database and the International Disaster Database. The final sample totals 95 countries (with no less than 10% missing data): 25 MDCs (Most Developed Countries), 35 ADCs (Average Developed Countries), 28 LDCs (Least Developed Countries), and 7 SIDS. These countries are representative of the diverse classifications of countries discussed in Nielsen (2011). The specific category of SIDS is added for the purpose of our study. The group of SIDS is representative considering the following criteria:

(i) SIDS produce less than 1% of the worldwide wealth. The ratio of SIDS' GDP to the sample is as low as the worldwide ratio, 0.72% and 0.57%, respectively, in 2010. The 7 SIDS of the sample represent the diversity of economic performances that is effectively observed in Nielsen's classification (2011): Singapore (MDC) [3], Bahrain, the Bahamas, Maldives, Jamaica, Mauritius (ADCs), and the Dominican Republic (LDC).

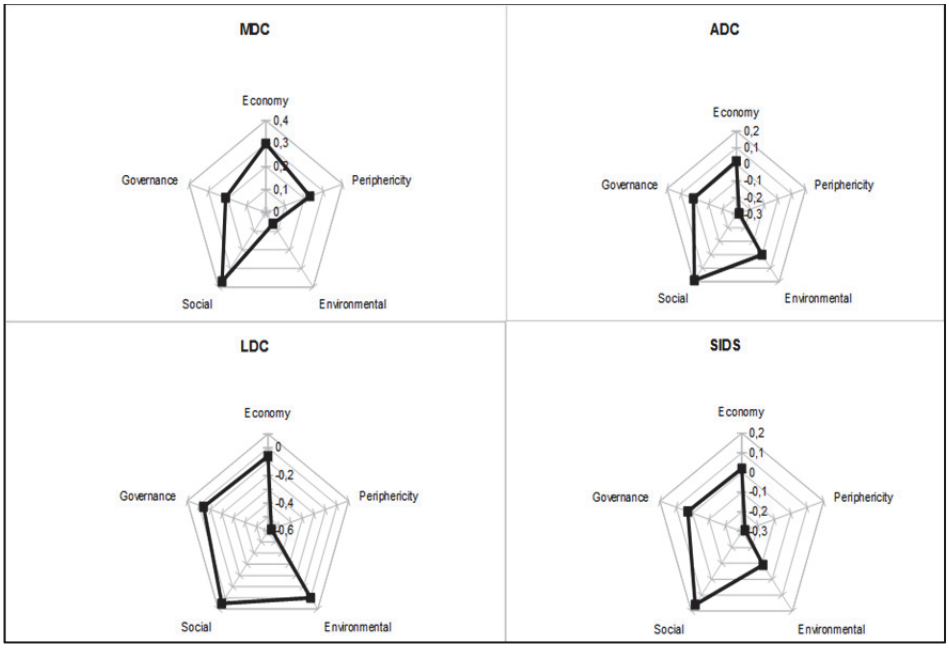
(ii) The SIDS of the sample are distributed according to geographical diversity. SIDS are located in the Caribbean (Dominican Republic, Jamaica, The Baha-

[3] Cyprus and Malta are included in our sample but are no longer considered as SIDS because they integrated into the European Union in 2004.

mas), the Pacific ocean (Singapore), the Indian Ocean (Mauritius), and the Persian Gulf (Bahrain)[4].

Figure 3 maps the *NVRI* values on a worldwide basis.

Figure 3. Mapping the state of vulnerability-resilience



Low vulnerability and high resilience coincide with the MDCs. Conversely, high vulnerability and low resilience coincide with the LDCs. There is a cantonment effect for the most (*least*) developed countries in the profile of *stable resilience* (*uncontrolled vulnerability*). This conclusion is consistent with Atkins *et al.* (2000), Briguglio (1995), Guillaumont (2009, 2010), UN (2008).

Concerning SIDS and their specificities, we notice that SIDS have an intermediate ranking between the LDCs and the ADCs. On average, the performance of SIDS is better than the performance of LDCs. SIDS show poor performance particularly in the environmental dimensions (*NVRI* for environment equals to -0.09). However, the peripheral component of SIDS' vulnerability does not differ from that of the ADCs. For both SIDS and ADCs, the *NVRI* in terms of periphericity is equal to -0.28. LDCs suffer twice as much in terms of periphericity (*NVRI* for this dimension is equal to -0.57). This leads to doubt regarding the stance according to which remoteness as a vulnerability factor is solely specific to SIDS. Despite the negative effect of periphericity, SIDS exhibit good performances in terms of governance. Their results outperform the ones the ADCs' results (*NVRI* = 0.03 and 0.01, respectively). Consequently, claiming that remoteness is an intrinsic factor of vulnerability that impedes de-

[4] Former SIDS (Cyprus and Malta) are located in the Mediterranean Sea.

velopment is debatable. SIDS can activate resources of resilience particularly in the economic and political dimensions to reverse physical assets of vulnerability. This calls for envisioning the state of vulnerability-resilience as a built strategy instead of an incurred factor.

3.2. SIDS vulnerability-resilience at a glance

Contrary to the MDCs and to the LDCs, results are not so clear for the 7 SIDS of the sample. Table 2 provides an illustration on this point.

Table 2. Profiling SIDS vulnerability and resilience

Stable resilience		**Unstable resilience**	
[SMART STRATEGY]	Singapore *(27/95)*	['BIGIDI' STRATEGY]	Bahamas *(59/95)*
Contained vulnerability		**Uncontrolled vulnerability**	
[BOLD STRATEGY]	Bahrain *(45/95)* Mauritius *(58/95)*	[MYOPIC STRATEGY]	Jamaica *(59/95)* Maldives *(62/95)* Dominican Republic *(76/95)*

Figures in parentheses indicate the NVRI rank on a worldwide sample of 95 countries.

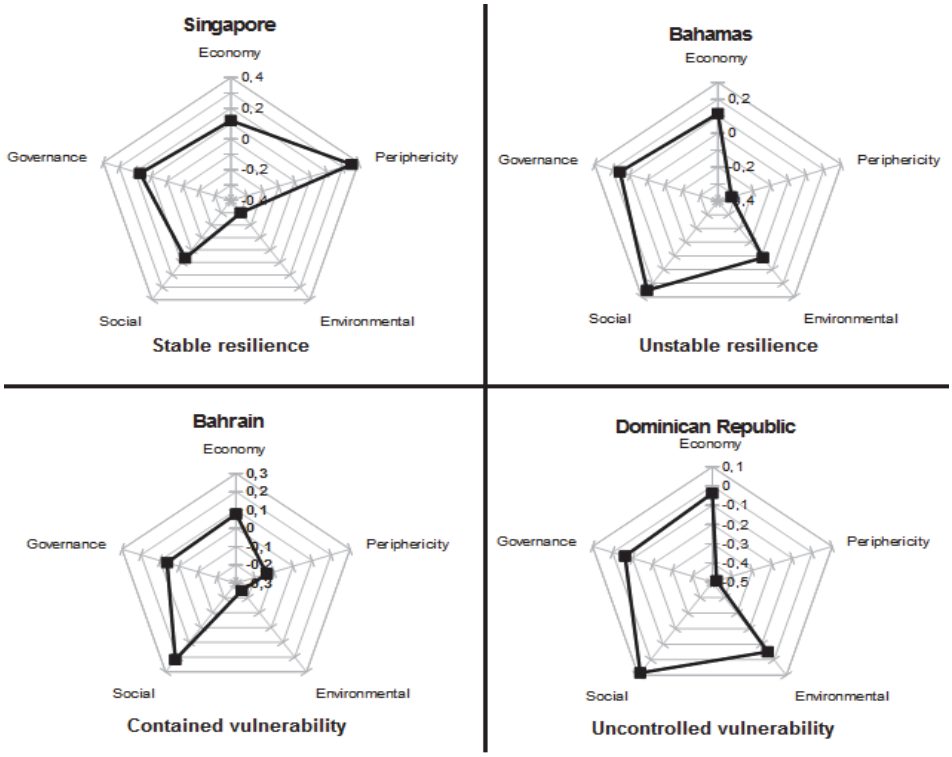
There is no "cantonment effect" for the SIDS in terms of vulnerability and resilience wherever they are geographically located. Such a conclusion invalidates the premise of the absolutely high vulnerability of SIDS that would imply that the SIDS represent a homogeneous group of countries located in the worst case of *uncontrolled vulnerability*.

Figure 4 gives further details by focusing on 4 archetypal profiles.

The best case of Singapore shows that being one of the SIDS does not hamper resilience capacities to counterbalance vulnerability propensities (Bates *et al.*, 2014). Despite the physical characteristics that could expose the island to a high vulnerability, the net resilience of the *control dimensions* (14.45%) enables a resilience of the *contingent dimensions* (4.02%). This situation is described as the 'Singapore paradox'. The weaknesses of Singapore are mainly rooted in the environmental dimension, a fact that is shared by all groups of developed and developing countries.

What is the difference between the best case of Singapore and the case of the Bahamas? Figure 4 shows that the gap between these two countries results from the peripheral dimension. The Bahamas fall in the category of *unstable resilience* because of an inadequate strategy to manage their peripheriCity. Singapore and the Bahamas have a geographical proximity to worldwide centers (respectively, South-East Asia and the United States). Consequently, both SIDS may have a comparative advantage associated with their peripheral status. Nevertheless, the main difference between the two entities relies on their economic specialization. Thanks to a *smart strategy*, Singapore has created a monopolistic regional status from its economic specialization: financial services. Financial services do not depend on geographic features. Moreover, Singapore is the gateway to the South-East Asian market. The Bahamas have developed two specific activities (offshore finance and tourism) in which they have no monopolistic position in the Caribbean comparable to Singapore in South-East Asia.

Figure 4. SIDS profiles at a glance



Additionally, as an archipelago, the Bahamas incur more logistic cost due to their geophysical characteristics. The conclusion obtained for the Bahamas concerning the peripheriсity issue is often shared among most of the SIDS. If smallness and remoteness have a permanent physical component, they are also reinforced by persistent political choices. Consistent strategies to develop networks that break the economic consequences of "islandness" and that favor a better international trade specialization should be deployed. In that sense, the ability of SIDS to turn their peripheriсity into a source of resilience such as in the Singaporean case is the key to their development success stories.

The *contained vulnerability* of Bahrain reveals the importance that should be given to the environment-peripheriсity duo and also illustrates the importance of considering a scoreboard such as the *NVRI* and its sub-indexes instead of considering only one aggregate result. The single value of the *NVRI* = -0.01% means *a priori* that Bahrain balances its resilience capacity and its vulnerability propensity well. However, a focus on each dimension reveals that the international trade structure of Bahrain tends to increase its vulnerability and impedes the obtaining of a *stable resilience*. The development strategy based on the dependency on the oil sector creates a "Dutch disease" trajectory that weakens the economic integration of the island. The lack of environmental considerations hampers the resilience of Bahrain.

The worst case of the Dominican Republic sheds light on two points. First, this is an example of the vulnerability trap in which most of the least developed countries are locked up. Without drastic changes in the governance and economic strategy, there are few chances for the Dominican Republic to shift to a trajectory of sustainable development. The specialization of the island in mass tourism can be incriminated, and the redistribution of tourism returns are involved. Thus, in this case, policy interventions also determine the state of high vulnerability beyond geographic or physical characteristics. Second, the Dominican Republic exhibits a good result for social resilience. This is the case for all of the SIDS whatever their profile; a fact that distinguishes SIDS from LDCs and provides a comparative advantage to SIDS.

3.3. Implications for SIDS analysis

Our analysis validates the overall results found in the literature on development economics regarding the extreme vulnerability of the LDCs and the solid profiles of the MDCs shows that peripheriсity and environment are determining factors of vulnerability for the SIDS (Briguglio, 1995; Atkins *et al.*, 2000; UN, 2008; Guillaumont, 2009; Briguglio *et al.*, 2009). These findings demonstrate the consistency of the *NVRI* insofar as no aberrant outcomes are underlined (Angeon and Bates, 2015).

The legitimacy of specific international aid dedicated to SIDS is all the more disputable because our sustainable development approach shows that SIDS are identifiable in any of the 4 profiles of VR *(stable resilience, unstable resilience, contained vulnerability, uncontrolled vulnerability*). There is no "cantonment effect" of SIDS in a specific case of VR, in contrast to MDCs, which always have a *stable resilience,* and to LDCs, which always exhibit an *uncontrolled vulnerability*. We understand that "islandness" specificities cannot be the main argument to target a group of countries through international aid. This disruptive view renews the stance of Easterly and Kraay (2000) and of Lee and Smith (2010). These authors explicitly argue that vulnerability discourses based on intrinsic features divert SIDS policy-makers from their accountability in their state of vulnerability.

Our analysis adds to the literature by pinpointing countries' strengths and weaknesses from a sustainable development perspective, which adds momentum to policy implications. Indeed, if the *NVRI* ranking could be applied, the effects of international aid would be less detrimental provided that the dimensions of weaknesses are properly identified.

4. CONCLUSION

The interest in re-examining the calculation of vulnerability-resilience from a sustainable development perspective stems from international recommendations. The *NVRI* is an attempt to improve the measurement of the state of vulnerability-resilience in this perspective and allows comparisons between countries regarding their ability to achieve sustained and inclusive growth.

On this holistic basis, we provide evidence that SIDS are not specifically more prone to vulnerability than other countries. We show that there is no de-

terminism that dictates that a country will remain either vulnerable or resilient despite its intrinsic and structural features. Despite the stance of international organizations, which have tried to maintain SIDS as an homogenous analysis unit (Earth summits, 1992, 2002, 2012 and the international conference on SIDS: the Barbados Programme of Action in 1994, the Mauritius Strategy in 2005 and the SAMOA conference in 2014), our analysis examines whether the SIDS category is an artificial construction.

Using the *NVRI* or using indexes that follow the same building principles should lead to improvement in the distribution rules of international aid from an economic vision to a more fair and ethical vision, which highlights the responsibility of SIDS policy-makers.

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PROMOUVOIR LE DÉVELOPPEMENT DURABLE DANS LES PETITES ÉCONOMIES INSULAIRES EN DÉVELOPPEMENT : LES ENSEIGNEMENTS D'UNE ANALYSE EN TERMES DE VULNERABILITÉ ET DE RÉSILIENCE

Résumé - *Cet article présente une méthode générique de construction d'indice composite de vulnérabilité et de résilience intégrant les dimensions du développement durable : l'indicateur net de vulnérabilité et de résilience. Une application de cet indicateur sur un échantillon mondial de pays permet d'identifier quatre états de vulnérabilité et de résilience : une vulnérabilité non contrôlée, une vulnérabilité contenue, une résilience instable ou une résilience stable. Nous montrons que la vulnérabilité et la résilience d'un État ne relèvent pas uniquement de facteurs déterministes mais revêtent également un caractère construit au sens où ils sont déterminés par les acteurs et leurs choix politiques. Contrairement à la conclusion communément admise, nos résultats empiriques révèlent que les petits États insulaires en développement ne sont pas plus vulnérables que les autres. Ces États doivent concentrer leurs efforts sur une meilleure insertion économique internationale compatible avec la préservation de leurs ressources environnementales.*

Mots-clés - DÉVELOPPEMENT DURABLE, INDICATEUR COMPOSITE, RÉSILIENCE, THÉORIE DES GRAPHES, VULNÉRABILITÉ