Possible Development and Uses of Multi-Dimensional Vulnerability Indices

Analysis and Recommendations

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Acknowledgements

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Executive Summary

While the vulnerability of countries has been recognized since the beginning of development economics as a major challenge, with an initial focus on vulnerability to exogenous trade shocks, it has become a stronger concern in recent decades with the increasing consequences of other types of shocks and global challenges, including climate change. Small island developing states (SIDS), traditionally vulnerable to trade shocks, are presently particularly vulnerable to climate change. The UN General Assembly (UNGA) has repeatedly underlined this vulnerability of SIDS and called both for an appropriate measurement of vulnerability and for international action to tackle vulnerability. At the same time, the UN Committee for Development Policy (CDP) uses a vulnerability index, as well as income-per-capita and a human assets index, as a criterion to identify the Least Developed Countries (LDCs), a process endorsed by the UNGA. In this global context, as in academic literature, vulnerability is related to exogenous shocks, and if it considered as a structural handicap (as it is by the CDP), all the development handicaps cannot be considered as "vulnerability".

In December 2020 in the Paragraph 8(a) of Resolution 75/215 the UNGA called on the Secretary General "to provide recommendations... on the potential development and coordination of work within the UN system on a multidimensional vulnerability index for small Island developing states, including on its potential finalization and use". Such a multidimensional vulnerability index (MVI) would assess the vulnerability of small island states, and other countries, and should serve as a criterion for access to and allocation of concessional resources among countries.

After examining the most recent indicators currently available (both within the UN system and externally), and thanks to a broad series of consultations[1], the authors of this report have been led to define the main conditions that any new indicator of vulnerability should meet in response to the General Assembly's request and consider the need for an indicator applicable to various groups of countries in various circumstances. These conditions and criteria are summarized below and simultaneously applied to existing indicators, the relevance and suitability of which is assessed. This report, while acknowledging differences in existing frameworks and definitions of key concepts, follows the definition of vulnerability used by the UN CDP, as its theoretical foundation corresponds to a common understanding in economics and is shared by most of the vulnerability indicators reviewed in this report. Thus, vulnerability is understood as the risk of being harmed by exogenous shocks. Vulnerability depends on the magnitude and frequency of such shocks, on the structural characteristics of the country concerned—which affect the degree to which it is exposed to such shocks—and the country's capacity to react to shocks.[2] The report also examines the way by which such an indicator can be set up, accepted and used, in particular by development finance institutions.

The required indicator must meet three conceptual criteria and three practical conditions.

Conceptual criteria 1. It must be multidimensional, with its three essential dimensions being economic, environmental and social. The three dimensions and their perimeters should be clearly defined and redundancy among components should be avoided. At the same time, the indicator should reflect the vulnerability of each country in its specific dimension.

It is possible to define the three dimensions in different ways. The simplest and most logical one differentiates the dimensions according to their manifestations. Economic vulnerability is the risk of the economy being affected by exogenous shocks, either of external or natural origin (thus including the economic effects of environmental or health shocks). Once natural shocks are taken into account with respect to their possible economic impact, environmental vulnerability consists

[1] Individuals and entities consulted included: UNDP, Prof Lino Briguglio (University of Malta), Asian Development Bank, Organisation for Economic Cooperation and Development, Commonwealth Secretariat, UNEP, UNDRR, Assistant Secretary General Mr. Elliott Harris (DESA), Caribbean Development Bank, International Monetary Fund, UNCTAD, FAO, WMO, Dr. Sabina Alkire (University of Oxford), UNESCO, Secretariat for the Committee for Development Policy (DESA), Dr. Simona Marinescu (UN Resident Coordinator) & Prof Jeffrey Sachs (Sustainable Development Solutions Network), African Development Bank, UNFPA.

[2] This report's use of certain terminology is consistent with the wording of the UNGA Resolution 75/215 calling for a multidimensional index of vulnerability to shocks, as well as with the previous use of the concept of vulnerability by the UN CDP, endorsed by the ECOSOC and UNGA.

mainly of the physical vulnerability to climate change (today's major challenge, whose economic consequences cannot be assessed for the different countries in a comparative and robust way). Furthermore, some aspects of the current physical environmental vulnerability as well as environmental anthropogenic shocks could be considered if sufficient data be obtained and a consensus on their exogeneity be reached. Finally, is the risk of being impacted by social shocks, mainly episodes of violence, and also health shocks such as epidemics. Alongside the three dimensions of vulnerability, the resilience of a country is its capacity to face and manage exogenous shocks, economic, environmental and linked to climate change, or social. This resilience (or lack of) results from factors that are either structural or related to present policy. The structural factors reflect the inherited capacity of countries and their populations to face and cope with external shocks. Taking resilience into account allows for a better understanding of the structural handicaps faced by developing countries, and also allows to better capture the vulnerability of population of exogenous shocks and not only their economic impacts.

For each of the three dimensions of vulnerability, the index should aim at capturing both the exposure to exogenous shocks and the likelihood of their occurrence, as mainly reflected by their past recurrence or trends. Most indicators detailed in this report acknowledge this view. It is also noticeable that the former Commonwealth Index used only exposure components, while the latest revision now includes components reflecting both exposure to shocks and intensity of past shocks.

While covering all three dimensions of vulnerability, the indicator should be able to provide an accurate vulnerability assessment and to show a country as very vulnerable, even if vulnerable in only one of the dimensions. In other words, the multidimensionality of the indicator should not mask the particular vulnerability of a country in one of the specific dimensions. This is why the methodology used to aggregate the different dimensions of vulnerability in a synthetic indicator should not rely on an arithmetic average, but rather on a quadratic average.

Conceptual criteria 2. The multidimensional vulnerability index must be universal, which means it should reflect the vulnerability of all categories and groups of developing countries, even if it is designed at the request of and for SIDS. There are two major reasons for this:

The first reason is that it is not possible to show how vulnerable SIDS are if there is no way to fairly compare them with other countries. In other words, to be useful to SIDS, the index must not be specific to these countries. Even an indicator that would be applicable to all developing countries, which includes components focused on the specific situation of small states, would not satisfy this condition of equity or comparability. For instance, some non-island states, such as the Sahelian countries, may also present a high vulnerability to climatic factors, but evidenced differently from that of SIDS. The use of a quadratic average recommended above is precisely a way of highlighting, in a general or universal indicator, one or the other of the vulnerability dimensions that are specific to a particular country or group of countries, such as SIDS, LDCs and Landlocked Developing Countries (LLDCs).

The second reason for having a universal indicator is that if the indicator is to be used to allocate concessional funds, it must be able to equitably capture the various kinds of vulnerability faced by developing countries, regardless of their geographical location and characteristics. The very creation of a financing institution exclusively devoted to small island states, which remains hypothetical, could be informed by comparing the vulnerability of these countries and of other developing countries.

Most of the indicators examined, when applied to all developing countries, seem to meet the universality criterion, but for the reason given above those specifically targeting SIDS (like the Caribbean Development Bank's (CDB) Economic Vulnerability Index (EVI), related to Caribbean countries, or the index of the SIDS Regional Coordination Office (RCO) do not really meet it, at least in the forms presented at the technical workshops organized by the UN Secretariat in 2021.

Conceptual criteria 3. The multidimensional vulnerability index must be separable in its components, namely between those factors that are structural or independent from the current policy and those factors dependent on current policy. Vulnerability is said "structural" when it results from factors beyond the present control of the countries' governments. It may reflect the long-lasting consequences of past policy choices that the present authorities have inherited and cannot be reversed or altered in the short-term. This requirement of separability, here called the separability criterion, is essential if the indicator is to be used by donors to allocate concessional resources between countries, or even to give access to concessional funds (eligibility). Indeed, when the vulnerability of countries is independent of their current policies, and constitutes a structural handicap to their development, it provides a justification for special support from the international community, in order to make development opportunities between countries more equal. Conversely the vulnerability of a country that depends on its current policy and could be mitigated by its own will is perceived by donors as a sign of poor performance and may lead them to allocate less resource. This is why multilateral development banks that use a "performance-based allocation" formula for concessional resource and are often reluctant to systematically take vulnerability into account as an allocation criterion if it is not clearly structural. In designing the multidimensional vulnerability index, it is therefore crucial to be able to isolate among the components of the index those which correspond to a structural vulnerability, and alone should be used as a criterion for allocating concessional resources, while

the general vulnerability, including both the structural vulnerability and the vulnerability linked to present policy, will be used more broadly to guide economic policy.

The resilience of countries, which is their capacity to cope with exogenous shocks and thus dampen their adverse effects, is strongly linked to their current policies, but it also depends on structural factors such as the level of per capita income, human capital, and infrastructure, among others. This structural resilience component is of course influenced by the policies conducted by the country in the past, but is not the result of present policy, and as such, it should be taken into account in an assessment of structural vulnerability. The lack of structural resilience can be treated separately from the rest of structural vulnerability, since donors and particularly multilateral ones who are asked to use structural vulnerability as a financing criterion, want or may want to keep specifically low per capita income and/or human capital as specific allocation criteria. The need to isolate in the vulnerability indicator what is truly exogenous and what is policy-dependent applies distinctly to all three dimensions of vulnerability, while resilience, whether policy or structural, is undifferentiated across all three dimensions.

With regard to economic vulnerability, as identified above, particular attention has been given by the UN Committee for Development Policy (CDP) to defining its Economic Vulnerability Index (EVI) as an indicator relying on exogenous components so that it can be used as a criterion for identifying the least developed countries, precisely defined as low-income countries suffering from structural handicaps to their development. This exogenous or structural character of the EVI and its successive revisions have been preserved, whereas it has not always been the case for the indicators that have been based on it. This exogeneity (or separability) criterion constitutes a constraint when circumstances seem to call for the introduction of new components in the index: Such is the case about the so-called debt vulnerability, whose status is ambiguous since debt ratios result both from the present governance and a long-term accumulated stock due to past policies and structural factors. The concept of health vulnerability, often used in the context of the COVID-19 pandemic to assess the risk of the population being affected, shares a similar ambiguity since it also depends both on the present policy and structural factors. Those examples further illustrate the fact that the demarcation between structural (or exogenous) factors and non-structural factors (meaning driven by current policies) is not always clear-cut. Since it is nevertheless needed, that can leave the most ambiguous factors out of the framework.

Regarding the physical vulnerability to climate change, separability appears to be less of an issue, since all its components may be chosen with respect to their exogenous or physical nature, independent from current policy. Indeed, the policy measures taken by the present authorities to address climate-related risks, such as climate change adaptation or disaster risk reduction, are, in this framework, considered as not structural. They are rather considered as non-structural resilience. However, if attention was paid more generally to environmental vulnerability and notably anthropogenic shocks, one would have to disentangle what is exogenous in environmental degradation and what results from bad present policies. Clearly the environmental indices (such as the ones described in the first chapter) besides the fact they are not multi-dimensional, do not meet the separability criterion, as they mix exogenous and present policy related components.

For the social dimension of vulnerability, the separation between what is exogenous and what is not seems more complex. For this reason, for many years it has been difficult to introduce an appropriate indicator of social vulnerability in an operational indicator of vulnerability, in spite of the need to do it. Indeed, social vulnerability appears to be highly dependent on current policy. However, the work of the last 20 years has highlighted the extent to which this fragility is also linked to structural factors leading to recurring violent episodes, but also health shocks such as epidemics and disasters caused by natural hazards[3]. Therefore, in order to take into account this structural component of social vulnerability, it is increasingly accepted that consideration should be given to the recurrence of health shocks, as well as violent events over time, and to the violence in neighboring countries, as acceptable exogenous components of the social dimension that should be included in a “structural” multidimensional vulnerability indicator. It all the more so that, besides these components, structural economic vulnerability, vulnerability to climate change, as well as structural resilience, capture other well identified factors of the risk of violence or civil conflict.

Consideration should also be given as to how the index can be used by the international institutions for which it is intended to serve. This is, of course, the case with the CDP for the identification of the least developed countries, although the CDP will always be free to choose another solution, submitted to the acceptance by the UN Economic and Social Council (ECOSOC). A main issue is the acceptability of the index by multilateral development banks and other international institutions of development assistance, which could fittingly use it for the allocation of their resources, at least their conces-

[3] Works presented in this report tend to use (natural) disasters or hazards interchangeably. The Open-Ended Intergovernmental Working Group (OIEWG) on indicators and terminology relating to disaster risk reduction, as explained below, makes an explicit distinction between hazards and disasters: A disaster can be caused by a natural hazard, but the term “natural disasters” may not reflect how socioeconomic systems influence the impact of hazards on people. In what follows, to better reflect the substance of the works presented, and to be consistent with the main sources of statistics available for the calculation of an index, this specific distinction is not made by the authors.

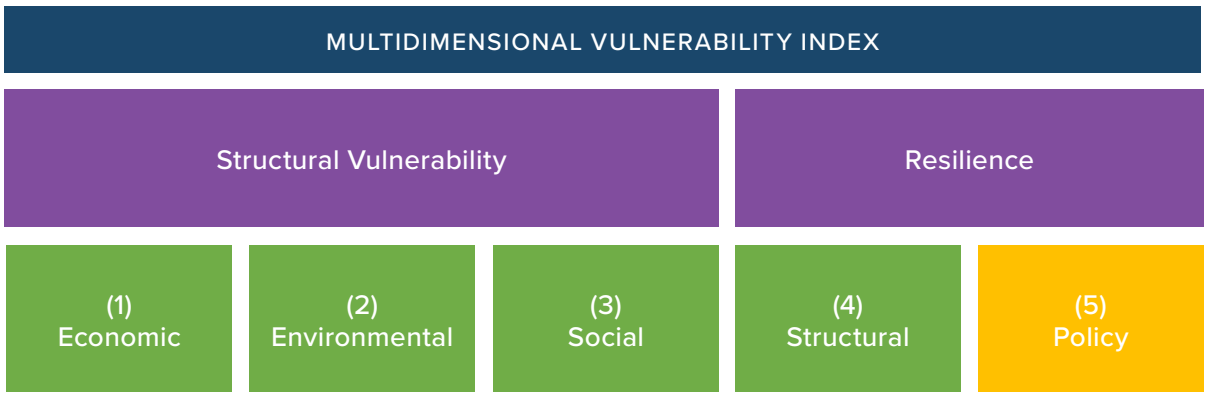
sional resources. To this end, it is necessary to bear in mind the constraints faced by these institutions, which may have an influence on the scope of the index. The first is that these institutions may want to keep per capita income as a separate criterion in their allocation formulas rather than within an indicator corresponding to a lack of structural resilience (human capital, infrastructure, etc.) as described above. By being separable and providing a flexible use of its components, the MVI might be used as an additional criterion for aid allocation.

The second contraint is that these institutions in their allocation model traditionally take into account the performance of countries. Their reactions to the inclusion of a structural vulnerability indicator indicate a legitimate concern to address, in their formula, the policy of countries to reduce vulnerability, in other words the political component of resilience (the 5th component of the Figure below). This therefore implies an in-depth reflection on how the quality of resilience policies is to be taken into account in the performance indicators, which is not enough the case in the ones currently in use. At the same time, the inclusion of criteria related to the quality of resilience policies in performance indicators would make it possible to clarify concretely the difference between structural vulnerability and political vulnerability: while it makes sense to include the low level of infrastructure, education, health as elements of structural vulnerability, justifying a higher allocation (by the same way that the exogenous shocks either due to natural hazards, climate change, or external factors), it is simultaneously reasonable to include in the performance indicator an assessment of recent improvements achieved by the country with regard to these elements (or the share of the budget devoted to this purpose).

Accordingly, the MVI framework could include 5 components as described by the figure below, 3 of which design a 3-dimension indicator of structural vulnerability, a 4th one an indicator of structural lack of resilience, these 4 indicators covering the structural factors of vulnerability. A 5th indicator corresponds to the non-structural or policy lack of resilience, the 5 indicators taken together designing a general (multi-dimensional) vulnerability indicator.

Considering the existing (multi-dimensional) vulnerability indicators with regard to their structural nature (or their separa-

Potential MVI Framework



bility between exogenous and policy-related components), the Commonwealth's UVI aims at fully satisfying this criterion, as it gives separately both an indicator of structural vulnerability and an indicator of general vulnerability. The CDP EVI since the beginning clearly uses only structural or exogenous components (although it does not fully cover the three dimensions of vulnerability, in particular the social one). The United Nations Conference on Trade and Development (UNCTAD) EVI+, in spite of relying on the CDP EVI and the FERDI's Physical Vulnerability to Climate Change Index (PVCCI), meets the separability criterion partially but still mixes exogenous and policy components through an heterogenous Productive capacity index. The same can be said for the UN Development Programme's (UNDP) EVI with its new financial vulnerability component and notably foreign Direct Investment (FDI) flows, which might not be structural. Similar concerns can be raised for the last version of the CDB's EVI with regard to components such as the volatility of current health expenditures, and for the Sustainable Development Solutions Network's (SDSN) MVI with the introduction of aid flows. Overall, the structural or exogenous properties of some components of each existing vulnerability indicator may be a matter of discussion.

To be internationally accepted and used an MVI should not only meet the three previous conceptual criteria (multidimensionality, universality, separability), but also three other more practical conditions.

Practical condition 1. A fourth condition that the MVI must satisfy is the availability of reliable data.

With regard to the universality criterion the need for available and reliable data covers all developing countries. This may raise a difficulty particularly in the case of small and very poor countries. It seems that in most of the existing indicators the authors have taken this difficulty into account when choosing the component indicators. Sometimes imputation systems are proposed from data available for neighbouring countries or countries with a similar structure.

It is more difficult to judge the reliability of the statistics collected. A case-by-case examination could be necessary. With regard to the operational use expected for the indicator the reliability of the statistics from which the indices are drawn is a key issue. It may lead to give up a highly relevant component which relies on a poor statistical basis. This possible trade-off has been often considered by the CDP, precisely because the EVI was to be used (as well as the Human Asset Index (HAI) for the inclusion and graduation of LDCs.

Availability should be obtained over time so that the evolution of vulnerability, as well as resilience could be assessed, which means monitoring both the evolution of structural factors of vulnerability and of policy-related resilience.

Practical condition 2. The fifth condition to be met by the MVI is its readability and transparency

This condition is also all the more important since the indicator should support the political and operational goal of helping the most vulnerable developing countries. The financial implications of its use require transparency.

The transparency should first be the result of a clear conceptual framework where the three dimensions and their main sub-components are well defined. The objective cannot be to limit the number of components (or sub-components) on which it is based by simply invoking transparency and readability. The process leading to the selection of components reflecting truly structural factors of vulnerability is itself an element limiting their number. In other words, it is a problem of selection of relevant indices rather than of a simple issue of an optimal number of variables.

Practical condition 3. A final condition refers to the acceptability and implementation of the vulnerability indicator, within and beyond the UN.

The MVI should be designed and finalized so that it can be accepted within the UN system and likely to be so beyond it.

As for its acceptance within the UN, it may be useful that a proposal is submitted, possibly amended and finally endorsed by a group of experts on the basis of the principles defined by the UN Secretary General in his report. To make the work of the group of experts effective, it is important that a framework should be proposed with the main components and possibly sub-components of the indicator so that the consistency of the proposal will be insured. Experts would have to validate or possibly modify the definition and measurement of each component or sub-component, the choice of the most reliable sources and the various combinations of the components, according to the expected use of the indicator. In order to facilitate the work, it might be recommended to use as a basis the corresponding multidimensional indicator that best meets the stated criteria.

Consideration should also be given to how the index can be used by the international institutions for which it is intended to serve.

A main issue is the acceptability of the index by multilateral development banks and other international institutions, which could use it for the allocation of their resources, at least their concessional resources, but are facing constraints in designing their allocation rules.

First, they might wish (or need) to keep per capita income separate among the criteria introduced in their allocation formulas rather than to include it in an indicator reflecting a lack of structural resilience (along with human capital, infrastructure, etc.) as described above. By being separable, the MVI may then be used as a major additional criterion for aid allocation, insuring flexibility for the users and their freedom to choose the formula weights.

Second, these institutions, which in their allocation model traditionally take into account the performance of countries, may fear that including a structural vulnerability indicator in the Performance Based Allocation (PBA) formula would weaken the importance of performance in the allocation. However, the literature addressing the issue of the introduction of a vulnerability index in the PBA, in particular in the case the African Development Fund, shows that is possible to increase the allocation share going to the most vulnerable countries without diminishing the share going to the best performers (what is made possible notably thanks to a reallocation towards vulnerable countries within the group of good performers).

Another and legitimate concern is to support the policy of countries to reduce their vulnerability. This issue can and should be addressed by including resilience present policies in the design of the performance indicator (the political component of resilience i.e. the 5th component of the Figure on page 4), including those related to disaster risk reduction[4]. The acceptability and use for aid allocation of the structural MVI designed according to the principles defined above involves a consistent design of a performance indicator taking into account the quality of resilience policies, which presently is not sufficiently the case. It should be noted that the inclusion of policy resilience in the performance indicator, impacting allocation in the same direction as the lack of structural resilience and the structural vulnerability, underlines the difference between structural vulnerability and policy vulnerability. While a low level of infrastructure, education, or health reflects a lack of structural resilience, as the recurrence of shocks, either related to climate change, natural hazards, external events or violence, reflects aspects of structural vulnerability, which both legitimate a higher allocation, it is also makes sense to include in the performance indicator an assessment of recent results achieved to lower these factors of vulnerability (or of the policy devoted to these purposes e.g. the shares of the public budget). In this framework the given level of a resilience indicator (e.g. infrastructure or education) will have a negative impact on allocation (structural resilience) and its change a positive impact (policy resilience).

[4] As outlined in the Sendai Framework for Disaster Risk Reduction 2015-2030, disaster risk reduction seeks to "Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience."

INTRODUCTION

Towards a Multidimensional Vulnerability Index (MVI)

A new Multidimensional vulnerability index for the SIDS: The call from the UN General Assembly

The need and call for the development of indices that capture the vulnerabilities of states, in order to better guide development financing, to countries with recognized vulnerabilities, has been around for a good part of three decades. The call for exploration of criteria based on vulnerability was made by small island developing States (SIDS) in 1994, in the Barbados Programme of Action. This call was endorsed and repeatedly made in subsequent United Nations General Assembly (UNGA) resolutions.

In June and August 2020, with the advent of the global COVID-19 pandemic, followed by its socio-economic consequences, Belize, the then Chair of the Alliance of Small Island States (AOSIS), motivated by the dire economic and debt situation confronting many SIDS, wrote to the UN Secretary-General reiterating the need to advance work on a multidimensional vulnerability index (MVI) and requesting the formal imprimatur of the UN to develop such an index. In his response, the Secretary General stated that the ongoing work on an MVI, including the recent initiative of the UN Resident Coordinator's Offices in SIDS to advance and develop a composite index, will be crucial to redefine eligibility for financing for sustainable development in SIDS.

During the 75th session of the UNGA, despite the general agreement by member States for roll-over resolutions, the Second Committee negotiated on this matter, considered its importance, and included in paragraph 8(a) of resolution A/RES/75/215, on the implementation of the SAMOA Pathway, a calls for the UN Secretary-General:

a. To provide recommendations as part of his report… to the General Assembly at its 76th session on the potential development and coordination of work within the UN system on a multidimensional vulnerability index for small island developing States, including on its potential finalization and use.

Accordingly, to fulfil this mandate, the Secretariat[5], conducted consultations through a series of technical webinars with various organisations and institutions, from within and outside the UN system, who are either in the process of developing a vulnerability index, have developed a vulnerability index, or had pertinent perspectives to share on the development of a multidimensional vulnerability index. A total of 19 institutions and persons were invited to present their work and views on the development of vulnerability indices for SIDS. Individuals and entities consulted included: UNDP, Prof Lino Briguglio (University of Malta), Asian Development Bank (ADB), Organisation for Economic Cooperation and Development, Commonwealth Secretariat (OECD), UN Environment Programme (UNEP), UN Office for Disaster Risk Reduction (UNDRR), Assistant Secretary General Mr. Elliott Harris (DESA), Caribbean Development Bank (CDB), United Nations Conference on Trade and Development (UNCTAD), International Monetary Fund (IMF), UN Food and Agricultural Organization (FAO), World Meteorological Organization (WMO), Dr. Sabina Alkire (University of Oxford), UN Educational, Scientific and Cultural Organization (UNESCO), Secretariat for the Committee for Development Policy (DESA), Dr. Simona Marinescu and SIDS Resident Coordinators (RCOs) & Prof Jeffrey Sachs (Sustainable Development Solutions Network), African Development Bank (ADV), UN Population Fund (UNFPA). Analysis of the submissions and views received are analysed in Chapter 1 of this paper.

It has to be remembered that ten years after the Barbados Conference (1994), the Mauritius Conference (December 2004) reiterated the concern of the international community about the vulnerability of small islands. In 2010, the General Assembly called for "concrete recommendations" on "what improved and additional measures might be needed to more effectively address the unique and particular vulnerabilities and development needs of small island developing States". (A/RES/65/2 of 25 September 2010, paragraph 33). In 2011, the Economic and Social Council, in turn, called for "independent views…" on "… what improved and additional measures might be needed

[5] The SIDS Unit, Division for Sustainable Development Goals, UNDESA and the SIDS Sub-programme of OHRLLS

to more effectively address the unique and particular vulnerabilities and development needs of small island developing States…". (Resolution E/2011/44 of 5 December 2011, para. 1) In September 2014, UN member States in the Third International Conference on SIDS reaffirmed their commitment "to take urgent and concrete action to address the vulnerability of small island developing States…". At the same time, they underscored "the urgency of finding additional solutions to the major challenges facing small island developing States in a concerted manner…". (SAMOA Pathway, Preamble, paragraph 22)

A broader approach to vulnerability and its measurement in the Resolution A/RES/75/215 and other UN official documents

While focused on the follow up of the SAMOA pathway, the December 2020 Resolution also considers vulnerability and its measurement in a broader framework, as reflected in several paragraphs (e.g. paragraph 13 and 23). In particular, the Resolution refers to the category of LDCs whose vulnerability is one of the three identification criteria (besides the income per capita level and a Human Assets Index). It notes "the comprehensive review of the LDCs criteria by the CDP" conducted in 2020 (para 17) and underlines the need to develop "new measures…for concessional finance and multidimensional assessments to address the limitations of an income-only assessment of development and graduation readiness" (paragraph 13) making the point that taking into account the level of vulnerability in finance allocation as well as graduation out of the LDC category was not only a SIDS issue, even if SIDS are highly concerned. Indeed, during the last 3 decades, and more and more over time, many UNGA resolutions or UN official documents also carried similar repeated calls for addressing developing countries vulnerabilities and measuring them to this aim, with a special focus on LDCs.

Following the strong concern about instability that emerged in the 1990s, in 1996, the UNGA requested that the UN Secretary-General prepares a report on a vulnerability index and that the Committee for Development Policy examine the index (A/RES/51/183). According to the Secretary-General's report, presented in 1998, both an ad hoc export group and a CDP working group had concluded that further work was needed. In mid-1998, the UN Commission on Sustainable Development urged the committee to present its conclusion, and it requested that other UN bodies make the vulnerability of SIDS a priority. In 1999, the Committee for Development Policy proposed a new, comparatively simple "economic vulnerability index". Before adopting this index, the Committee had considered other indices available at that time – the Commonwealth Secretariat composite vulnerability index, the Caribbean Development Bank economic vulnerability index, and the South Pacific Applied Geoscience Commission environmental index. In 2000, the UNGA presented its own review of the several attempts to build a vulnerability index for small island developing States (A/55/185). Since then, the CDP has revised several times its EVI, mainly in 2005, 2012, and in 2020, the last revision making it more "multidimensional". These successive versions of the EVI fitted the purpose of LDC identification, with a special attention given to the case of SIDS since a majority of LDCs then considered for graduation were SIDS, and as such have been regularly endorsed by ECOSOC in the whole set of rules and criteria used by the CDP for the identification of the LDCs.

A plethora of other specific indicators: Definitions needed

While since the beginning of development economics, the vulnerability of countries has been recognized as a major challenge, with an initial focus on the vulnerability to exogenous trade shocks, in recent decades it has become an even stronger concern with the increasing consequences of state fragility and climate change. Small island developing states, traditionally considered as vulnerable to trade shocks are presently even more vulnerable to climate change. The LDCs are also partly identified as vulnerable. The expression "poor and vulnerable countries" or "vulnerable developing countries" is more and more used, and the various documents within and outside of the UN (see Chapter 1) refer to the notion of vulnerable countries. Examining the UNGA call for a multidimensional index thus needs a conceptual clarification of country vulnerability with respect to its broadening scope. It also requires an identification of the sources and determinants of vulnerability.

In this report, as in economic literature that influenced the design of the UN CDP EVI, vulnerability (of a country) is the risk of being affected by exogenous shocks, from various origins (external, natural, in particular climatic, or socio-political)[6]. Vulnerability is related to shocks. To a large extent it can be

[6]The economic literature on the vulnerability of countries is as old as development economics, as evidenced by the numerous works on the effects of export instability or of terms of trade instability on growth and development, but was not restricted to this kind of shocks. An overall view may be found in several books such as Bourguignon, Peskovic and van der Gaag (2006), or in the context of small states in Briguglio (2004), see also Collier and Gunning Edrs (1999) and Guillaumont (2004). Among the seminal works on the concept and measurement of macroeconomic vulnerability see Briguglio (1995), Easter (1998), and the first UN CDP report on this issue (1999). A different approach, with a different semantics, may be found in the book by Weisner, Blaikie, Cannon, and Davies (1994, 2003), limited to shocks due to natural hazards, focused on the heterogenous consequences of these shocks on people, as well as the factors explaining these consequences on people. Vulnerability is defined as being generated by social, economic and political processes that influence how hazards affect people in varying ways and with differing intensities. To be noted this conceptual framework differ from the "micro perspective" on vulnerability, as presented by Dercon (in particular in Bourguignon et al.) and now familiar among economists.

Scene from Les Cayes, Haiti, in the aftermath of Hurricane Matthew, the category 4 storm which made landfall in the country on October 4.

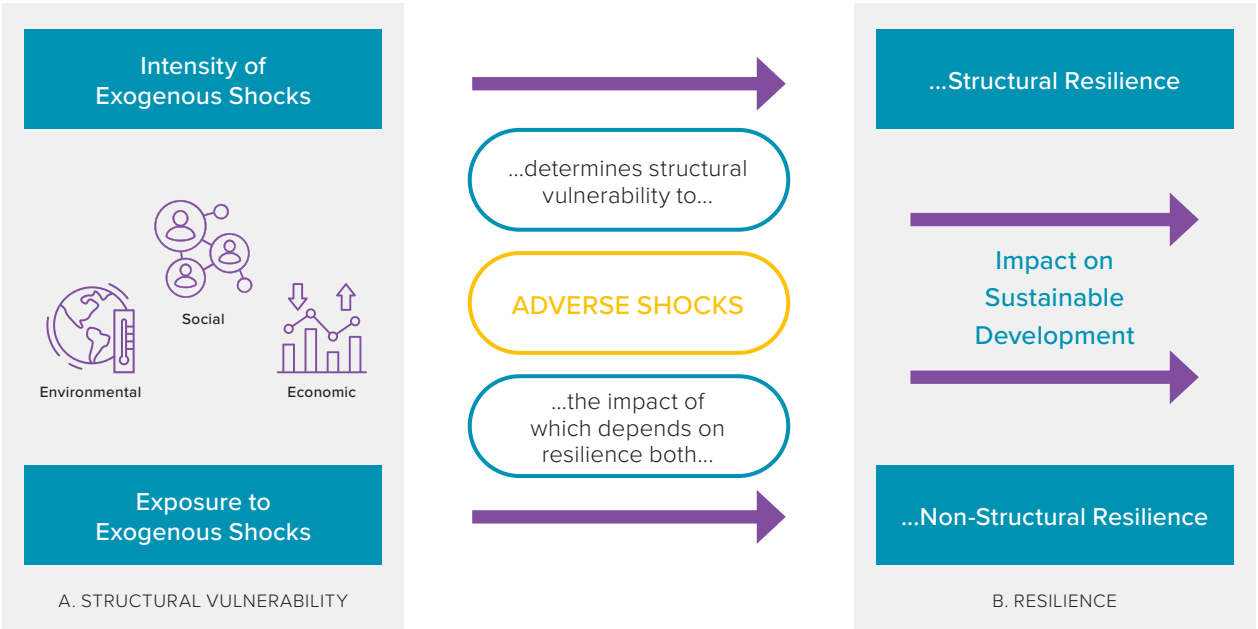
Photo: UN Photo/Logan Abassi

considered as a structural handicap to sustainable development (as it is by the CDP), while all the handicaps to development cannot be considered as "vulnerability". This definition of vulnerability, which is the basis for most Economic Vulnerability Indices and Multidimensional Vulnerability Indices available (see Chapter 1), has been spearheaded by the CDP.

The CDP has understood vulnerability as depending on the magnitude and frequency of exogenous shocks, on the structural characteristics of the country concerned—which affect the degree to which it is exposed to such shocks—and the country's capacity to react to shocks (i.e. its resilience). Taken together, the first two components represent structural vulnerability, while combining the three reveals the general vulnerability of a country, becoming the risk of having its sustainable development affected by exogenous shocks. Structural vulnerability includes only factors that do not depend on a country's present policies and are entirely determined by exogenous and persistent factors, including the long-lasting consequences of past policy choices that the present authorities have inherited and cannot be reversed or altered in the short-term. General vulnerability also includes the effect of current and future policies and therefore evolves more quickly. To be used as a criterion for the identification of the LDCs the vulnerability considered by the CDP was a structural vulnerability, because it is only a handicap inherited, and so beyond the present will of a country, which could legitimate giving it the benefit of the LDC status. The same holds when vulnerability is to be used as a reason for higher aid allocation, as argued by the SIDS. This is why the concept of structural or exogenous vulnerability is so relevant with respect to the call of UNGA for a vulnerability index.

In the general vulnerability framework, the economic impact of an exogenous shock (whether economic, natural, environmental, or social) depends on the size of the shock, the economy's exposure to it and the country's resilience with regard to it, i.e. its ability to cope with it. Resilience first refers to the capacity of the country to face exogenous shocks by implementing measures to correct or mitigate their effects. However, it not only depends on the current will of countries, it also depends on structural factors, such as their level of human capital and more generally their level of development or per capita income which determine reactions of people to shocks and

Figure 1: Vulnerability to exogenous shocks



Source: Authors' elaborations

a more or less effective implementation of resilience policies. This resilience may be called structural resilience, distinct from the resilience related to present policy or non-structural resilience. To be noted in the CDP framework the lack of structural resilience is not included in the structural vulnerability criterion because a low level of income per capita and human capital are two separate and complementary criteria for the identification of LDCs.

As displayed in Figure 1, it seems reasonable within this framework to identify three main areas of macro-vulnerability: economic, social, and natural/environmental. These three areas of vulnerability correspond to the three dimensions generally referred to in the presentation of the agenda of sustainable development. In these three areas, vulnerability appears as the opposite of sustainability (Guillaumont 2013); it is a threat to sustainability. Structural economic vulnerability is indeed the risk that a country's development becomes unsustainable, because of shocks and factors independent of its current will (outside its control).

For consistency, a distinction should be made in each of these three areas between structural vulnerability, which depends on long-lasting or structural factors beyond the immediate control of a country, and general vulnerability, which depends both on structural factors and a country's policies. A country's structural economic vulnerability should also be understood in a dynamic manner as the risk for a country seeing its economic growth, and more generally its rate of development, durably slowed down by exogenous shocks, independently of its will. It is not only a risk of isolated loss of welfare. This should be reflected in the choice of the factors or components to be taken into account in the design and measurement of structural economic vulnerability.

The economy's structural lack of resilience should also be seen as a source of structural vulnerability and notably social vulnerability. It is linked to the overall level of development. Measures of human capital (such as health and education, and variables that influence the ability of countries to respond to shocks), as well as overall level of income per capita (a variable which tells us how well the inhabitants of a country are able to weather shocks on average) are critical factors in structural vulnerability. Specifically, where human capital and income levels are low, economies and populations do not have the flexibility or resources to respond adaptively to shocks. Further, because such countries are prone to being hit harder by shocks, they fall into a "trap" or a vicious circle where, because they are underdeveloped, they bear more costs from shocks, which further lowers their human capital and income over time, leaving them even more vulnerable in the future (Guillaumont 2009a). In essence, the structural risk of getting trapped results from the conjunction of structural economic vulnerability (stricto sensu) and low structural resilience. This is why, as seen above, a low level of income per capita, a high vulnerability, and a low level of human capital are considered complementary criteria for the identification of the LDCs. Similarly, countries in special situations, such as the LLDCs that are facing high trade and transportation costs, as well as cumbersome transit procedures may also be vulnerable to exogenous economic shocks.

In this context, human capital is seen as a factor improving structural resilience. It is an important point illustrating the difficulty of settling the definitional issue. Indeed, there is often a strong conceptual overlap between general vulnerability, as the risk for an economy of having its sustainable development impacted by external shocks, and the risk of harm to vulnerable population from consecutive hazards.

For example, in the conceptual risk framework of the Intergovernmental Panel on Climate Change (IPCC) (2012) where risk comprises hazard, exposure and vulnerability the same terms represent different meanings and concepts and the framework of Figure 1 is conceptually very different from the one used by the IPCC.[7] Quite similarly, in the context of disaster risk reduction, as per the work of the Open-Ended Intergovernmental Working Group (OIEWG) on indicators and terminology relating to disaster risk reduction, disaster risk is understood as "the potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity." In this context, vulnerability is defined as "conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards."[8] [9] To be noted, disaster is defined in the work of the OIEWG as "a serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts". This definition is different from the one used by the Emergency Events Data-base of the WHO Centre for Research on the Epidemiology of Disasters who produced the disasters data used in most indicators (see below) and where a disaster is "An unforeseen and often sudden event that causes great damage, destruction and human suffering. Though often caused by nature, disasters can have human origins." Work on consecutive Global Assessment Reports on Disaster Risk Reduction (GARs) sees risk is a function of more than simply hazard and that disasters are not natural but a product of the interaction of often naturally occurring events and human agency (see annex 2). This approach to understanding disaster risk, was notably widely disseminated through the work of the Intergovernmental Panel on Climate Change (IPCC) and the 2012 Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX).[10]

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[7] The open-ended intergovernmental expert working (OIEWG) group on indicators and terminology relating to disaster risk reduction (A/71/644) was established by the UNGA in A/RES/69/284 and endorsed by the UNGA in A/RES/71/276. The report presents recommended indicators to monitor the global targets of the Sendai Framework, the follow-up to and operationalization of the indicators and recommended terminology relating to disaster risk reduction.

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[9] The work of the OIEWG also defines hazard as "A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation." Exposure, defined as "the situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas," is related to the definition used above of structural vulnerability. Capacity is defined as the "combination of all the strengths, attributes and resources available within an organization, community or society to manage and reduce disaster risks and strengthen resilience."

[10] According to the IPCC, hazard is seen as the likelihood over a specified time period of severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery. Exposure represent the presence of people; livelihoods; environmental services and resources; infrastructure; or economic, social, or cultural assets in places that could be adversely affected. Vulnerability is the propensity or predisposition of people to be adversely affected. Finally, resilience is seen as the ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions (IPCC, 2012). These definitions are compatible with the ones endorsed in resolution A/RES/71/276 and are aligned with the definition of risk of the UNFCCC secretariat.

A woman carries supplies through a flooded street in Cap Haïtien after days of continuous rains. Serious flooding left more than a dozen dead and thousands homeless.

Photo: UN Photo/Logan Abassi

To highlight differences between the use of vulnerability terminology, this report also considers attempts inspired by the IPCC framework, the work of the OIEWG and the Sendai framework.

The terminology used in this report is consistent with the wording of the UNGA Resolution 75/215 calling for a multidimensional index of vulnerability to shocks (not to hazards), as well as with the previous use of the concept of vulnerability by the UN CDP, endorsed by the ECOSOC and UNGA.

CHAPTER 1

Classification and assessment of existing MVIs

This first chapter details the structures of the most recent attempts (or revisions) at building MVIs that are currently discussed and implemented at the UN and also by other organizations. This particular focus on the most recent attempts at measuring vulnerability is needed to highlight the key trends and also consensual as well as contentious hypotheses and stances reflected by each of them. A longer list of older vulnerability indicators can be found in Assa & Meddeb (2021). The objective of this section is to present the reasoning behind each as well as their theoretical underpinnings. The review particularly focuses on the analytical framework they are based on, and on the key definitions that support the view of vulnerability they represent. This chapter also reviews other types of indicators notably to show that even if their aim and design are different there are clear similarities between them. In that context, in order to gather a broad support, a new MVI should rely on a fair and relevant synthesis of the literature.

The Economic Vulnerability Index (EVI) of the CDP

The CDP understands vulnerability as the risk of being harmed by exogenous shocks. Vulnerability depends on the magnitude and frequency of such shocks, on the structural characteristics of the country concerned—which affect the degree to which it is exposed to such shocks—and the country's capacity to react to shocks (i.e., its resilience). Accordingly, EVI has two main components: an exposure index and a shock index. There is no explicit resilience component in the EVI, as some of the structural features of the country also reflect resilience, while other aspects of resilience are policy-related and therefore non-structural. Moreover, other key factors of resilience, such as income and human capital, are measured by the other two criteria for the identification of LDCs, namely GNI per capita and the HAI.

The EVI was originally designed in 2000[11], revised in 2005 for the CDP's 2006 triennial review of the list of LDCs, unchanged during the 2009 review, and then slightly revised in 2011 for the 2012 review as well as in the subsequent triennial reviews[12]. From 2005 to 2020, the EVI consisted of a simple average of two sub-indices, reflecting respectively the exposure to exogenous shocks and the magnitude of these shocks, each sub-index being a weighted average of several components. According to the CDP, the EVI focuses on those sources of vulnerability that (a) accentuate or perpetuate underdevelopment, (b) are not the result of misguided policies but, instead, are such that they limit policymakers' capacity to respond to shocks, and (c) are beyond a country's control.

The index used from 2005 to 2009 had 7 components:

- 4 components for exposure to shocks: size of the population, distance from world markets, concentration of merchandise exports, share of agriculture, forestry and fisheries in GDP.
- 3 components for magnitude of shocks: percentage of homeless people due to natural disasters, instability of agricultural production, instability of exports of goods and services[13].

Since 1999, the instability of exports of goods and services has been included as a component in the EVI. The purpose was to reflect the fact that highly variable export earnings cause fluctuations in production, employment, and the availability of foreign exchange, with negative consequences for economic growth and sustainable development. Because of the large share of raw materials in production and exports (and often a geographical concentration of export markets), LDCs are

[11] The original index was designed around five components: population size, export concentration, share of manufacturing and modern services in GDP, instability of agricultural production, instability of exports of goods and services.

[12] See history and comments in Guillaumont 2009a, 2009b, 2015a, 2015b, 2017). This index was recommended by the United Nations General Assembly as a criterion for aid allocation (as well as the other two criteria for identifying LDCs).

[13] The raw data are drawn from different databases (Emergency Disaster Database (EM-DAT) of the Center for Research on the Epidemiology of Disasters (CRED) in collaboration with the WHO, and the World Bank's World Development Indicators database).

characterized by high export instability. This instability constrains their capacity to implement investment programs through its impact on domestic saving, tax revenue, and import capacity. Moreover, instability in export earnings increases uncertainty with a negative impact on private investment. It also has detrimental social consequences, lowering the impact of the average rate of growth on poverty reduction (Guillaumont, 2009a).[14] It is indeed reasonable to suppose that, for a given level of income per capita, macroeconomic instability influences income distribution and then poverty (Chauvet et al., 2019). Instability may increase inequalities because of the asymmetry of responses to positive and negative shocks, depending on whether people are initially rich or poor: poor and near poor people are more vulnerable to instability than richer people. They have less diversified sources of income, are less formally educated and less mobile between sectors and areas (Laursen and Mahajan, 2005). Likewise, they have little access to credit and insurance markets and depend more on public transfers and social services (Guillaumont Jeanneney and Kpodar, 2005). The inability of poor people to face negative shocks results in losses of human capital, which are difficult to reverse, e.g. nutritional status (Dercon and Krishnan, 2000, for Ethiopia), or removing children from school (Thomas et al., 2004, for Indonesia).[15]

Two changes were made in 2011. Firstly, the definition of one of the components relative to natural hazards was changed by replacing the displaced population share due to natural disasters by the share of the population affected by these disasters, which is a broader but vaguer concept. Although the change may seem minor, especially since both indices come from the same source (Emergency Disaster Database (EM-DAT)), it was a significant change, as indicated by a very low rank correlation (23%) between the two versions of the component (Cariolle, Goujon and Guillaumont, 2015).

A second, conceptually significant modification was to include among the components relative to exposure a “climatic” component–the risk associated with sea level rise–as measured by the share of the population living in Low Elevation Coastal Zones (LECZ), and also reducing the weighting of population size in the sub-index. These changes were a problem for a straightforward reason. It was argued at the time that the introduction of this single climatic component, unbalanced the EVI indicator to the detriment of countries facing other climatic risks, such as the risk linked to increasing aridity[16]. Therefore, in order to keep this climatic component in the exposure sub-index, the introduction of the share of arid lands in the total country area should also be considered. As a result, the specific vulnerability of West Africa and the Sahel countries, as well as of countries such as Botswana and Eritrea, would be captured alongside that of small island states.

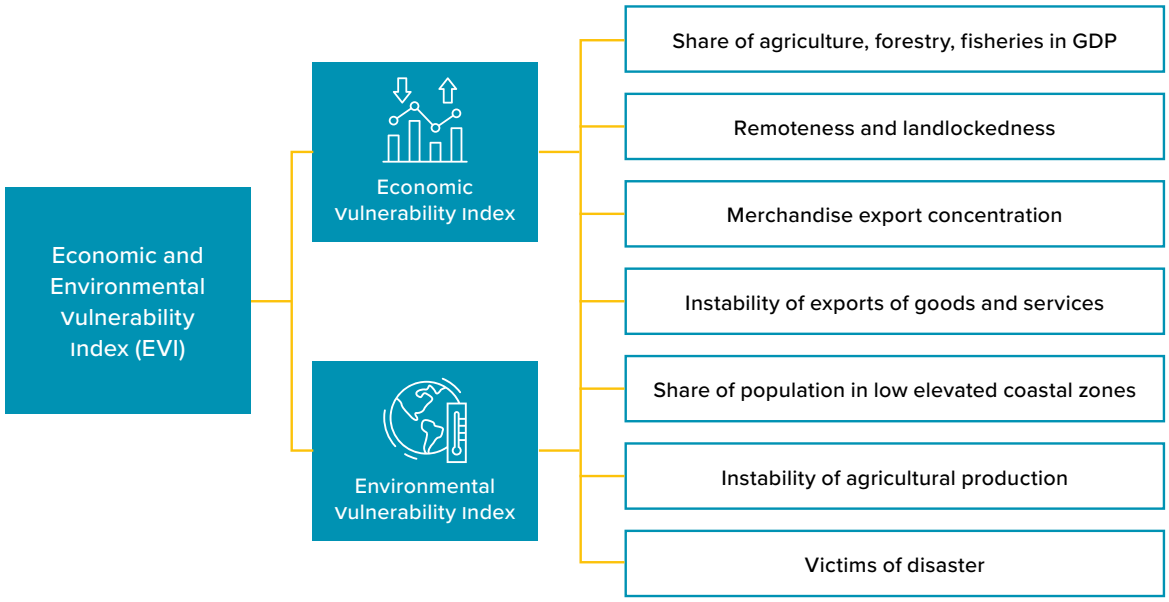
To address this issue and to attempt clarify the index, the indicator of share of population living in drylands was added to the last revision of the EVI. Furthermore, the new 2020 EVI no longer differentiates between shocks and exposure but rather tries to disentangle economic vulnerability from environmental vulnerability. Taken together both vulnerabilities now represent economic and environmental vulnerability to natural or external shocks: (i) environmental or ‘natural’ shocks, such as earthquakes or volcanic eruptions, and the more frequent climatic shocks, such as typhoons and hurricanes, droughts, floods, etc., and (ii) external (trade- and exchange-related) shocks, such as slumps in external demand, world commodity price instability (and correlated instability of terms of trade), international fluctuations of interest rates, etc. The indicator on Population size was removed from the EVI, as it was argued that small size does not directly measure an economic or environmental vulnerability and specific economic and environmental vulnerabilities associated or compounded by population size should be captured in some of the remaining EVI indicators.

[14]It is well established that macroeconomic instability has harmful consequences for development (see a review in Guilaumont 2006, 2009). Indeed, numerous works have shown the negative effect on the average growth of income either of income growth instability (Ramey and Ramey, 1995; Hnatkovska and Loayza, 2005; Norrbin and Yigit, 2005), or of specific exogeneous instabilities, more particularly export instability, especially in Africa (Guillaumont et al. 1999). The negative effects of instability on growth come both from uncertainty and risk-aversion (ex ante effect) and from asymmetric responses to positive and negative shocks (ex post effect). As income growth is a major factor in poverty reduction income instability hurts the poor through its negative effect on income growth.

[15]A few cross-country econometric analyses of the effects of instability on inequality have been performed. Laursen and Mahajan (2005) find a negative effect of income instability on the poorest quintile, while for Breen and Garcia-Penalosa (2005) the next to last quintile (rather than the last one) appears to be the most affected, suggesting that almost poor people may become durably poor under unstable conditions. More recently Calderon and Levy Yeyati (2009) have also evidenced distributive effects of output volatility, captured both through the Gini coefficient and the through a differentiated impact on each quintile, effects found non-linear, as depending on other variables such as the level of public expenditures, considered as a mitigating factor.

[16]We have quantified the impact of the change made in 2012 by the CDP to the rank of various types of country with regard to the index: Landlocked countries from the Sahel, but also some small mountainous island states would have been classified as less vulnerable (Guillaumont, 2014).

Figure 2: the UN-CDP EVI (as revised 2020)



Source: Adapted from UN-CDP

The EVI is one of the most parsimonious indicators of vulnerability with only 8 components. This is, as noted, a strength as it allows for simple computations and is easily understandable by stakeholders. While slightly evolving through each revision, the EVI remains consistent with its core principle, which is to approximate the risk of a country seeing its development hampered by the natural or external exogenous shocks it faces. EVI is an official UN index, which has the advantages of: (i) having consistent coverage across countries (143) and time (since 2000); (ii) having a methodology agreed by CDP and reviewed by it every three years (other indices only subject to academic peer review); (iii) being already used to assess the vulnerability of the LDCs; (iv) being computed every three years, with individual figures being updated internally every year. To be underlined, it has been built and revised with the clear constraint to include only exogenous factors of vulnerability, so that it can be used for the identification of LDCs.

The EVI is multidimensional, except for the social dimension, as it accounts for the adverse economic impact of external and natural shocks. It also recognizes that the economic vulnerability of developing countries is linked both to natural (environmental) and external (economic) shocks.

In many developing countries, most production and exports come from agriculture and a large part of the population still lives from subsistence farming. Natural or environmental shocks are a main source of economic instability (the other traditional source being instability in prices of raw materials). Furthermore, the impacts of natural shocks are mostly measured through their instantaneous economic impact. Natural hazards directly affect countries' economic outcomes through three main channels reflecting different kind of exposure:

- Impact on human lives (death, injury, homelessness)
- Impact on physical capital (destruction of infrastructure, productive capacities or housing, lower human capital accumulation)
- Impact on natural capital (destruction of forest, farmland or crops, lower yields)
- Impact on social capital (through damage to community support mechanisms and cohesion)

Each channel in turn can affect economic growth and development. The strength of the link depends on resilience. Resilience also influences the long-term impact of those shocks.

The main criticisms of the EVI

Building a composite index is complex, and there is a challenging balance needed between scope, coverage, data availability and political momentum. This fragile equilibrium inevitably gives rise to criticism that can be classified into two categories:

The first category of criticism focuses on specific variables that are arguably missing from the index without modifying the scope or key definitions used by the CDP. Without providing an exhaustive list among those factors that are notably important for the SIDS, one can think of the role of remittances, tourism (or more broadly, services), dependence on strategic imports, measurements of the direct economic impact of natural disasters, migration, infrastructure, etc. The decision in 2020 to remove population size from the index has also been criticized. Originally, population was introduced alongside remoteness, so that taken together the two variables would reflect the structural factors determining openness to trade, which is a critical factor explaining the exposure of small states to external shocks. Removing smallness without introducing a direct measurement of openness does not provide an accurate picture of the economic vulnerability of small states.

The second category of criticism is more heterogeneous as it discusses the scope and definitions used by the CDP. The debate around definition issues mainly addresses the exogeneous aspect of its components. As the UN CDP EVI tries to capture only structural factors of vulnerability, it of course leaves out factors that are endogenous or linked to policies, or man-made under the stricter application of the rule. It means that for example some macroeconomic aspect such as debt or aid and FDI flows are not considered under this framework. Similarly, some authors (Briguglio, 1995, 2007), have argued that instability variables and more broadly variables reflecting past shocks should not be included as the impact of exogenous shocks is explained by both structural and non-structural factors.[17] The scope of the UN CDP EVI has also been criticized over the last 20 years, notably because its narrow focus on external and natural shocks leaves aside aspects related to climate change or more broadly the environment and social vulnerability. It also does not include factors of resilience, as those are proxied by HAI and GNI per capita in the identification process of LDCs. It means that considering the vulnerability of countries through the lens of the EVI tells only part of the story.

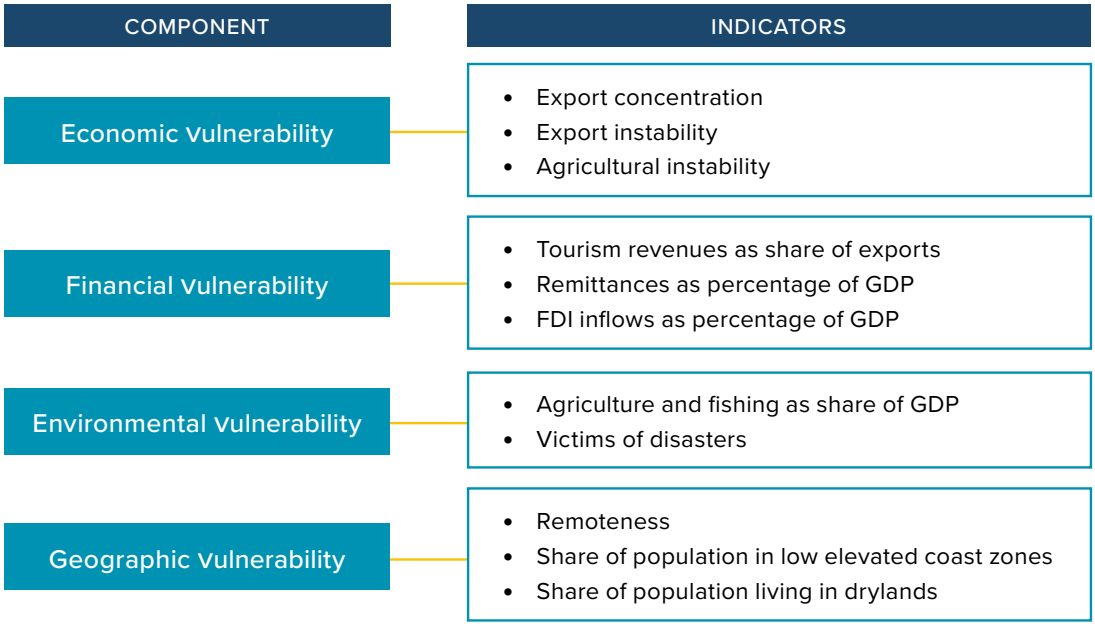
In the same way, since the EVI of the CDP was to be used according to a specific threshold for this process of LDC identification (inclusion and graduation) it has always been in the CDP reports that other elements could be taken into account besides the quantitative criteria before making a judgement on the inclusion or graduation of a country close to the thresholds defined for the three criteria. As for vulnerability, and since the adoption of the EVI, these qualitative elements have been gathered in a "vulnerability profile", set up by UNCTAD. More recently to address the criticisms about the limited scope of the EVI, even when associated with the HAI and GNI per capita, while maintaining a consistent definition of the EVI overtime, the CDP has listed as Supplementary Graduation Indicators (SGI) to be possibly taken into account for graduation in an undefined manner (see annex 1). Those criticisms also led to the development of several alternatives to the UN CDP EVI, considered below. However, the purpose of the CDP EVI should not be forgotten: it was designed as an index to be used with a specific threshold for the identification of a category membership (i.e. on a binary manner), not as a continuous index to be used for aid allocation (even though this has later been proposed).

Alternative indices based directly on the EVI

Each institution, with specific goals in mind, includes variables in their own indices that do not always overlap. While the debate on the specific factors to include in a multidimensional vulnerability index often represent a trade-off between criteria of relevance, simplicity and data availability, the structural property of the index remains critical. Most of the indices represent attempts to capture or isolate the structural aspects of vulnerability. The distinction between what is structural and what is not is crucial as it conditions the use of the index and its relevance in this debate. The specific positions relative to this question often explain the significant differences between indices and illustrate the fact that the demarcation between structural factors non-structural factors (meaning driven by current policies) is not always clear-cut. Some components related to specific anthropogenic or social shocks or to financial flows (FDI, foreign aid etc.) or to macroeconomic variables such as debt stock represent clear examples of the difficulty of disentangling purely exogenous factors of vulnerability from partly endogenous ones. On one hand, a narrow definition of the exogeneity of components could lead to a very restrictive view of vulnerability seemingly disconnected from the concerns of developing countries.

[17]According to Briguglio, vulnerability is not the same thing as poverty. A country with a high degree of vulnerability may experience stability and succeed economically if policies are put in place to enable it to withstand exposure to external shocks. Conversely a country with a low degree of exposure to external shocks, but is weakly governed, may experience economic instability and poverty. Accordingly, only exposure should be taken into account. Notably, openness to trade is the main factor of vulnerability for sids. Self-harm factors, such as social shocks or social vulnerability altogether), should not be taken into account (self-harm is not vulnerability). A vulnerability index should included causes and not effects. This is why contrary to vulnerability index based on the CDP EVI, instability variables which according to Briguglio are mixing vulnerability and governance should not be included.

Figure 3: UNDP Multidimensional Vulnerability Index



Source: Adapted from Assa and Meddeb (2021)

On the other hand, a loose definition could blur the distinction between structural vulnerability and policy performance and would greatly limit the potential uses of such an index. A similar point can be made about the rationale to consider specific factors as structural vulnerabilities or structural resilience factors (or lack of).

UNDP Multidimensional Vulnerability Index

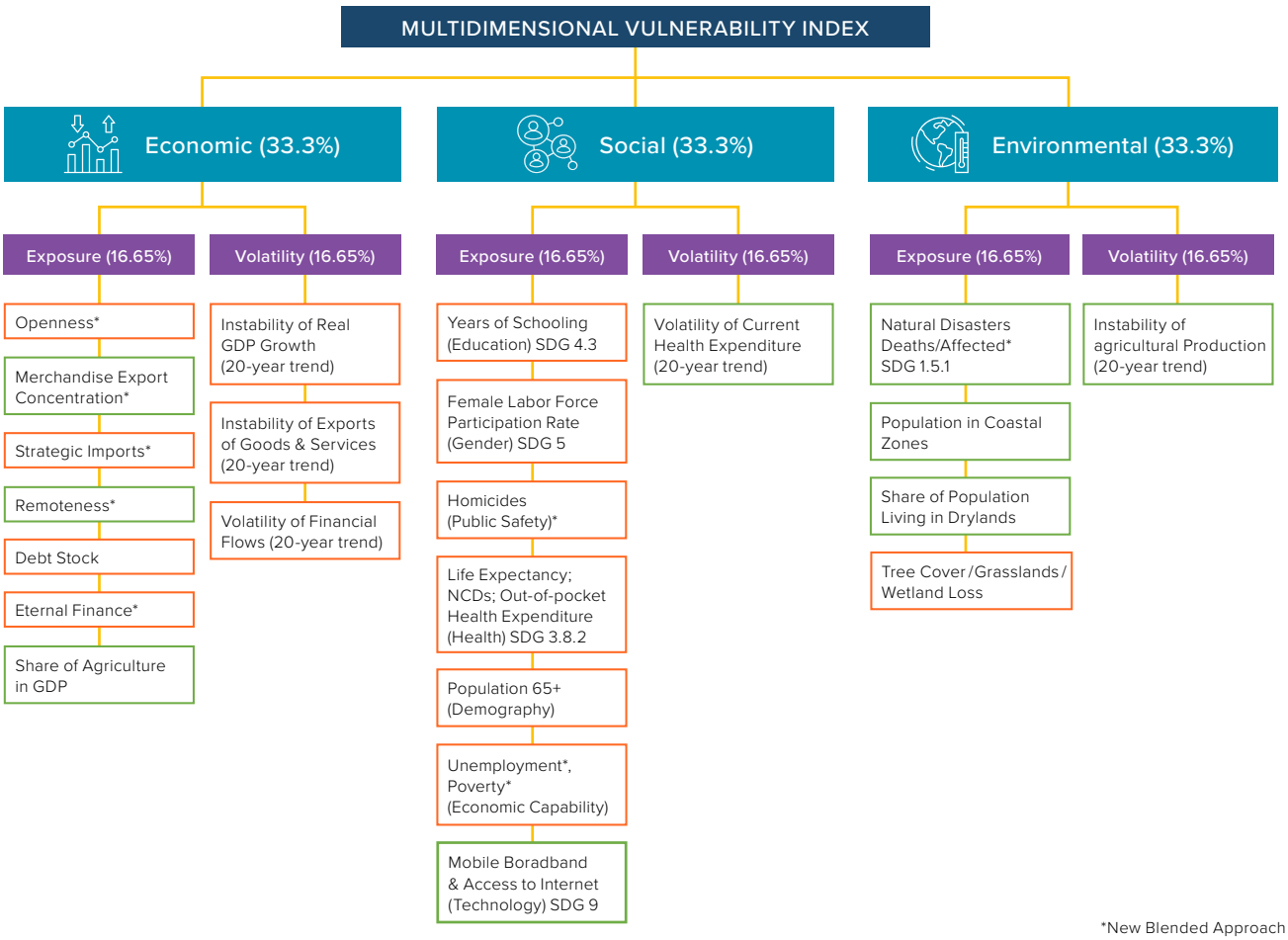
Recognizing that the COVID-19 pandemic greatly exacerbated the vulnerabilities of SIDS and other developing countries, the UNDP developed a new MVI based on the structure of the CDP EVI. The purpose of the exercise was to show whether SIDS are on average more vulnerable than as assessed by the CDP EVI by including specific variables related to exposure to sudden stops of external financial flows. Being highly dependent on tourism as a major source of export earnings, on foreign investments as well as remittances compared to other categories of countries, SIDS are vulnerable to external economic shocks. UNDP include those three variables in a new specific cluster reflecting financial vulnerability (see Figure 3).

Indeed, a feature of the CDP EVI is that it recognizes the exposure associated with having a high concentration of exports (the index of which is produced by UNCTAD), but only accounts for exports of merchandise and not of services. The concentration of exports of services may be a source of vulnerability, in particular for tourism. However, it should be noted that, even without a conceivable synthetic index of concentration of goods and services the vulnerability due to services exports is captured through the instability of exports of goods and services as a shock index rather than as an exposure index. Similarly, not included (or only partially included) in the services, but in the private transfers, are the remittances. While the remittances received from abroad can be considered essentially exogenous, those remittances paid abroad may be considered more dependent on the country policy.

UNCTAD Economic Vulnerability Index Plus

With a similar concern regarding the specific vulnerabilities of SIDS and the urgency to respond to the COVID-19 pandemic, UNCTAD envisions developing a new vulnerability index broadening the scope of the EVI. This new EVI+ would introduce two main changes to the CDP EVI. First, it would replace one of the critical aspects of exposure to external and natural shocks, namely agriculture, forestry and fishing as share of GDP by UNCTAD Productive Capacity Index (PCI). The PCI was developed in response to the ECOSOC resolution (E/RES/2017/29), encouraging UNCTAD "to pursue its methodological work to measure progress in and identify obstacles to the development of productive capacities in developing

Figure 4: CDB Economic Vulnerability Index



Note: Indicators in yellow are being introduced in the 2021 revision.
Source: Adapted from CDB.

countries". It covers 193 economies for the period 2000-2018. The set of productive capacities and their specific combinations are mapped across 46 indicators reflecting 8 components: human capital, natural capital, energy, transport, ICT, institutions, private sector and structural change[18]. Second, the EVI+ would introduce as an additional component of exposure an index of physical vulnerability to climate change. FERDI's Physical Vulnerability to Climate Change Index (PVCCI) which is a forward-looking indicator based on a distinction between two kinds of risks due to climate change:

- Risks associated with gradual shocks, such as sea level rise (e.g. coastal erosion), trends in increasing temperatures, or decreasing rainfall (e.g. risk of desertification)
- Risks associated with the intensification of recurrent shocks, whether rainfall shocks (flooding or droughts), temperature shock (heatwaves), or cyclones.

For each of type of shock, the physical vulnerability to climate change index combines the magnitude of shocks and the exposure to shocks (see Feindouno et al., 2020).

Caribbean Development Bank Economic Vulnerability Index

The Caribbean Development Bank (CDB) also estimates its CBD MVI. The original design and methodological approach was guided by the work of Briguglio (1992, 1997) and was initially computed by Crowards (1999). The CDB EVI consisted of the following 6 sub-indices (peripherality and accessibility,

[18]Structural change refers to the movement of labour and other productive resources from low-productivity to high-productivity economic activities. This shift is currently captured by the sophistication and variety of exports, the intensity of fixed capital and the weight of industry and services on total GDP.

dependence upon imported energy, export concentration, convergence of export destination, reliance upon external finance, susceptibility to natural disasters) and 11 proxy indicators.[19]

A new methodology was developed in 2019 and has been updated for the 2021 revision. It adds 7 additional variables and a new cluster reflecting social vulnerability, covering notably, poverty, crimes & unemployment in its 2019 revision. The forthcoming 2021 revision largely expends the list of factors. The 2021 index if approved would consist in 32 indicators, largely expanding the scope of the original CBD EVI by taking into account biodiversity, debt, trade openness, migration, tourism, financial flows, homicide & gender-based violence, poverty, unemployment, etc. (see figure 4 below). The index is built for the CDB member countries but could be expanded to cover a larger share of the developing world in the future, according to the authors.

As mentioned earlier, the CBD EVI has a role in the allocation of CDB's concessional financial resources. In CDB, the Special Development Fund (SDF) is the single largest source of concessionary resources. The distribution of these concessional resources is a two-stage process. Currently, access to SDF is based solely on per capita income. Only then, are concessional resources allocated using a number of metrics, including the vulnerability index score. As a result, the vulnerability index score is one of several criteria that is used to determine the size of the allocation of each country that has access to SDF.

Commonwealth Secretariat: From an Economic Vulnerability Index to a Universal Vulnerability Index

The Commonwealth Secretariat started its work in the area of vulnerability and resilience over twenty years ago. The first attempts at building a Commonwealth Vulnerability Index came from Atkins et al (1998, 2000) who consider the volatility of GDP as a sign of economic vulnerability. To build their index, they regress the volatility of GDP on 3 explanatory variables: economic openness (measured by the percentage of exports of goods and services over GDP), lack of diversification of exports, impact of natural disasters (measured by the proportion of the population affected by such events). The final index is an average of the 3 explanatory variables weighted by the coefficients obtained from the regression. The methodology involved in estimating a second EVI was based on the work of Briguglio (1995) and Briguglio and Galea (2003). The basic criteria adopted to construct the Vulnerability Index and that underlies the selection of the indicators in the current study were: simplicity (the index should not be too complicated to construct); ease of comprehension (the overall composite index must have an intuitive meaning); and suitability of international comparison (the index should lend itself to international comparisons).

The Commonwealth EVI had four equally-weighted components of: (a) Trade Dependence Index; (b) Export Concentration Index; (c) Dependence on Strategic Imports Index; and (d) Disaster Proneness Index. These components were complemented with a resilience index that was grouped into three equally-weighted components of the Macroeconomic Stability Index; the Market Flexibility Index; and Political, Social and Enviro-Governance Index. For both the vulnerability and resilience indices, the total score was the simple average of the different components; and vulnerability was the risk of being hurt by an external economic shock minus resilience.

In the third evolution of their index in 2021 (see Kattumuri & Mitchell, 2021), the Commonwealth Secretariat introduced a new framework based two components that can be broken down in respectively three vulnerability sub-indices and two resilience sub-indices (see table below). The three vulnerability sub-indices are:

a. ***An Economic Vulnerability to External and Natural Shocks Index*** taking into account both the structural exposure of countries to those type of shocks and the intensity of past (and recurrent) shocks.

b. ***A Physical Vulnerability to Climate Change Index*** reflecting the growing influence of climate change measured only through its physical manifestation and assessed according to the country exposition to it.

c. ***A Socio-Political Vulnerability Index*** measuring the recurrence of conflicts and violence in its various dimensions that the organization of society is unable to ward off.

[19]Peripherality and accessibility, measured by freight and insurance costs for imports as a percentage of total imports, and provides an indication of remoteness from major economic trading partners:
- Dependence upon imported energy, measured by imports, net of exports of energy (largely in the form of oil), as a percentage of total energy consumption.
- Export concentration, measured as the percentage of total export receipts and accounted for by the major export and the top three exports, includes both export of goods and services and is combined with information on the openness of the economy measures as total export earnings as a percentage of GDP.
- Convergence of export destination, measured in terms of the percentage of total export receipts, accounted for by the single most-important destination and the top three most-important destinations. This includes the exports of goods and services and is combined with information on the openness of the economy, that is measured as total export earnings as a percentage of GDP.
- Reliance upon external finance, measured by a combination of two variables, i.e. overseas development assistance as a proportion of annual gross fixed capital formation and foreign direct investment as a proportion of annual gross fixed capital formation.
- Susceptibility to natural disasters, measured as the cumulative number of persons affected and deaths caused by natural disasters between 1950 and 1998, each as a proportion of the total population.

According to the Commonwealth Secretariat, taken together the three indices represent the risk for a country to be affected by exogenous shocks due to the probability and size of future shocks and to its structural exposure to these shocks. Since countries are particularly affected by the most severe among the various kinds of shocks, the three indices are aggregated through a quadratic, rather than an arithmetic, average. Two equally structurally vulnerable countries may show a different ability to withstand shocks because of their level of resilience, whether due to structural characteristics or good policies.

The new framework considers resilience through two dimensions: a Structural Resilience Index (SRI), as well as a non-structural one or Non-Structural Resilience Index (NSRI) capturing the quality of policies and regulations, both explaining shock absorption and the magnitude of the final impact of shocks on sustainable development. The structural resilience index takes into account the levels of capital (physical and human) and income per capita. When they are low, and poverty is high, economies do not have the capacity or resources to adaptively respond to shocks. The index notably includes infrastructure and connectivity, as well as the demographic factors.

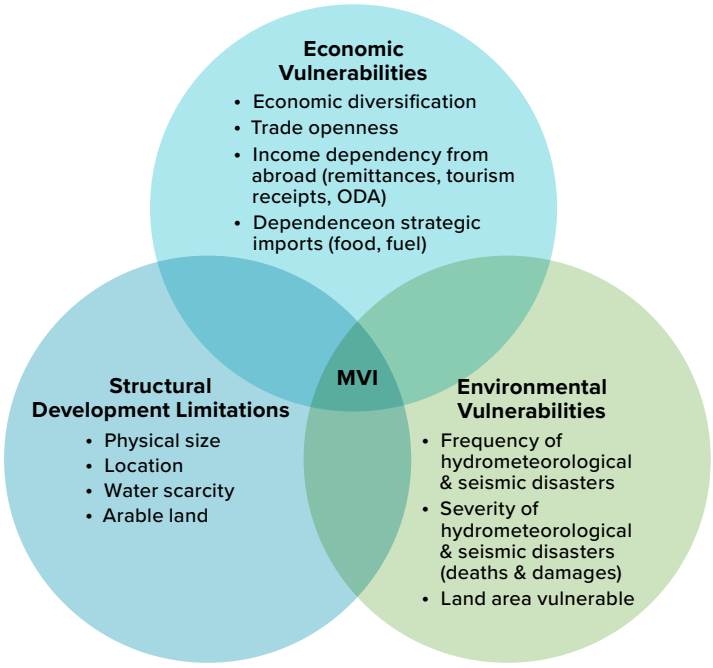
The UVI is then computed as the ratio of the Structural Vulnerability Index to the Resilience Index (or only to the Structural Resilience Index for the purely exogenous UVI). Another mode of calculation is also considered by the Commonwealth Secretariat consisting to add two "Lack of Resilience Indices" (the structural one and the policy one) to the three indices of structural vulnerability (or only the Lack of Structural Resilience for the purely exogenous UVI). The preference given to the first solution (ratio) rather than to the second one (additive) may be debated.

The Commonwealth UVI framework allows the isolation of exogeneous (structural) factors from non-exogeneous (non-structural) ones allowing for smart resource allocations according to the specific dimensions of the index. By limiting the substitutability between various forms of vulnerability, it allows underlining the specific vulnerability of each group of countries (so it is indeed SIDS friendly, but also friendly towards other country groups such as in the Sahel or more broadly LDCs). It also allows highlighting specific vulnerability profiles through its five components. The UVI takes comprehensively into account structural vulnerability to climate change. It also includes a socio-political component captured through an exogenous or structural indicator relying on violence data. Finally, it allows for a large coverage with limited data imputation.

Table 1: Commonwealth Secretariat UVI

Structural Vulnerability Index (SVI)	Resilience Index
• Economic Vulnerability to External and Natural Shocks Index: exposure and shocks: . Broad trade dependance index (goods , services & remittances) . Export concentration index . Share of agriculture, forestry and fisheries in GDP . Share of population in low elevated coastal zones . Share of population living in drylands . Instability of exportations of goods and services . Instability of import unit values . Fatalities per 100.000 inhabitants due to disasters . Losses per unit of GDP (in %) due to disasters . Instability of agricultural production • Physical Vulnerability to Climate Change Index (see above) • Internal Violence Index: 9 quantitative variables related to internal violence are divided into 4 clusters: internal armed conflict, crime, terrorism, and political violence. Violence in neighboring countries is also introduced as an additional cluster and variable, leading to 10 sub-components.	• SRI–Structural Resilience Index (built-up): human dev (Poverty, Health, Education), demographic structure (Refugees, Brain Drain, Dependency Ratio), market connectivity (Remoteness, Market size, Infrastructure) • NSRI–Non-structural resilience index (policy performance): quality of governance index, macroeconomic stability index, quality of regulations index

Figure 5: SDSN Framework for the Multidimensional Vulnerability Index (MVI)



Source: Adapted from Sachs et al. (2021)

Support of the United Nations Resident Coordinators for the Small Island Developing States (SIDS) and the Sustainable Development Solutions Network to develop a Multidimensional Vulnerability Index

This work is conducted in the framework of the partnership between the United Nations Resident Coordinators for the Small Island Developing States (SIDS) and the Sustainable Development Solutions Network under the coordination of Prof. Jeffrey Sachs with the purpose to develop a multidimensional vulnerability index (MVI) for the SIDS in line with Art. 8.a. of General Assembly Resolution A/RES/75/215. The initiative aligns with the vision of the SAMOA Pathway as adopted in Samoa in 2014.

To support the UN effort to develop a sound and robust Multidimensional Vulnerability Index (MVI), Sachs et al. (2021) present a new pilot framework and MVI for tracking SIDS structural vulnerabilities by distinguishing across different SIDS categories. Based on this framework and indicators retained, preliminary results underline that SIDS tend to be particularly vulnerable compared with other world regions.

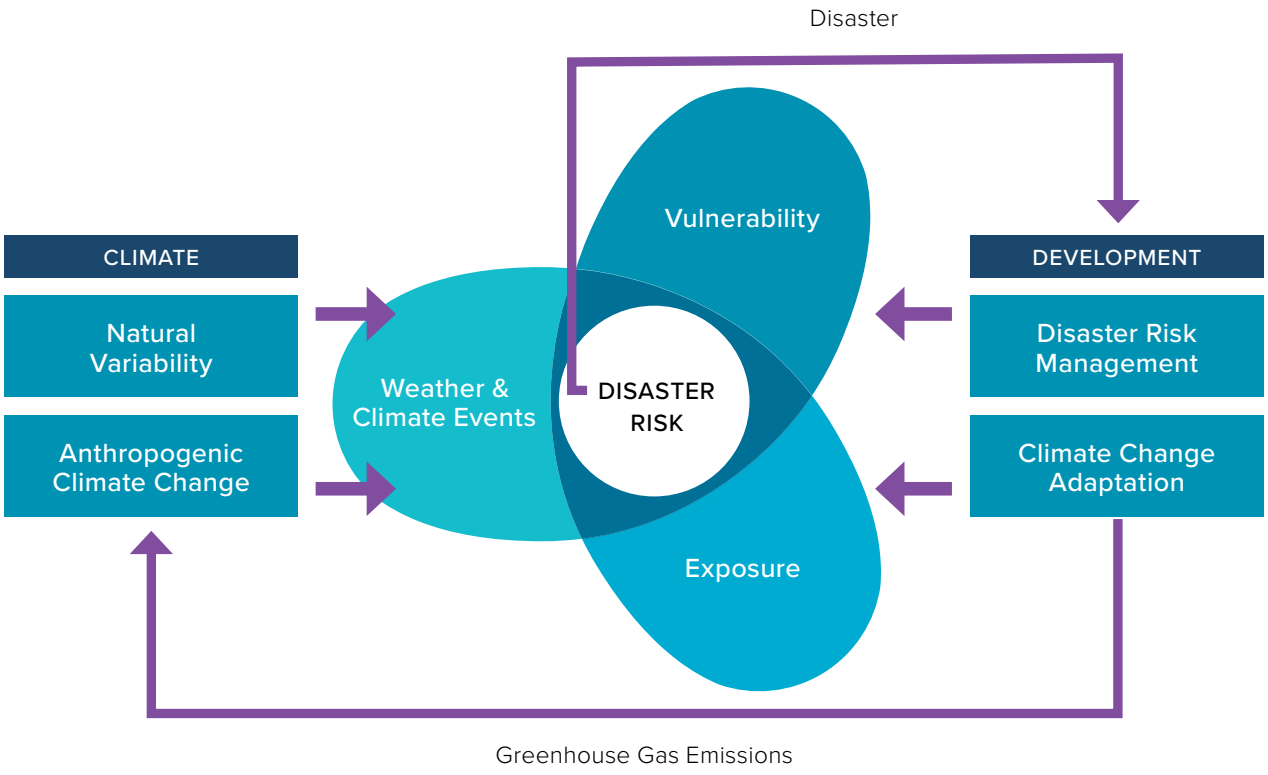
The preliminary Multidimensional Vulnerability Index (MVI) in its current form is made up of 18 indicators across three categories, reflecting the three broad dimensions of structural vulnerability: economic vulnerabilities; structural development limitations; and environmental vulnerabilities[20], as reflected by Figure 5.

The six indices presented above constitute only the latest production of an abundant literature that aims at building vulnerability assessments and country rankings to guide public policy and international development efforts. Looking back to the recent past or broadening the scope and the survey produces a long list of indicators whose specific descriptions fall outside the purpose of this document. However, an analysis of their general characteristic is important to understand the challenges of building a multidimensional vulnerability index.

As exemplified by the recent evolution of most of them, vulnerability is increasingly understood as a multidimensional phenomenon where the vulnerability of a given economy is the sum of specific forms of vulnerability. The range of shocks being considered by the various indices now includes

[20]According to Sachs et al. (2021), economic vulnerability is the probability that a country is affected by economic and financial external shocks. Structural development limitations refer to those geophysical constraints such as smallness and remoteness, which hinder the development progress of a country. Environmental vulnerability is the exposure of a country to the impacts of climate change and natural disasters.

Figure 6: The IPCC risk framework



Source: Adapted from Special Report of the Intergovernmental Panel on Climate Change (IPCC, 2012).

progressive shocks related to climate change, environmental shocks and shocks from social origins. The list of exposure components, some of which could be considered similarly as factors of (lack of) resilience, is also growing to take into account the specificity of various group of countries facing distinct issues for which data collection is improving overtime.

This leads to an increased complexity of the indices putting a new emphasis on the need to define clearly the core concepts and definitions required to build a MVI and it should be remembered that the meaning of any index should be understood with respect to its expected use.

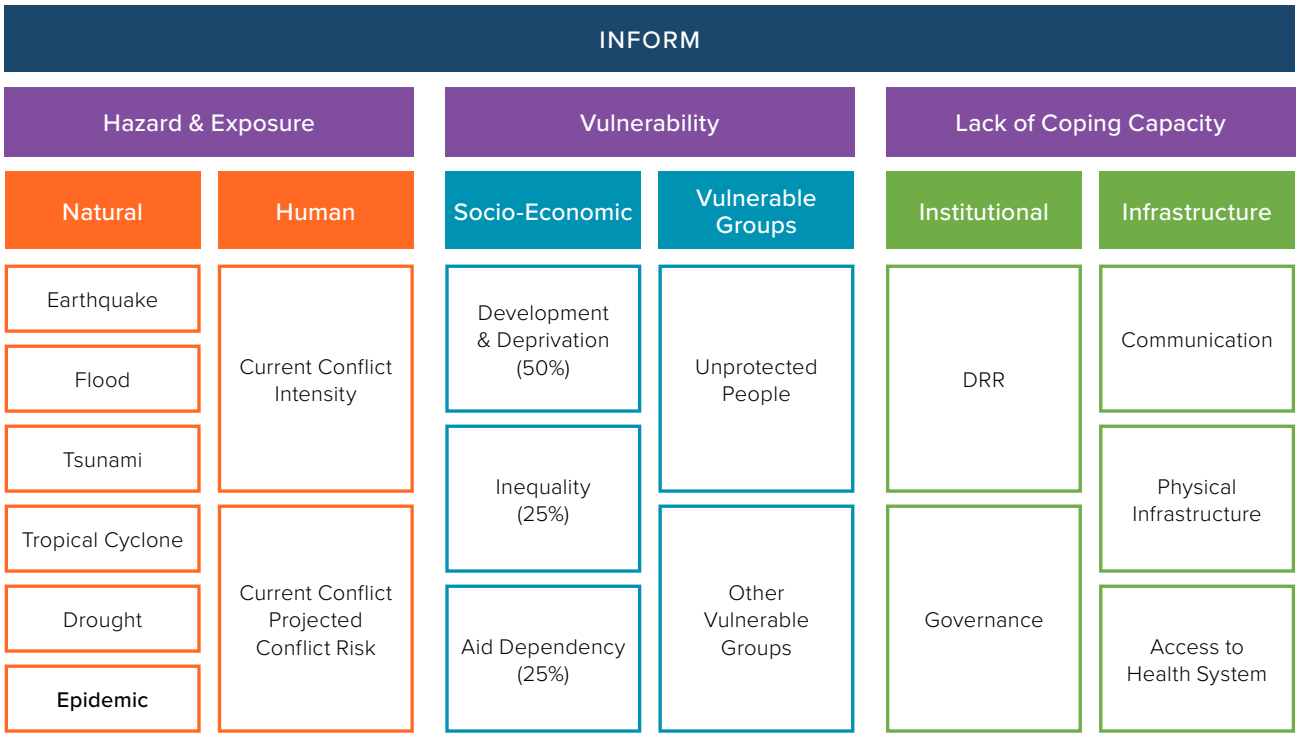
Additional approaches and indices based on alternative frameworks

Traditionally the economic vulnerability literature understands vulnerability as the risk of being harmed by exogenous shocks and break down this risk between exposure into factors that make the occurrence of the shock more likely, and the magnitude and frequency of such shocks in the past. This suggests, according to the CDP EVI, that an economy is more likely to be harmed by external shocks if it is more open and/or has faced important export fluctuation in the past or if it is more dependent on agricultural production and/or more exposed to natural shocks. This particular focus on the source of volatility and the type of shocks that it is generated is central to this literature and it is necessary to clearly define the range and nature of shocks to include in any index of vulnerability. Indeed, a MVI represents the risk of being harmed by exogenous shocks from different origins and should not be viewed as the simple aggregation of factors leading to a slower development nor a composite index of sustainable development strictly aligned with the SDGs. This is particularly important to keep in mind when considering introducing new dimensions such as social vulnerability or the role of climate change.

a) Alternative views on vulnerability

As discussed above, while the five indices highlighted above tend to be based on the CDP definition of vulnerability, several risk indices were built following the IPCC risk framework discussed above and represented in Figure 6 including as risk management tools for climatic hazards. Similarly, according to the OIEWG, disaster risk is determined probabilistically as a function of hazard, exposure, vulnerability and capacity.

Figure 7: Inform Risk Index 2021



Source: Adapted from Marin-Ferrer et al. (2017).

As an example,[21] an application of this framework is given by the INFORM Risk Index piloted by the Joint Research Centre (JRC) of the European Commission.[22] As a tool for understanding the risk of humanitarian crisis and disasters, the INFORM model balances two major forces: the hazard and exposure dimension on one side, and the vulnerability and the lack of coping capacity dimensions on the other side (see Miola et al, 2015 for a review). It is also a multidimensional index as it considers natural and human hazards. Hazard-dependent factors are treated in the hazard & exposure dimension, while hazard- independent factors are divided among two dimensions: the vulnerability dimension that considers the strength of the individuals and households relative to a crisis situation, and the lack of coping capacity dimension that considers factors of institutional strength. The aspects of physical exposure and physical vulnerability are integrated in the hazard & exposure dimension, the aspect of fragility of the socio-economic system becomes INFORM's vulnerability dimension while lack of resilience to cope and recover is treated under the lack of coping capacity dimension (JRC, 2017), as presented in Figure 7.

[21]There are many indices based on the same framework mostly related to risks of disasters from natural hazards. The review of this specific literature goes beyond the scope of this work.

[22]INFORM is a collaboration of the Inter-Agency Standing Committee Reference Group on Risk, Early Warning and Preparedness and the European Commission. The European Commission Joint Research Centre is the scientific lead of INFORM.

Table 2: Indicators used to create the global drought risk map

Hazard	Exposure	Vulnerability
Monthly precipitation totals from the Full Data Reanalysis Monthly Product Version 6.0 of the Global Precipitation Climatology Centre (GPCC).	• Global agricultural lands in the year 2000 • Gridded population of the world, version 4 (GPWv4) • Gridded livestock of the world (GLW), v2.0 (reference year 2005) • Baseline water stress (BWS) (baseline year of 2010). hydrological catchment polygons from the Global Drainage Basin Database (GDBD).	**Economic** • Energy Consumption per Capita • Agriculture (% of GDP) • GDP per capita (current US$) • Poverty headcount ratio at $1.25 a day (PPP) (% of total population) • Rural population (% of total population) **Social** • Literacy rate (% of people ages 15 and above) • Improved water source (% of rural population with access) • Life expectancy at birth (years) • Population ages 15–64 (% of total population) • Refugee population by country or territory of asylum (% of total population) • Government Effectiveness Country Negative 2013 WGI • Disaster Prevention &Preparedness (US$/Year/capita) **Infrastructure** • Agricultural irrigated land (% of total agricultural land) • % of retained renewable water • Road density (km of road per 100 sq. km of land area)

It appears clearly that the same denominations represent different concepts proxied by an alternative framing of the variables. This, in turn, can generate confusion when designing a new MVI based on the economic vulnerability indicators literature.[23] Schauser et al (2010) highlight the difficulty of disentangling these 3 aspects, because of the overlap between vulnerability and coping capacity. These indices do not meet the required conditions mentioned above to be based only on structural factors, in particular due to the fact that they include components that depend on the public policies of developing countries, or the effect of previous policies. Most available indexes are composite and integrate a wide range of variables, combining the environmental, social, economic, and political dimensions of vulnerability, with no effort to disentangle what is really exogenous from what depends on present policies.

Another illustration (among many) of how to build specific risk indices is given by the JRC's Global Drought Risk Map (Carrao et al, 2016). Drought risk is defined as is the probability of harmful consequences or likelihood of losses resulting from interactions between drought hazard, drought exposure, and drought vulnerability. Drought vulnerability is defined as the propensity of exposed elements to suffer adverse effects when impacted by a drought event. According to the authors, risk is determined not only by the amount of exposed entities and physical intensity of the natural hazard, but also by the vulnerability of society at a given moment in time – vulnerability is dynamic in response to changes in the economic, social, and infrastructural characteristics of the locale or region. The interaction between the components can then be expressed as Risk being a function of Hazard, Exposure and Vulnerability with each dimension detailed in Table 2.

[23]For example, the Briguglio index (1995) has 3 main components: (i) exposure to external economic conditions measured by ratio of imports and exports to GDP, (ii) remoteness and insularity as measured by the ratio of transport and freight costs to export earnings, (iii) the propensity of natural disasters as measured by the ratio of value the damage caused by disasters relative to GDP. In 2007, the author modified the index by adding 3 new variables (concentration of exports, dependence on strategic imports, and dependence on external sources of financing) while excluding the variable for the propensity of natural disasters. Briguglio and Galea (2003) have proposed another index of economic vulnerability. Their index uses 4 components: economic openness (share of exports and imports over GDP), dependence on a very narrow range of export products, dependence on strategic imports (average imports of energy as a percentage of national energy production), remoteness (ratio of freight and transport costs over trade revenues). Turvey (2007) assesses countries economic vulnerability by their exposure to human and physical risks as well as the risks and dangers that may arise over time and the geographical context. 4 indicators are used by Turvey: (i) a "coastal" indicator measuring the risk of flooding, (ii) a "remoteness" indicator measuring remoteness and insularity, (iii) an urbanization indicator expressed as the proportion of the population living in urban areas, (iv) an indicator capturing natural disasters expressed as the percentage of the population affected by natural disasters. Vulnerability due to external economic shocks is not taken into account, however some indicators cut across it. Barrito (2008) proposes an index of vulnerability to external economic and financial shocks called "GVI" (Geographic Vulnerability Index). Barrito tries to estimate the negative impact of natural disasters on economic growth from the ratio of the value of economic losses to net capital formation. The South Pacific Applied Geoscience Commission (SOPAC, 2004)'s environmental vulnerability index reflects the status of a country's environmental vulnerability, which refers to the extent to which the natural environment is prone to damage and degradation. It does not address the vulnerability of the social, cultural or economic systems, and not t the environment dominated by human systems (e.g. cities, farms). The index is based on 50 indicators structured around components focusing on ecosystem integrity and how it is threatened by anthropogenic and natural hazards. More specifically, each indicator is classified into a range of sub-indices including: Climate Change; Biodiversity; Water; Agriculture and fisheries; Human health aspects; Desertification; and Exposure to Natural disasters.

The components of vulnerability in this case bring together aspects of reflected by the CDP EVI (such as the share of agriculture over GDP) but also the GDP per capita and human capital aspects reflected by the CDP HAI.

This illustrates further how rather than focusing on specific variables to include in a new MVI, it is critical to design a coherent framework to define and articulate the key components of such an index. As detailed above, the same variables might reflect concepts that are very differently defined even if they share the same names. The new MVI will have to be grounded in a clear a coherent framework and taxonomy. In that context, the work of the GRAF should be acknowledged in the development of the MVI, including its work toward understanding and modeling systemic risk in line with the implementation of the Sendai Framework.

b) The case of climate change

In 2020, a major revision occurred in the Economic Vulnerability Index used by the CDP for the identification of the Least Developed Countries, renamed Economic and Environmental Index and including components reflecting not only the economic factors of vulnerability, but also environmental factors for their potential economic consequences.

Indeed, the economic vulnerability of developing countries is linked both to natural and external shocks. For many developing countries, most of production and exports come from agriculture and a large part of the population still derive their livelihood from the primary sector. In this context, natural, anthropogenic and socio-natural hazards are a main source of economic instability and they are often measured through their immediate economic impact. Hazards directly affect countries' economic outcomes through three main channels reflecting different kinds of exposure: (i) Impact on human lives (death, injury, homelessness); (ii) Impact on capital (destruction of infrastructure, productive capacities or housing, lower human capital accumulation); (iii) Impact on natural resources (destruction of forest, farmland or crops, lower yields). Each channel in turn reduces economic growth while making it more unstable in the short run and can affect long-term economic growth and sustainable development, depending on resilience.

The 2012 revision of the CDP EVI introduced another dimension directly: climate change, through the share of population living in Low Elevation Coastal Zones, making the index more complex[24]. The economic effects of climate change, which is fundamental for many countries, is different from the instantaneous effect of natural and environmental shocks while sharing some of its exposure factors. Some climatic factors of economic vulnerability are already taken into account in the design of the EVI, in particular through the components of the index of natural shocks (the instability of agricultural production and the percentage of population victim of natural disasters) or through some of the components of exposure, in particular the share of agriculture, forestry, and fisheries in the GDP. But these indicators are related to permanent geoeconomic features and to any kind of shocks, but not to climate change per se. Vulnerability to climate change, which is a vulnerability to a specific and major kind of shock, stems from a risk of long-term change in geophysical conditions rather than from a growth handicap in the medium term. In other words, it is more physical than economic, and has a longer time horizon, as in the PVCCI discussed above and used as a component of the Commonwealth Index or in the EVI revised by UNCTAD.

Expanding the list of dimensions covered by a vulnerability index, while designing a framework allowing for a clear separation across dimensions such as the last revision of the CDP EVI implies expanding the scope of the literature considered so far to include the lessons of the specific literature on vulnerability to climate change. Besides the PVCCI referred above, many indices have been developed following the growing awareness of the risks related to climate change, such as Disaster Risk Index (UNDP, 2005), Natural Disaster Hotspots (Dilley et al, 2005), Predictive Indicator of Vulnerability (Adger et al, 2014), Social Vulnerability Index (Cutter et al, 2003), Climate Vulnerability Index (Sullivan, 2005), Quantitative Assessment of Vulnerability to Climate Change (ICRISAT, 2009), ND-GAIN Country Index (Notre Dame Global Adaptation Initiative, University Notre Dame), Environmental Performance index (Yale University). Most of these indices are constructed at the country level, allowing for cross-country comparisons. The principle behind these indicators of vulnerability to climate change are here again derived from the definition of vulnerability by the Intergovernmental Panel on Climate Change (IPCC). Most of these indexes are composite and integrate a wide range of variables, combining not only the physical, but also social, economic, and political dimensions of vulnerability. Cutter et al (2003) developed the "Social Vulnerability Index" from 42 socio-economic variables (age, race, ethnicity, education, family cohesion, etc.). Wongbusarakum and Loper (2011) focus only on the social aspect of vulnerability using 10 indicators: an exposure indicator, a sensitivity indicator, and 8 indicators which reflect adaptive capacity, thus measuring the level of vulnerability to climate change of various communities. Their indicators reflect the households' subsistence level, the diversity of the sources of income, the ability of a society to reorganize after a shock, governance and leadership, equitable access to resources, etc.

One of the best-known indexes is the Notre Dame University "Notre Dame Global Adaptation Index" or "ND-GAIN". The ND-GAIN Country Index summarizes a country's vulnerability to climate change and other global challenges in combination

[24] Complemented in 2020 by share of population living in drylands.

with its readiness to improve resilience. The index is composed of a Vulnerability score and a Readiness score. On vulnerability, it considers 36 indicators on vulnerability structured through six life-supporting sectors–food, water, health, ecosystem service, human habitat and infrastructure. Readiness is measured through 9 indicators structured within three components–economic readiness, governance readiness and social readiness. The scope of the index is quite broad and does not allow to disentangle between factors of vulnerability that are structural and factors linked to present policy.

Another well-known index is the Environmental Performance index. The EPI is a joint product from Yale University (Yale Center for Environmental Law and Policy) and Columbia University (Center for the International Earth Science Information Network) in collaboration with the World Economic Forum and the Joint Research Centre of the European Commission. It is used by the CDP as one of the 23 supplemental indicators for LDC's graduation (see annex 1). It offers a scorecard that highlights leaders and laggards in environmental performance and provides practical guidance for countries that aspire to move toward a sustainable future. The Environmental Performance Index for the year 2020, ranks 180 countries. As for the ND-GAIN, the EPI is hardly exogenous and appears to be highly correlated with development levels[25]. It is not an indicator of vulnerability, and is presented as an indicator of "performance", which is the opposite for a possible consideration in an aid allocation formula. Even in this perspective, for some of its components it is difficult to disentangle the exogenous effect of climate change from the effect of regulations[26]. Moreover, the EPI also tends to approximate policy performance ex post rather than ex ante and mixes structural or natural factors with policy performance. There are many revisions each year leading to a risk of breaks in the time-series.

It is easy to see that these indices, because of the plethora of variables they contain, without a clear distinction between the three main dimensions of vulnerability, and a blurred relationship (or overlapping) between the vulnerability and resilience they are based on, do not meet the conditions required to be used directly in a MVI.

c) The case of social vulnerability

Social vulnerability alongside vulnerability to external and natural shocks is often introduced in vulnerability indices. Social vulnerability acts as a major impediment of sustainable development. However, it is often loosely defined making it difficult to consider in a multidimensional vulnerability index. As illustrated by the cases of the CDB EVI and the INFORM index above, the concept of social vulnerability is often rooted in the DRR framework. In that context, it refers to the conditions determined by social factors or processes, which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards rather than exposure factors relative to specific societal shocks. As explained earlier, this set of social factors are introduced very differently in the CDP framework to identify LDCs through the HAI and represent structural (lack of) resilience. Other indices such as the UNDP Human Development Index (HDI) or Multidimensional Poverty Index (MPI) could also reflect this dimension. An alternative definition of social vulnerability can be formulated through the prism of social shocks reflecting health related shocks as well as unrest and/or violence, the drivers and consequences of the later on governance and sustainable development involves the literature on state fragility and the drivers of conflict and violence.

Major civil conflicts, i.e. those generating at least 1,000 deaths per year, declined by 72% between 1990 and 2003. Since then, the trend in the number of major conflicts has started to rise again, particularly with the resurgence of tensions in Afghanistan, Iraq, Nigeria, Pakistan, Somalia, Sudan, Syria, Ukraine and Yemen, bringing the number of major conflicts recorded in recent years back to the level it was at in the mid-1990s. In 2020, the overwhelming share of the world's conflict-related deaths were the result of eight major episodes in countries such as Yemen, Syria, Somalia, Afghanistan, Nigeria, Eritrea and Azerbaijan.

However, these different episodes of major conflict mask a different reality. Minor internal conflicts (having generated at least 25 and at most 999 deaths during the year and involving at least one national state actor) are increasing at a worrying rate, particularly over the period 2015-2018. Thus, 48 minor conflicts were recorded in 2020. This rebound in the number of conflicts was partly caused by the expansion of Daesh, Al Qaeda and their ramifications around the world, particularly in Africa and more particularly in the Sahel, radically changing both the nature of conflicts and their dynamics.

Detailed conflict data reflect another recent phenomenon, that of the internationalization of internal conflicts. Indeed, a number of conflicts that were initially presented as internal conflicts have seen a foreign actor added to them. In 1991, 4% of conflicts were considered to be internationalized; this number increased tenfold in the recent years. This is particularly the case today with the conflicts in the Democratic Republic of Congo and Syria.

[25] The EPI is highly correlated with other indices such as countries' GDP per capita (80% in 2020) and the Ease of Doing Business of the World Bank (72% in 2020).

[26] It is particularly the case for the environmental health sub-component (PM2.5 exposure, Household solid fuels, Ozone exposure, Unsafe drinking water, Unsafe sanitation, Lead exposure, Controlled solid waste management).

Tsunami damage, Solomon Islands 2007.

Photo: AusAID

In addition to the phenomenon of the internationalization of conflicts, two other developments considerably complicate the peacemaking efforts of international actors. First, organized crime, especially transnational crime, has become a major stress factor that exacerbates the fragility of States and makes conflicts more complex and difficult to resolve. Although organized crime has long existed, its corrosive impact on the legitimacy of states is exacerbated by the proliferation of new transnational "criminal markets" and illicit flows. The growth of illicit markets has lowered the barriers to entry for organized violence. Secondly, the growing presence of jihadist groups in modern conflict situations poses a significant challenge to peacemaking and peacekeeping. Indeed, an important part of the changing nature of conflicts relates to the growing influence of jihadist groups in modern conflicts. Since 2010, there has been a significant increase in the number of jihadist-Salafist fighters, while at the same time terrorist actions involving Daesh, Al-Qaida and their affiliates have resulted in many more deaths.

Although the concept of state fragility has been widely used in recent years in the economic literature, as shown by the large number of research and publications on the subject, it has proved difficult to reach a consensus on the definition of fragility. Originally, the notion of political fragility was used to refer both to a lack of capacity of will, a lack of legitimacy of states to implement policies in favor of the majority of the population or simply to exercise their regalian functions. Each institution tends to establish its own terminology and definition according to its own beliefs and objectives. It is nevertheless worthwhile to note that clear parallels can be drawn between the vulnerability and fragility literature as illustrated by the components of fragility indices reviewed in annex 3. This is clearly illustrated by the work of the OECD on state fragility. Indeed, the OECD characterizes fragility as the combination of exposure to risk and insufficient coping capacities of the state, system and/or communities to manage, absorb or mitigate those risks. In recognition of fragility's inherent complexity, the OECD introduced its multidimensional fragility framework in 2016. This framework captures the diversity of those contexts affected by fragility, measuring it on a spectrum of intensity across five dimensions: economic, environmental, political, security and societal.

Besides conflict and violence, health shocks are also key factors of social vulnerability. Since the adoption of the Millennium Development Goals in 2000, significant progress has been made in the area of health in most other developing countries (lower infant and child mortality rates, lower maternal mortality ratios, higher life expectancy at birth, etc.). However, the health situation remains worrying in many areas.

The burden of infectious diseases remains high: of the top 10 causes of the overall burden of disease in developing countries, four remain related to infectious diseases (diarrheal diseases, malaria, lower respiratory tract infections, and HIV/AIDS) despite the commitment to an epidemiological transition with strong growth in non-communicable diseases; Per capita health spending (around $80 on average for 2017) remains low and would be just enough to allow for the proper functioning of the first level of health systems: while per capita health aid more than tripled from 2000 to 2017, peaking in 2013, the golden age of international financing is over; The COVID-19 pandemic is putting pressure on developing economies, their health systems, and household demand for health care. This particularly delicate context makes it even more complex to achieve the ambitious Goal 3 of the Sustainable Development Goals, "Ensure good health and promote well-being for all at all ages," that the United Nations adopted in 2015. After the Ebola and Zika epidemics, the COVID-19 pandemic confirms the vulnerability of developing economies' health systems to external shocks and the urgency to strengthen them and increase their resilience.

Conclusion

This review illustrates three key points. First, only a few existing vulnerability indices rely on a clear framework based on precise definitions of the main concepts of vulnerability, exposure, shock and resilience. Second, the typology of shocks is often not identified clearly enough to allow introducing multiple dimensions in a coherent manner. Third, although following the UN CDP definition of vulnerability, the existing indices most often do not allow clearly distinguishing between (i) structural and non-structural factors, (ii) likelihood of shocks and exposure to shocks, and (iii) factors of (lack of) resilience. This third point, central to the vulnerability literature, highlights the important use of the MVI as a policy tool. The MVI should evidence the structural challenges faced by countries irrespective of their current policies and the political will of their governments.

This review also highlights the fact that the strong links between key aspects of sustainable development implies that many indicators unrelated to the concept vulnerability of the CDP or even unrelated to vulnerability itself, while based on very different theoretical underpinnings, tend to contain sets of variables that are highly similar.

However, a clear multidimensional design also has to avoid taking into account too many factors, some only loosely connected to the vulnerability concept as presented above, and making it a composite index of progress toward the SDGs rather than a genuine structural multidimensional vulnerability index.

CHAPTER 2

Five Criteria to Assess the Vulnerability Indices

At the macro or national level, and even more than at the micro level, vulnerability is a multi-dimensional concept, and its various facets are important. By definition and in different ways, vulnerability is a threat, or an obstacle, to sustainable development. Vulnerability is the opposite of sustainability in its broader meaning. For this reason, vulnerability calls for international support to the most vulnerable developing countries. Such a support requires assessments of vulnerability, according to indicators or indices, which are comparable between countries, reliable, and likely to be used for policy purposes, primarily for the international allocation of concessional resources. Indices should capture the various kinds of vulnerability to be addressed, either economic, social or environmental, and be consistent with the process of resource allocation.

A few words are needed on the semantics of vulnerability. Vulnerability, at the macro level (as at the micro level) is mainly viewed as the risk of being hampered by exogenous shocks, natural (e.g. droughts or typhoons) or external (e.g. terms of trade). It depends on three main kinds of components:- the size of the shocks, recurrent (e.g. instability) or progressive (e.g. rising sea level); the exposure to these shocks (e.g. a small population size); the capacity to cope with the shocks, including the capacity to adapt, or resilience. Structural vulnerability is the vulnerability that does not depend on the country's present will, but is determined by exogenous and enduring factors of the three components (although mainly the two first). General vulnerability also depends on the country's present and future will, which changes more rapidly, essentially through the resilience component. The distinctions presented here are valid for various kinds of shocks and vulnerability, either economic, social or climatic.

Vulnerability is important for growth and (sustainable) development. It is first important for economic growth, due to reasons linked to the occurrence of shocks, both negative and positive, which correspond either to the risk generated by economic instability or to asymmetry effects (the different impact of positive and negative shocks). Vulnerability matters even more for poverty reduction, because instability makes economic growth, itself reduced by vulnerability, less pro poor. It also matters for policy, because the quality of policy and institutions is affected by structural vulnerability (Mc Gillivray, Guillaumont, Wagner, 2017). Finally, economic shocks have detrimental environmental consequences; environmental degradation and shocks have economic consequences for long-term growth.

It is not surprising that vulnerability has been moving up the international agenda, in various ways. From the beginning, the Least Developed Countries (LDCs) have been identified by the United Nations Committee for Development Policy as low income countries suffering from a low human capital and a third criterion corresponding implicitly until 2000, then explicitly to a high structural economic vulnerability (which has been measured by an "Economic Vulnerability Index"(EVI), examined later). Another, more informal, group of countries, the Small Islands Developing States (SIDS) have repeatedly expressed concern about their vulnerability, in particular at the Barbados (1994), Mauritius (2004), and Samoa (2014) UN Conferences, as well as when tsunamis affected Asian and Pacific islands, and in various recent UN resolutions (see supra). A different concern, but also related to vulnerability, and of growing importance in international institutions and meetings is about the fragility of states, in particular in countries facing civil conflict or post-conflict situations. More broadly an increased awareness of vulnerability issues has emerged from the "multiple crises" of the end of the 2000s (e.g. oil prices, food prices, world demand downturn), as well as, and increasingly so, from climate change and violence, two major sources of vulnerability, and now COVID-19.

There are various ways to tackle structural vulnerability. Of course, appropriate policy responses first depend on the kind of vulnerability to be addressed, economic, social or environmental, and on the source of each of them. This holds notably for the domestic or external actions aimed at reducing vulnerability (e.g. economic diversification, adaptation to climate change, or conflict prevention), but also to some extent for policies aimed at compensating countries for the consequences of exogenous shocks. Another avenue is to strengthen partnerships and regional integration. As for international action a key way to tackle vulnerability is to allocate international resources (either ODA or adaptation resources) according to the needs generated by structural vulnerabilities (either economic

The Marshall Islands coping with the effects of climate change and rising sea levels.

Photo: Asian Development Bank 2.0

or climatic): For this, relevant quantitative indicators of structural vulnerability are needed.

The relevance of existing vulnerability indicators, in particular those likely to be used for international policy, should be assessed according to five main principles or criteria. (i) They should be "multidimensional" reflecting medium-term economic vulnerability, and/or long-term physical vulnerability to climate change, and/or of social vulnerability. (ii) To be really considered as "structural", the indicators should be independent of present policy, i.e. independent of the present will of the country. They should primarily capture both the likely size of exogenous shocks, and the structural exposure to these shocks. (iii) They should also be universal in terms of both factors and countries covered, (iv) They should be based on the best available data and (v) be easy to understand. This second chapter details the rationale behind each of those issues and provides recommendations accordingly.

Multidimensionality: Three dimensions agreed, but borders to be clarified and country specificity to be highlighted

The MVI should include the main dimensions of vulnerability to be equitable and to gather a broad support across stakeholders. Three dimensions of vulnerability (economic, environmental and social) appear to form the base of the consensus. Indeed, to be multidimensional, vulnerability should be understood in a broad sense and cover central aspects of risks to sustainable development. As explained in the first chapter and restated above, the definition of a coherent framework is key to articulate those dimensions in a new index. This is particularly the case for social vulnerability for which the consensus on its perimeter and rationale has emerged more slowly, notably in the context of structural vulnerability. This strong focus on social vulnerability also opens the door to a discussion on the role of resilience and the introduction of some of its structural aspects directly in the MVI and more broadly illustrates the

issue with overlapping dimensions and definitions. The CDP EVI illustrates this aspect. Designed first as an index of economic vulnerability to external and natural shocks, it evolved in its last revision to become a general index of structural vulnerability combining an index of economic vulnerability and an index of environmental vulnerability while maintaining the same set of variables and somewhat keeping (even if no longer explicitly) its exposure/shock original structure. It means that what represented economic vulnerability has evolved to some extent to become environmental vulnerability. This section discusses avenues to disentangle the various aspects of vulnerability.

The economic dimension

The economic dimension may be defined as the risk for an economy to be harmed by exogenous shocks. It has been for a long time the major, if not the only dimension captured in vulnerability indices. This was well reflected in the initial versions of the EVI of the CDP, as well as various others such as the former Commonwealth Secretariat's EVI or the CDB's EVI. It is not to say that only economic shocks were considered, but all shocks were considered with regard to their short- and medium-term economic consequences. The economic dimension was a dimension with regard to a potential economic impact. It was clear for instance that the CDP EVI was designed to capture natural as well as external shocks.

Since the economic vulnerability of developing countries is linked both to natural and external shocks, it makes it difficult to disentangle economic and environmental vulnerability. Either purely economic or "economic and environmental" the vulnerability index should be measured as an indicator of structural handicap and not depend on current economic policies (see below).

The environmental dimension and the challenge of climate change

Natural or environmental shocks are a main source of economic instability and they are often measured through their immediate economic impact, which justifies the apparent overlap between the two dimensions. Shocks directly affect countries' economic outcomes through three main channels reflecting different kinds of exposure: (i) Impact on human lives (death, injury); (ii) Impact on capital (destruction of infrastructure, productive capacities or housing and homelessness, lower human capital accumulation); (iii) Impact on natural resource (destruction of forest, farmland or crops, lower yields). Each channel in turn can affect economic growth and development, depending on resilience. As there is a rationale for combining the economic and environmental dimensions of vulnerability under the umbrella of their short- and medium-term economic impacts, this view does not seem to fully capture the extent of the potential impact of climatic and environmental factors on sustainable development. Two specific aspects have to be discussed.

First, it is often argued that existing indices do not cover the extent of environmental exposure to shocks nor the range of environmental shocks themselves. The difficulty to find reliable data often limits the ability to go beyond what is currently used (victims of disasters, instability of agricultural production) and there is often a tradeoff between the precision of the concepts added to the model with a lesser accuracy in the overall measurement of vulnerability. This, in turn, explains the often large discrepancies between the extent of indicators covered under the countries' national disaster management plans and the use of broader proxy variables in indicators intended for international comparisons. Furthermore, while some environmental factors are important in explaining specific country development trajectories, they can only be loosely linked with specific shocks, even if environmental stress experienced by developing countries and notably SIDS could become a factor of vulnerability as it generates instability over time. This makes their use difficult in the context of a vulnerability index, which is different from a combination of factors correlated with economic development. This is also a difficult vulnerability measurement because of the lack of data making the MVI non-operational.[27]

Second, inspired from models of environmental hazards, it is argued that shocks affect not only the economy in the short term but also the environment directly and that, according to this view, environmental vulnerability should consist in measuring the risk of an environment to be harmed by exogenous shocks in symmetry with economic vulnerability. This aspect of vulnerability is often left aside in existing MVIs. The difficulty comes from the fact that it is often not possible to disentangle the effects of exogenous shocks from the ones of local human activities as well as of local regulations and incentive schemes. The case of anthropogenic hazards is particularly complex, as disentangling the effects of purely exogenous factors from those of unsustainable practices on, for example, the negative trends in biodiversity, tree cover, marine life, or natural resources (or capital) in general, is a difficult exercise. Furthermore, one could argue that related proxy variables are already included in the economic dimension of most MVIs, as in the case of the CDP EVI (in particular through the instability of agricultural production and the percentage of population victim of natural disasters or the share of agriculture, forestry, and fisheries in the GDP, and the indicator of population living in low lying coastal areas or in drylands).

[27] As a follow-up to this report, a panel of environmental data experts could suggest some environmental stress data based on what is available to be included.

What is clearly not captured in this case is the long-term physical impact of climate change, occurring progressively or through increasing recurrent shocks. Vulnerability to climate change, which is a vulnerability to a specific kind of shock, stems from a risk of long-term change in geophysical conditions rather than from a growth handicap in the medium term. In other words, it is more physical than economic, and has a longer time horizon. Vulnerability to climate change is understood here as a vulnerability to a specific global and progressive shock, likely to translate into country-specific shocks through various events. Exposure to climate change is a central challenge for many countries as it implies the diminution of the overall usable land surface either through desertification or sea-level rise or the intensification of adverse climatic shocks (more storms per year, more drought, etc.). It is not fully captured by the environmental vulnerability index of the CDP EVI. It is not appropriate here to use indices, which are an assessment of the economic damage expected in the future from climate change. These estimates are inevitably debatable, as well as limited and arbitrary and highly prone to measurement errors notably in developing countries (without even factoring indirect costs). And it depends on future technology and policy. Inversely it has been possible to estimate past damages from disasters covered by the CDP EVI. As with structural economic vulnerability, and in fact more so, the physical vulnerability to climate change should be designed to be independent of present (and future) country policy. For this reason, its measurement should be based only on physical characteristics and trends. There are indeed two components of the general vulnerability to climate change. Firstly, there is the exogenous vulnerability, which results directly from climate change and for which policymakers in low-emitting countries are not responsible, and which justifies external support. This is not the case for the second component, the vulnerability that a country could reduce by improving its policies. However, most of the available vulnerability to climate change indices such as the ones presented in the previous chapter combine the two types of vulnerability, which allows them to offer a broad view of a country's vulnerability, but makes them less structural and not usable for aid allocation.

The social dimension: Disentangling social shocks and structural resilience

As indicated in the previous chapter, many vulnerability indicators include variables linked to social vulnerability (Commonwealth Secretariat UVI, CDB MVI, INFORM index, CDP Supplementary Graduation Indicators, South Pacific Applied Geoscience Commission environmental index, etc.). This is linked to the fact that countries with a high level of social vulnerability are at risk of facing significant economic and fiscal shocks linked to social unrest, violence and conflict but also health shocks such as epidemics or the COVID-19 pandemic. With the current pandemic we are witnessing a significant manifestation of social vulnerability through high mortalities of vulnerable populations in addition to the difficulties for governments in providing supports to people in vulnerable situations. In addition, this specific vulnerability is reinforcing the social impact of other kinds of shocks, for instance making it more likely that natural disasters trigger economic and social crises of significant magnitude. Violence is often the manifestation of a long-standing situation that has been deteriorating without proactive support at the right time to address the issue. Thus, this social dimension has to be taken into account in any vulnerability index in order to make it multidimensional but also for the MVI to become a tool for prevention. Nevertheless, the inclusion of this dimension raises two issues, one related to the measurement of the corresponding shocks, the other to the measurement of the country exposure and resilience.

First, the economy's structural characteristics that create a lack of resilience are also sources of structural social vulnerability. These are features linked to the overall level of development and imply social vulnerability rather transversal and more difficult to isolate from the other dimensions of vulnerability. Measures that give information as to the level of human capital (such as health and education), and variables that influence the ability of countries to respond to shocks (such as level of income per capita) are critical characteristics impacting on structural vulnerability. Specifically, where human capital and income levels are particularly low, economies as well as vulnerable populations do not have the flexibility or resources to respond adaptively to shocks. Further, as such countries and vulnerable populations within those countries are prone to being hit harder by shocks, they fall into a "trap" or a vicious circle where, because they are underdeveloped, they bear more costs as the result of a shock, which further lowers their human capital and income levels over time, leaving them even more vulnerable in the future (Guillaumont 2009a). In essence, the risk of getting trapped results from the conjunction of structural economic vulnerability (stricto sensu) and low human capital, in countries with low income per capita. This is the reason why a low level of income per capita, a high EVI, and a low level of human capital are considered complementary criteria for the identification of the LDCs.

Resilience depends on so many factors that, in the end, it seems difficult to measure. However once again, it is necessary to distinguish two kinds of factors influencing the level of resilience, structural characteristics, that are not influenced by the present will of government and evolve slowly over time, and present policies. Policies that contribute to resilience consist, for example, to discourage the buildup of large external financial imbalances (unless they are used for productive investments that can finance debt repayment over time); to

The Ebeye Water Supply and Sanitation Project is linking all households in Ebeye, Marshall Islands to upgraded freshwater and sewage facilities that reduce water leaks and sewage overflows.

Photo: Asian Development Bank 2.0

promote financial market stability and the prudential behavior of financial entities; to promote depth and access to the financial system, including insurance. Covering all these topics would require building a broad index of good governance. In short, to introduce the full extent of social vulnerability in a MVI, resilience has to be taken into account.

Second, social shocks that impact sustainable development must be introduced directly. Shocks such as health and idiosyncratic or recurring shock reflecting pandemics or elevated burden of diseases directly affect the well-being of populations. Another main manifestation of the structural social vulnerability in this context is the recurrence of conflicts and violent events that the organization of society is unable to ward off. Countries that face recurrent episodes of violence are vulnerable even more when violence is explained to some extent by other types of vulnerabilities (economic and natural shocks, climate change, etc.). While all these risks could be mitigated to a certain extent, through resilience building, they are likely to remain substantial in the short and medium term, increasing in particular the countries' risks of debt distress. In comparison to larger fragile states where problems tend to be complex, multifaceted and largely structural in nature, few small states suffer from the same kinds of issues related to fragility, notably conflicts and wide spread violence. However, fragile small states are likely to be weakest in terms of capacity and legitimacy of their government compared to larger fragile states, which speak directly to less structural problems of governance. However, the lack of legitimacy is also driven by exogenous factors such as the influence of drug trafficking in the Caribbean. This means that it is necessary to separate, as for other kinds of vulnerability, the structural components of fragility, which can be captured through insecurity, or conflict indicators computed from its non-structural components related to the quality of policies and governance. It is also necessary to recognize that other types of structural vulnerability (external, environmental, climate change) also influence security. In SIDS particularly, humanitarian support to the most vulnerable and marginalized communities as well as recovery dimensions related to health, social services per se is being challenged at an alarming scale and rate by recurring natural and environmental shocks within these extremely short and limited "recuperation" phases. Both increased frequency and magnitude of hazards poses major concerns for the leaving no one behind principle, not only after a shock but in the long-run with the pillars of social cohesion being weakened each time a bit more, without enough time and resources to rebuild them. Measuring structural social cohesion is difficult and

the list of structural factors of "latent social conflicts" is long, controversial, and composed of elements for which the quality of available measures is debatable and not precise, such as ethnic tensions, inequalities, regional dynamics and many more. Most of the common factors highlighted by the literature on conflicts and violence are already taken into account either through other types of vulnerabilities or by variables reflecting structural and non-structural resilience (such as governance). This means, following the literature, that the exposure part of this particular vulnerability is already proxied by the other indexes of vulnerability and resilience and one should be careful to avoid redundancies when designing an MVI.

The aggregation of multiple dimensions: Capturing country specificity by appropriate averaging

As more and more dimensions are taken into account and components introduced, a MVI could risk, though a global average, providing vulnerability scores and rankings that mask the specificity of particularly vulnerable groups. Using an arithmetic average assumes that the various dimensions of vulnerability are fully substitutable, which is not the case. Alternatively, giving different weights to the various dimensions would be arbitrary (and unfair for some countries). One possible technical solution to overcome this difficulty would be to use a more appropriate averaging (such as a quadratic one), so that the higher vulnerability dimension would have for each country a stronger influence overall.

The choice of the quadratic mean (also called root mean square, RMS) instead of the arithmetic mean, as done by the Commonwealth Secretariat, is based on the idea that the vulnerability of a country may critically depend on the levels of only one or two dimensions or components, whatever the level of the others. The quadratic mean gives greater weight to larger values (and is greater than the arithmetic mean) and allows a limited substitutability between components. The vulnerability of a country may depend on the levels of only one or two components, and the use of a quadratic mean enhances the impact of the component(s), which reflect(s) the higher levels of vulnerability or resilience. As an example, an island with a very large share of area likely to be flooded and an arid country suffering from a highly increasing trend in the instability of the level of temperatures are both highly vulnerable, due for each of these two countries to a specific component, even though they are not vulnerable with respect to other components of the index. Thus, a high vulnerability to climate change will be better evidenced by using the quadratic average, rather by an arithmetic average. A quadratic average evidences the vulnerability of each country in its specificity. By organically giving more weight to the components representing the highest source of vulnerability for each country, it allows us not to rely on an ad hoc weighting scheme.

Briefly stated, a major criterion to select the most appropriate way to combine indicators in a new MVI is that it must allow for limited substitutability between components. This is currently not the case with most indices, which favor simple arithmetic means. Of course, it might be useful to go beyond this limitation by determining thresholds beyond which vulnerability compromises sustainable development. This would imply in-depth research and the results would hardly lead to an operational consensus. Admittedly, the thresholds used for inclusion or graduation go in this direction but similarly are not based on an empirical analysis of what actually compromises sustainable development.

In conclusion, the MVI will be all the more relevant if the way by which its dimensions are aggregated and articulated highlights the specific vulnerability of each country.

Universality: Could the MVI be focused only on SIDS?

The search for a MVI is an exercise presently driven by SIDS concern. The MVI should indeed well capture the vulnerability of SIDS. But the credibility of a MVI is linked to its comparability between the various groups of (developing) countries. SIDS cannot be said to be "more vulnerable" than other developing countries if their vulnerability cannot be compared to that of other (developing) countries. Noticeably for example LDCs are themselves identified partly with regard to their vulnerability, for the measurement of which the EVI has been built, and LLDCs also have special vulnerabilities which should be addressed. The magnitude and frequency of external shocks combined with economic structure characterized by the lack of economies of scale and scope represent major challenges to SIDS' development but other categories of vulnerable countries are also exposed to exogenous shocks (resource rich, resource poor, fragile countries or countries with pockets of insecurity, etc.).

While resilience is strongly correlated with income per capita levels, it is not necessarily the case for the structural vulnerabilities, where middle-income countries and notably many upper-middle-income ones present very adverse vulnerability profiles. It is extremely difficult for some countries and notably small states to significantly and rapidly reduce their structural exposure to exogenous shocks, notably climatic ones, even as income levels rise and consequently, to less extent, their vulnerability in general, even if long term strategies are needed and can be put in place to progressively do it.

The challenge is to build the index so that the specific vulnerability of each group of country is adequately reflected. The focus solely on SIDS characteristics would find a rationale only if it was to be used by (financial) institutions exclusively devoted to SIDS for the allocation of their funds. But even in

this case a universal MVI would be needed to argue that such institutions should be set up or extended.

In a balanced index where challenges of all developing countries are considered including SIDS, the index could be useful in facilitating support for SIDS and would demonstrate their relative vulnerability.[28] As explained in the previous paragraph, this can be obtained by using an average method allowing only a limited substitutability between the various dimensions (and each dimension component as well) such as a quadratic average.

However, it does not mean that the specific vulnerability profile of SIDS should be left aside. Being highly dependent on tourism as a major source of export earnings, SIDS are vulnerable to external economic shocks.[29] Likewise, SIDS are more dependent on inflows of remittances than other developing countries. Countries that import significant quantities of products either for direct consumption or as inputs (i.e. energy) such as SIDS can also face negative economic consequences when the price of those products fluctuate significantly.

Overall, all those factors as well as a few more such as openness to trade or instability of exports are directly linked to smallness. Smallness of population size is indeed a major structural factor of vulnerability. It was originally included in the CDP EVI and its weight was reduced over the last couple of revisions and finally removed in 2020. This reflects the view that it is the consequences of smallness that constitute the vulnerability of SIDS, not smallness itself. Hence introducing smallness as a factor of vulnerability alongside other factors related to the size of countries would lead to a double counting of the impact of smallness on overall vulnerability. Furthermore, some aspects of smallness are not correlated with vulnerability such as the impact of smallness on social cohesion and a decreased probability of conflict and violence.

Separability between exogenous and inherited factors

One of the key characteristics of the various vulnerability indices presented above is that they represent only the structural aspects of vulnerability and to some extent structural resilience as well. This focus on structural vulnerability represents the consensual view that only high structural vulnerability can be the basis for improved access to concessional finance. In effect, to be compatible with the Performance Based Allocation (PBA) model used by most developments banks and aid agencies, the vulnerability resulting from a present policy weakness should not lead to the allocation of more aid, while on the opposite the structural vulnerability does justify a higher level of assistance. As aid is mostly allocated according to governance and policy performance indicators, a vulnerability index that does not disentangle structural factors from policy effectiveness elements (for example, effective institutions for macroeconomic stabilization and for building fiscal buffers in good times) would not be useful for aid allocation purpose.

The distinction between what is structural and what is not is crucial as it conditions the use of the index for resource allocation. Specific positions relative to this question often explain the significant differences between indices. A general rule of thumb consistent with the various positions discussed in the literature could be the following: To be really considered as "structural", the indicators should be independent of present policy i.e. independent of the present will of the country. More precisely, vulnerability is "structural" when it results from factors beyond the present control of the countries' governments, including the long lasting consequences of past policy choices that the present authorities have inherited and cannot be reversed or altered in the short-term. Structural vulnerability indicators should rely on long-lasting factors measured over significant periods, so that they reflect either medium-term economic, environmental or social vulnerability (or long-term physical vulnerability to climate change). They should primarily capture both the likely size of exogenous shocks, and the structural exposure to these shocks. As a consequence, the structural vulnerability and its various components are likely to evolve slowly overtime.

Shocks, exposure, and resilience: what is exogenous?

It has been argued that in a Vulnerability/Resilience framework using only indices of exposure to shocks is the best approach for measuring vulnerability (Briguglio, in Lewis-Bynoe 2014), all the more when "result variables" are considered, reflecting altogether the intensity of shocks, the exposure to the shocks and the resilience of countries. However, this approach, raises several issues. It assumes that the set of variables chosen in the index (exposure and resilience) explains 100% of the hazard of shocks occurring in a country, whatever the intensity of past shocks, their size and recurrence: The intensity, size and recurrence of past shocks reflects the probability of such shocks to occur in the future (it is a proxy for future hazard). In the longer term, the recurrence of macroeconomic instability

[28]For example, some of the characteristics of SIDS also applies to Landlocked Developing Countries (LLDCs) and should be captured in the MVI—exposure to exogenous economic shocks, export vulnerability, high cost of basic infrastructure, higher unit costs of investment in the industrial sector, limited size of domestic markets, and distance from major markets—affecting their creditworthiness—in addition to these an MVI that takes into account the specificity of LLDCs would require factoring in transit issues, trade facilitation at borders or in general trade costs and environmental factors such as desertification, climate change related disasters such as floods, persistent droughts and glacial lake outbursts or climate change impact on mountains.

[29]The tourism sector accounts for more than 30 percent of total exports in many SIDS.

may weaken the economic and social structure, which further increases these countries' vulnerabilities to economic shocks. Overall, when they are recurring and exogenous, past shocks can be considered as structural factors of vulnerability.

It was also argued that the exposure-only approach (focused on economic results) was acceptable for the SIDS. However, it is not the case anymore with a broader scope of vulnerability particularly when climate, climate change and social vulnerabilities are introduced in the framework, since their economic impact is indirect and cannot be quantified. Even if a measure of economic damage from past disasters due to natural hazards may be introduced as a proxy of "environmental vulnerability", as often done, it cannot capture all the likely impacts of climate change, which can only be assessed in physical terms. Introducing social vulnerability raises the same issue with the introduction of a shock variable reflecting social unrest or health related shocks. Moreover, assessing the vulnerability/resilience nexus from economic results does not allow disentangling structural vs policy factors. Briefly stated for a MVI to capture what is exogenous or structural it is necessary to assess risk of being harmed by exogenous shocks through variables reflecting the intensity and recurrence of past shocks, as well as the exposure to these shocks.

What is structural vulnerability? Taking also into account structural (lack of) resilience

While it is clear that only "structural" components should be included in an MVI, when referring to the size of the shocks and the exposure to these shocks, it might be asked why the index does not include the resilience factors that are structural. The capacity to react (or 'resilience'), on which general vulnerability also depends, mainly depends on present policy, but it also depends on structural factors, what can be called structural resilience.

These structural factors of resilience are broad factors, somewhat captured by GNI per capita and the Human Assets Index (HAI), which with EVI, are already used as complementary criteria for the identification of LDCs by the CDP, and for aid allocation as well. Other indices such as the UNDP Human Development Index (HDI) or Multidimensional Poverty Index (MPI) could also reflect this dimension. Including them in the vulnerability index would slightly modify the current definition of vulnerability and its scope. Structural lack of resilience is distinct from structural vulnerability, as it does not influence directly the probability and size of future shocks, nor its immediate potential impact due to the country exposure to shocks, but rather their likely impact on sustainable development. By introducing resilience components in the MVI, it not only covers the risk of being harmed by exogenous shocks in the short and medium term but also the likely long-term impact of shocks. Indeed, two equally structurally vulnerable countries may show a different ability to withstand shocks because of their level of resilience, whether due to good policies or structural characteristics (see Box 1).

Resilience not only depends on the current will of countries; it also depends on structural factors, which make the effective implementation of resilience policies more or less effective. The structural characteristics of the economy, which are sources of structural vulnerability, also create a lack of resilience. A low level of income per capita and/or of human capital (mainly health and education) indicate the extent to which a country's inhabitants will not be able to cope with shocks and also condition the ability of governments to implement an effective macroeconomic policy. When income per capita and capital accumulation (physical and human) is low and poverty and inequalities are high, economies do not have the flexibility or resources to respond adaptively to shocks. Furthermore, as noted above, those factors of low resilience can also be considered as factors of high social vulnerability under the definitions used in risk models.

Resilience refers to the ability to cope with exogenous shocks by implementing measures to correct or mitigate their effects. It influences the magnitude of the impact of external shocks on sustainable development. However, resilience, as suggested above, not only depends on the current will of countries; it also depends on the structural factors of the countries, such as their physical or human capital, their infrastructure and more generally their level of development or per capita income that result in a more or less effective implementation of resilience policies. At the same time, structural resilience is distinct from (structural) exposure to shocks. The exposure to the shocks determines the potential impact of the shocks: For instance, the trade dependency (exposure) determines the potential impact of trade instability (shock). The structural resilience contributes with the exposure to determine the potential impact as it does not influence directly the probability of future shocks but rather their likely impact on sustainable development.

Resilience can be more easily assessed ex post than ex ante, as it is revealed by social or economic outcomes in the aftermath of a shock. However, this revealed resilience mixes structural and non-structural factors. Simultaneously it is easier to assess the structural factor of resilience, rather stable over time, than the possible reaction of public and private agents after the shock as well as the expected effectiveness of public policies. When looking for a possible indicator of resilience, these two components should be explicitly taken into account separately, mainly since the lack of structural resilience should be used as a positive factor for aid allocation reflecting significant financing needs, but not the lack of policy resilience, to remain compatible with a performance-based allocation framework.

Box 1: The elusive long-term economic consequences of natural and environmental shocks

The expected long-term impact of each type of shock is uncertain, and this is particularly true of natural hazards, as the lack of a real consensus on the question of their long-term economic impact would seem to indicate. Indeed, various structural and non-structural characteristics tend to influence the stages and trajectory of the propagation of the shock on the economy. Natural and environmental shocks have a negative short-term effect by reducing the stock of available human and physical capital. This reduction in GDP can be even more direct, as when a drought reduces agricultural production.

While a negative impact is commonly observed in the short term, the impact of natural and environmental shocks in the medium to long term is open to debate. For example, the impact will be negative if business disruptions, loss of inputs, disruption of value chains or reductions in demand or tax revenues (among other channels) are greater than the increased activity associated with reconstruction and the possible increase in productivity that follows the adoption of new technologies. It is also important to note that the long-term impact on human capital is difficult to reverse (e.g. children being undernourished or withdrawn from school during difficult times).

Thus, as the graph below shows, the macroeconomic impact of a natural or environmental shock depends to a large extent on the vulnerability and resilience (i.e. general vulnerability) of the affected country.

In scenarios (1) and (2) in Figure B1 below, the shock does not influence the long-term growth path of incomes: the shock has a negative impact on GDP, followed by an expansion during reconstruction and the level of output returns to its long-term equilibrium state. In scenario (3), as the shock has permanently reduced the capital stock, the new long-run equilibrium is set at a lower level of GDP. Finally, in scenario (4), the replenishment of human and physical capital leads to technological changes that improve the long-term growth rate of the economy.

It should be noted that different types of shock can be associated with different scenarios. For example, an earthquake is more likely to be associated with scenarios (2) or (4) because it is usually followed by a large-scale reconstruction phase that may trigger growth in the economy and potentially, in time, technological change. Conversely, scenarios (1) or (3) could correspond to a drought, because when losses are generally limited to annual production and household livelihoods, production potential is unlikely to increase without significant investment in irrigation or other drought-reducing technologies.

These different scenarios illustrate the diversity of possible economic effects of natural and environmental shocks, while highlighting the importance of the characteristics of the affected countries and the policies pursued for adaptation and reconstruction. All of these factors are reflected in the concept of general vulnerability that takes into account resilience.

Figure B1: The different types of economic impacts following a natural or environmental shock

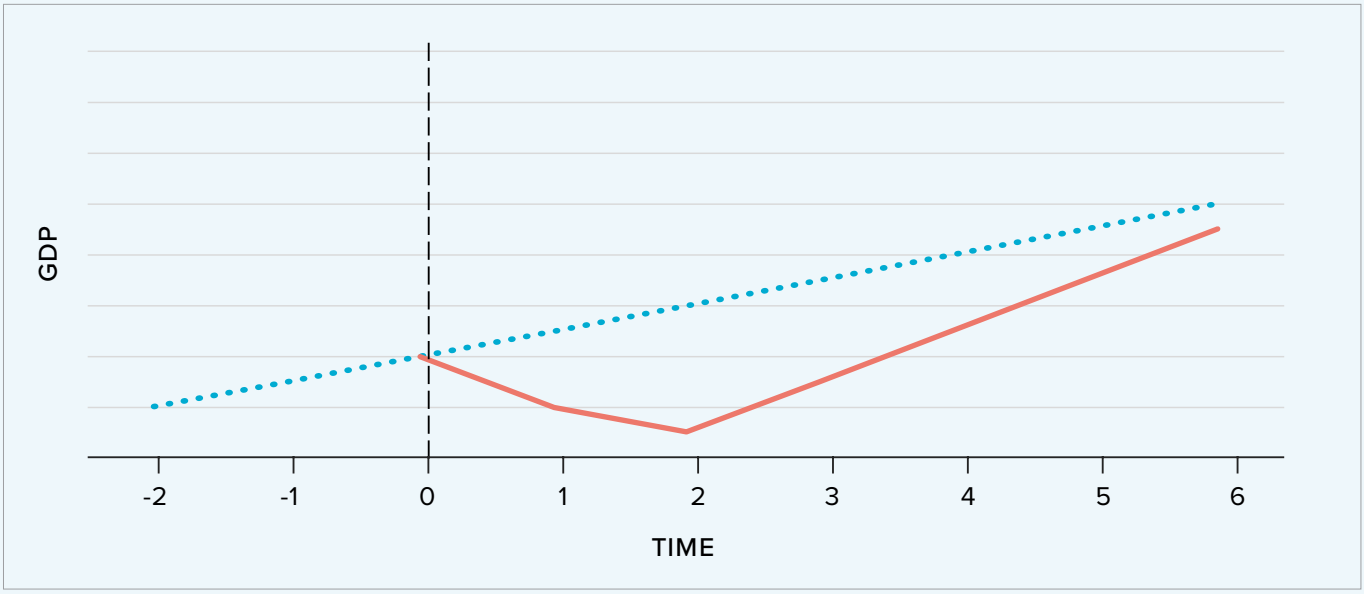
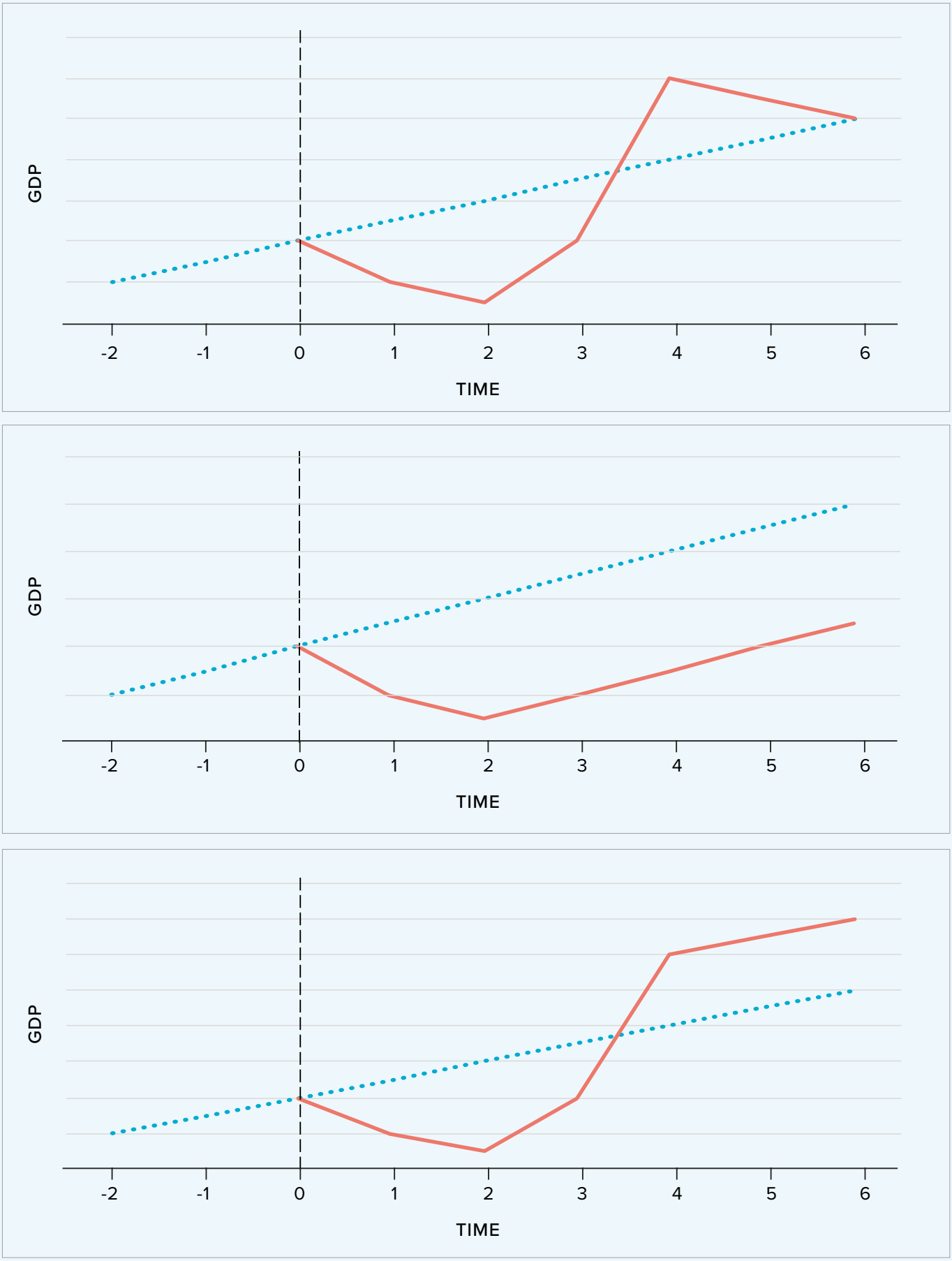


Figure B1: The different types of economic impacts following a natural or environmental shock (continued)



Note: The shock occurs at t=0. The red line represents the deviation from the counterfactual (blue line) in the absence of the shock.
Source: Authors' adapted from Chhibber and Laajaj (2008).

Structural resilience and non-structural policy resilience

Both the lack of structural resilience and a high level of structural vulnerability constituting general structural vulnerability should be used as a positive factor for aid allocation reflecting significant financing needs, but not the lack of (non-structural) policy resilience reflecting poor performance, to remain consistent with a performance based allocation framework.

Structural vulnerability measures the risk of getting impacted by an exogenous adverse shock (external, natural, etc.). This likelihood of exogenous shocks is approximated by measuring the recurrence of past exogenous shocks as well as the level of exposure to those shocks. According to this definition, exposure to endogenous shocks (or the shocks that are themselves caused by poor policies) is not directly taken into account nor the likelihood of their recurrence both of which represents non-structural vulnerability.

As non-structural vulnerability is manly driven by bad policy performance, it is indeed very difficult to disentangle non-structural vulnerability from non-structural resilience, a concept very similar to average policy performance. Both non-structural vulnerability and in the opposite direction non-structural resilience would then be proxied by a very similar set of indicators explaining both the probability of occurrence and likely size of endogenous shocks as well as the quality of the government response to those shocks.

Briguglio et al (2006) define economic resilience as the policy-induced ability of an economy to recover from or adjust to the negative impacts of adverse exogenous shocks. It is constituted of four components, namely macroeconomic stability, microeconomic market efficiency, good governance, and social development. They propose this as an explanation as to why many small economically vulnerable states generate a relatively high GDP per capita.[30]

This approach, similarly to that of Notre Dame University "Notre Dame Global Adaptation Index" or "ND-GAIN" index presented above that measures the state of readiness of each country (rule of law, political stability, etc.), mixes structural aspects of resilience (through social development) with non-structural aspects. Non-structural resilience represents the present political choices and will of countries facing exogenous shocks, including the quality of macroeconomic management, the quality of the crisis response framework or early warning systems; the design of insurance schemes and appropriate regulations to make the economy more resilient and less exposed to future shock; or their effort to build partnership with other countries to mitigate the effect of exogenous shocks.

Measuring non-structural or policy resilience is a difficult exercise. Which policies are the most important to allow a smooth absorption of shocks (of various origins)? Facing interconnected phenomena, many aspects of good governance matter. There is no obvious way to select what aspects of governance are most relevant in this context. Available resilience indicators are often mixed bags of various broad components covering many issues. Furthermore, it is very difficult to find purely non-structural aspects of resilience as the outcome of public policies are more often than not influenced by structural factors themselves. Economic policy uses different instruments. Instruments and their use define the policy stance. The policy stance and its efficiency give the impact of the policy on economic outcome. Exogenous structural features then affect economic outcomes in three ways:

- Directly.
- Through the choice and the use of policy instruments by governments, so that policy stance is then partly induced by the nature and the level of structural feature.
- Through the efficiency of the policy or the degree of "response" of the economy to policy actions. In other words, policy efficiency is partly function of structural features.

Policy stance, policy efficiency and its impact on outcome and the various impacts of structural features are not observable directly, so there is a need for synthetic indicators of policy. The construction of a policy indicator can then follow two directions:

- Through policy instruments (or policy stances), giving the instrument-based indicators.
- Through the impact of policy on outcome (policy stances associated with efficiency), giving the outcome-based indicators.

The two kinds of indicators may not generate the same diagnostic, the difference being explained mainly by policy efficiency, which should depend on the length of transmission channels between instrument use and outcomes. However, the difference between diagnostics is not systematic. First,

[30]The authors explain this in terms of the juxtaposition of economic vulnerability and economic resilience, identifying four possible scenarios into which countries may be placed according to their vulnerability and resilience characteristics. These scenarios are termed as "self made", "prodigal son", "best case" and "worst case". Countries classified as "self made" are those which are inherently highly economically vulnerable but at the same time have built their economic resilience through the adoption of appropriate policies that enable them to cope with or withstand the effects of their inherent vulnerability. Countries falling within the "prodigal son" category are those with a relatively low degree of inherent economic vulnerability but whose policies are deleterious to economic resilience, thereby exposing them to the adverse effects of shocks. The "best case" category applies to countries that are not inherently vulnerable and which are relatively well governed economically. Conversely, the "worst case" category refers to countries that compound the adverse effects of inherently high vulnerability by adopting policies that run counter to economic resilience. The four categories were also used by the Commonwealth Secretariat to qualify the general vulnerability profile of its members.

instrument-based indicators may include efficiency in instrument use. Second, outcome-based indicators may be approximated by intermediate policy outcomes instead of final outcomes.

There are no criteria to favor, a priori, one kind of indicator over the others. On one hand, instrument-based indicators require much work to gather data on the different instruments. They suffer from a high degree of subjectivity, since questions about policy instruments and the assessment of the changes can be ambiguous. In addition, it is difficult to compare all of the characteristics of policies between countries and to derive a quantitative and synthetic indicator. Moreover, arbitrariness is unavoidable when characteristics or instruments are aggregated to build a synthetic indicator. On the other hand, outcome-based indicators are influenced by exogenous factors and cannot represent policies alone.

One could turn to econometrics to regress the effect of structural vulnerabilities and structural resilience on the volatility of GDP growth. The residuals could then be interpreted as the revealed non-structural resilience. However, this particular methodology leads to a set of technical issues (specification, stability, etc.) that renders its use doubtful in this context.

This means we should rely on instruments when relevant. We could use a selective approach based on a census of instruments aimed at mitigating the effects of shocks. This approach comes with its own set of issues, namely:

- How to make sure that the list of instruments is really comprehensive using publicly available data?
- How to take into account the effectiveness in the use of those instruments?

Availability: Large coverage and reliability

It seems better to build those indicators from internationally recognized and already existing indicators, whenever possible, in order to legitimize the approach and achieve the largest coverage possible. The coverage concern has to drive the choice of specific variables to include. Measuring past shocks requires longer time-series that reduce the range of dataset available but also implies to select the period over which those shocks are measured. Whenever possible indicators with perfect or near perfect coverage should be preferred.

However, for some specific aspect of vulnerability and resilience (for example poverty levels) approximations and imputations might be necessary notably to ensure that all developing countries are included. The necessary balance between data availability and the importance of specific factors to build the MVI framework should not be a sufficient reason for inaction.

While it is important that most or all developing countries are included in the sample, it seems less useful to produce figures for developed countries. As evidenced by the list of indices presented above, each institution, with specific goals in mind, included variables in their own indices that do not always overlap. The debate on the specific factors to include in a MVI often represent a trade-off between political considerations, relevance, simplicity and data availability.

Readability: The framework and its results have to be easy to understand

The redundancy of components from one indicator to another should be avoided when multiple composite indices are used. For example, it is the case for UNCTAD's Productive Capacities Index that was introduced in the EVI+.

Even without redundancies, a positive correlation between vulnerability and resilience is to be expected. In the long run, vulnerability and resilience impact one another and structural components influence the way policies are designed and implemented. This is why the design of the conceptual framework is important as it justifies the inclusion of each component.

More precisely, specific sub-indices of vulnerability and resilience should be designed. Specific vulnerability indexes should reflect clear visions on the kind of vulnerability faced by developing countries and should avoid being tailored to a specific group (i.e. small states), without omitting to capture their specific vulnerability.

Similarly, while some vulnerabilities can influence others (i.e. climate change and social vulnerability) the three dimensions are needed to capture the vulnerability profile. However, redundancies in sub-components of the indexes should be avoided and a low correlation between vulnerabilities should be sought.

The optimal number of components of each composite indicator is a difficult choice: a large number of components, as it is often the case in the literature, has the disadvantage of weakening the weight and the visibility of the components that are the most representative of what the indicator must reflect.

Once the MVI index and its sub-indices have been built, a specific analysis of their values based on specific thresholds (such as a traffic light system) rather than a simple ranking could enhance the readability of the results.

CHAPTER 3

Implementation and potential use of the MVI

Once agreed that a MVI should be built according to required criteria explained above, this index should be set up, accepted, implemented and used for its intended purposes. Besides the usefulness of such an index for the general issue of aid allocation, several events have made the need of the index highly useful and evidenced how it should be used for domestic, as well as international policies.

Why a new MVI is urgently needed and how the COVID-19 crisis evidences this need

Developing countries are facing the COVID-19 crisis head-on. External, both epidemiological and economic, shocks –which reinforce each other — are undermining the health and the economy of these countries. The economic shock could have a more significant impact on mortality than the epidemic itself.

The first shock is epidemiological—the importation of the virus with an unequal spread between countries at this time. The question is to know if the epidemic spread will be similar to that observed in the developed world or if the slow access to vaccine will prolong the duration and severity of the crisis. This aspect of vulnerability evidenced by a number of deaths can be captured through the social dimension of a MVI.

The second shock, which is likely to be more severe, is the economic shock. We know that it has been brutal, particularly in tourism or commodity exporting countries. Countries benefiting from significant migrant remittances whose incomes are themselves affected by the recession in emigration countries. Remote countries, such as SIDS, LLDCs and LDCs, often depend on basic imports, including food, pharmaceuticals, personal protective equipment and fuel, which was also limited by the global lockdown. The importance of the informal sector does not seem to mitigate the impact of the economic shock. With consequences on food and sanitary situations, the economic shock will have considerable effects on the health of populations and mortality. In LDCs in particular, the effects of the economic shock on mortality, particularly among young children, can outweigh the direct effects of the epidemic. These effects, both on the level of activity and on the level of mortality can be captured through the economic dimension and the social dimension of a MVI.

The two types of shocks reinforce each other. The recession will increase the difficulties in combating the epidemic. At the same time, it will contribute to lower the economic activity, not only in the short term but also in the long term due to the now well-known consequences of poor health. Finally, the interaction of the two shocks creates fertile soil for internal conflicts with a high risk for fragile States. Countries' experience shows that conflicts are a factor in the spread of diseases. This shows how it is relevant to consider vulnerability in its various dimensions.

The COVID-19 pandemic and its effects in developing countries illustrate in a cruel light how vulnerability to shocks combined with low resilience can act as a severe and long lasting detrimental effect on economic growth and sustainable development. It also reminds us that shocks have economic, social and environmental impacts, often interconnected, and that structural factors lead to a high sensitivity and exposure to exogenous shock.

While it is the responsibility of national policies to mitigate the consequences of exogenous shocks, and so make the country more resilient, history has shown how economic growth and human development are threatened by exogenous shocks of various origins. This is why the fight against vulnerability must be at the heart of international policy aiming at supporting small developing states (and other vulnerable developing countries).

The severity of the crisis generated by the pandemics of COVID-19 may have opened the way for a reform of the international system, where addressing the vulnerabilities would become a common concern. In this context a new MVI meeting the criteria exposed above and supported by a broad consensus would be a powerful tool.

This international effort could be directed towards integrating vulnerability into global strategies of UN institutions, and in-

ternational financial institutions as well. Development partners could recognize that, as it is the case for climate change or fragility, vulnerability is one of the crucial challenges faced by many countries. As detailed in this report, the multidimensional feature of vulnerability means that it overlaps with other markers currently being used by international economic community, such as climate change. By highlighting the connections between the several dimensions of the vulnerability index and existing markers, the MVI could help making vulnerability a more central concern in strategies pursued by international institutions.

International financial institutions are now more likely to recognize that vulnerable countries are facing recurrent exogenous shocks more and more intensively and that the cumulative effect of those shocks harms sustainable development. This is particularly relevant when support, notably concessional, is conditioned solely on GDP per capita thresholds. Countries, which are highly vulnerable, should not graduate from concessional finance at the same speed than non-vulnerable countries with similar income levels.

Finally, tackling the challenge of vulnerability means developing proactive and preventive strategies to help vulnerable countries coping with external shocks. While ex-post interventions and humanitarian support are important tools, the international strategy to address vulnerability must also rely on ex-ante structural programs aiming specifically at reducing exposure and improving resilience. A new strategy that focus on vulnerability would aim to enhancing aid effectiveness by supporting countries in addressing the drivers of vulnerability, measuring related impacts and strengthening resilience. This multilateral effort in tandem with domestic policies could be guided by an MVI where its components are used to inform the choice of instruments and sectorial solutions, as well as monitor and evaluate their related project performance. Given the diversity of challenges related to the multiple-dimensions of vulnerability, there can be no one-size-fits-all approach.

Guiding domestic and regional policies

A well designed MVI may guide policy in three main directions:

- ***Promoting resilient macroeconomic policies.*** Macroeconomic resilience comprises the policy or other transitory economic, environmental, and social factors that allow a country to be more adaptive and less exposed to an exogenous shock. According to Guillaumont (2017), one can compare two countries, which are equally structurally vulnerable, but are differently able to weather shocks due to their levels of resilience. The more resilient economy will be one that is less exposed due to policy implementation. Policies that would fall into this category are those that (i) discourage the accumulation of large external financial imbalances (unless they are being used for productive investment that can finance the repayment of debt over time), (ii) promote financial market stability and prudential behavior by financial entities, (iii) foster depth of, and access to, the financial system including insurance, (iv) encourage responsible fiscal expenditure and adequate revenue collection, (v) facilitate a social welfare safety net to assist those who are hit adversely by exogenous shocks, (vi) enable a flexible but fair labor market that allows for easy job transfer while minimizing exploitation, and (vii) enable appropriate checks and balances with respect to the political and judicial systems such that accountability of decision makers is ensured.
- ***Reducing the social impact of vulnerabilities.*** The effects of the various exogenous shocks, noticeably change-related shocks and natural disasters, affect the livelihood and security of the poor, in particular in rural areas, due to heavy dependence on subsistence agriculture, chronic food insecurity, physical isolation and lack of access to social safety nets. The response to these risks could be to strengthen early disaster response, improve adaptation to global warming, and reform social safety nets so that they are even more extensive and can be used more flexibly during emergencies, through conditional or unconditional emergency pay schemes. Given the impact of climate-related shocks on physical infrastructure, adaptation measures must include regular maintenance of infrastructure as well as its development in the most difficult to access areas. Loss of livelihoods in climate-affected areas may put pressure on migration to areas less affected by climate-related shocks or changes, which may lack the necessary infrastructure and require measures to address resettlement of populations in areas prone to disasters.
- ***Strengthening regional partnerships and regional integration.*** The small, sparsely populated, fragmented, and often isolated vulnerable economies make a compelling case for them to integrate regionally to reap efficiency gains, exploit economies of scale, and provide mutual insurance through policy coordination and regional management of disasters risks. Partnerships to address specific vulnerabilities can also increase resilience, such as by sharing technical capacity and enhancing the economy of scale of resilience projects, pooling of foreign reserves, etc.

Allocating international resources: A limited use of vulnerability

Allocation of concessional finance between countries, when intended to support beneficiaries, always involves a trade-off between country needs and their effectiveness or performance in the use of resources. To what extent do Multilateral Development Banks (MDBs) and other international institutions

who allocate concessional resources consider the structural vulnerability of countries in their allocation process? Actually, they do it more by designing specific windows for special groups of countries than by using an index of vulnerability as an allocation criterion.

Most often the MDBs use a principle or formula called Performance Based Allocation (PBA). The origin of Performance Based Allocation (PBA) can be traced back to the late '70s when it was first implemented at the World Bank, in 1977, for the allocation of the credits from its concessional window, the International Development Association (IDA). For the geographical allocation of development assistance by a multilateral institution, rather than to leave it governed by discretionary practices, it might be seen to be easier to find a consensus among donor members in the apparent simplicity of a mathematical formula, where roughly the amount of aid allocated to a country i is:

Ai = f (Performance, income per capita, population)

While today's practice, still relying on a formula, has become more complex, the core message of the PBA has remained the same for almost 40 years. It is to allocate a larger amount of aid to the well performing countries because aid was supposed more effective in these countries and because it was an incentive to improve policies. The "performance" of countries was assessed according to a Country Policy and Institutional Assessment (CPIA), which represents the alleged quality of their public policy or in other words their commitment to development. This principle of aid allocation became quickly popular among stakeholders and multilateral institutions, as it was supposed to allow accountability to public opinion, rewarding the "good guys" and providing incentives to the others.

There has been, however, a growing consensus that an optimal allocation of aid requires better taking into account needs through the structural obstacles to development that each country faces, that do not depend on the present will of countries, in particular structural vulnerability. To date, vulnerability is directly taken into account only by a small number of IFIs, and on a limited scale (AfDB, 2021). This current trend as well as the over-reliance on specific and dedicated financing windows and instruments reflect a limited (until now) appetite of the main IFIs in incorporating a vulnerability index in their allocation frameworks, what the availability of a robust MVI could now modify.

The Caribbean Development Bank (CDB), which operates in many small islands suffering from vulnerabilities, has for a long time included in its allocation formula a multidimensional assessment of countries' vulnerability to capture their specific needs, and recently moved towards a "MVI" (see above Chapter 1). While the access to the (concessional) Special Development Fund is determined only on the basis of income per capita, the vulnerability index score is one of several criteria (policy performance, GNI per capita, population, etc.) that is used to determine the size of the allocation of each country that has access to this Fund. The CDB's MVI also supports evidence-based policy formulation.

The Asian Development Bank (AsDB) introduced an "economic vulnerability premium" for the 10 SIDS eligible for the Asian Development Fund (AsDF) eligible SIDS under AsDF 13. The size of the premium, set up in absolute terms (US dollars) for 4 groups of countries, depending only on their vulnerability, assessed from the UN CDP EVI. This is in contrast to the base allocation under AsDF 12, which allocated a uniform amount to all eligible countries. The AsDB stopped introducing the EVI in the PBA (which remains the rule for the AsDB funds allocation), due to the fact that the EVI could not capture adequately the various forms of vulnerability of eligible Asian countries (which an appropriate MVI could have done).

The European Commission introduced a vulnerability index in its allocation formulas both for the European Development Fund (EDF), devoted to African-Caribbean-Pacific (ACP) countries and the Development Cooperation Instrument (DCI) devoted to non-ACP and non-ACP developing countries on the period 2014-2020. This reform replaced an extremely complex system, with a multitude of indicators and therefore little transparency, with a simple framework more favorable to poor and vulnerable countries. The country allocations result from a formula, that in addition to a per capita income indicator and the Worldwide Governance Indicators (WGI) produced by the World Bank, incorporates the two indicators reflecting structural handicaps that also serve to identify the Least Developed Countries (LDCs) at the UN (the level of human capital — the Human Assets Index (HAI) and the level of structural economic vulnerability — the Economic Vulnerability Index (EVI). These indicators were taken form by the United Nations Committee on Development Policy.

The IFAD, devoted to agricultural development, went through a long approach to review its performance-based allocation system in 2016 with the aim of better reflecting rural vulnerabilities in their PBA formula. The IFAD assessed several indices to identify a suitable existing index that would comprise rural poverty measures and concluded that no such measure is available. Consequently, IFAD Management sought to identify an existing index that could constitute a solid starting point in developing an IFAD-tailored vulnerability measure. The IFAD Vulnerability Index (IVI) was created to capture the multidimensionality of rural poverty in the country needs component of the PBAS formula. In broad terms, the IVI provides an indication of well-being in rural areas, factoring in the effects of climate change. It is an index of 12 equally weighted indicators that measure rural vulnerability in terms of exposure, sensitivity and lack of adaptive capacity to endogenous and

exogenous causes and/or events. Each of these can be associated with one or more of the IVI focus areas (food security, nutrition, inequality, and climate vulnerability). The index is computed by IFAD, based on internationally recognized data sources. The indicators within the IVI were selected to reflect IFAD's specific focus on poor rural people. The IVI is produced every year, to feed into the yearly allocation calculations. Unlike some other IFIs, IFAD does not have special windows to address the needs of SIDS, but these dimensions are taken into account in the proposed new PBAS formula. SIDS, most of which receive minimum allocations under the current PBAS formula, will benefit from an increased amount of allocation through the higher minimum allocation threshold.

The World Bank once considered an allocation approach that would link IDA's allocations to a country's structural vulnerability and tested a modification of Country Performance Rating (CPR) by integrating the EVI and the HAI. The World Bank found this approach in the past to be less feasible due to several issues such and notably reduction of the performance-orientation of the PBA system, and actually the inadequacy of the indices used for this aim. In order to address the vulnerability of small states member countries without direct inclusion of vulnerability indices in the PBA formula, IDA provides these countries with exceptional treatment in terms of IDA eligibility and increased minimum base allocation, among others.

Under the existing IDA architecture, countries are eligible for IDA resources based on relative poverty and lack of creditworthiness. In 1985, the Board approved a Small Island Economies Exception (SIEE) to these IDA eligibility criteria under which SIDS are granted access to concessional IDA financing even if a county's per capita income exceeds the IDA operational cutoff. Only 24 of 38 SIDS, are eligible for IDA including 16 through the SIEE.[31] 19 out of 32 LLDCs, and 45 out of 47 LDCs were eligible for IDA.[32] The SIEE was introduced in recognition of small islands' special characteristics, including exposure to exogenous economic shocks, export vulnerability, high cost of basic infrastructure, higher unit costs of investment in the industrial sector, limited size of domestic markets, and distance from major markets—affecting their creditworthiness—despite having GNI per capita levels higher than the IDA operational cutoff. For IDA18, 15 SIDS with GNI per capita above the IDA operational cutoff were eligible for the most concessional Small Economy Terms pursuant to this exception. Depending on their risk of debt distress ratings, 10 of them are also eligible for IDA Grants. Furthermore, The World Bank's management has proposed to explore in IDA 19 that an IBRD-only Small States be granted temporary access to the Crisis Response Window (CRW) under certain limited conditions.

Finally, the most important exceptional treatment given to small countries is the minimum allocation. But it does not allow differentiating allocations according to the relative vulnerability of eligible countries, while it blurs the principle of performance for all the countries the PBA of which is below the minimum allocation.

The African Development Bank has also been considering the direct inclusion of vulnerability indicators in the allocation formula of the African Development Fund (AfDB, 2021), for the 16th ADF replenishment. Notably, the ADF-16 Working Group emphasized that the Review of the Fund's resource allocation and operational frameworks has five objectives: (i) to maintain the performance principle (ii) to elevate fragility (iii) to increase the importance of structural vulnerability and drivers of fragility (iv) to ensure transparency and simplicity; and (v) to enable predictability of resources. So far only an indicator of infrastructure has been added to the PBA formula, a poor proxy of what could be captured in a MVI. Not unlike the World Bank, so far, the AfDB adopted an indirect approach where fragile countries are given special access to a supplemental window, the Transition States Facility (TSF): the eligibility to this window is not determined on the basis of a single indicator and the amount of the corresponding allocation is derived from the previous PBA, so that neither the TSF allocations, nor the PBA ones are differentiated according to the relative vulnerabilities of countries. However, the ADB also use a base allocation that is added to the PBA and gives a relative benefit to small countries.

Moving ahead. It results from the above review that the present practice of multilateral development finance institutions hardly takes into account the multidimensional vulnerabilities of developing countries, and until now when they do so (CDB, EU) they do not consider the three dimensions of vulnerability. Most often (AsDB, AfDB, IDA) they use special windows or lump sums allocations to address special kinds fragility, vulnerability or smallness, which does not allow to fairly and continuously take into account the relative and multidimensional vulnerability faced by receiving countries. The neglect of the vulnerability to climate change is particularly strange, as it is the most clearly exogenous vulnerability.

One argument often heard to explain the absence of vulnerabilities in the allocation formulas is the lack of an appropriate indicator, that is also robust and consensual. Building a MVI according to the principles designed above appear all the more relevant. Through its use in allocation formulas, it may have a significant impact on sustainable development (see Box 2 for a development on the way by which vulnerability can be taken into account).

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[31]**IDA-only status (Kiribati, Micronesia, Marshall Islands, Maldives, Samoa, Sao Tome and Principe, Solomon Islands, Tonga, Tuvalu, Vanuatu); Blends (Cabo Verde, Dominica, Fiji, Grenada, St. Lucia, St. Vincent and the Grenadines). St. Kitts and Nevis (which was granted the exception in 1985) graduated to IBRD-only status in 1994. Available at: https://thedocs.worldbank.org/en/doc/b6217d2790ba4515176ae5ee674940d2-0290032021/original/Small-States-2021-brochure.pdf

[32]https://ida.worldbank.org/about/borrowing-countries

Box 2: Taking into account vulnerabilities for a better aid allocation[33]

The issue of allocating concessional funds is a key issue for international institutions, notably in the multilateral development banks. This involves a trade-off between performance criteria and need criteria, the main difficulty being that the most vulnerable countries (and those with the greatest needs) are also the countries deemed to be the least performing and that many of the most performing countries are also deemed to have the least needs as reflected by their per capita GNI. To overcome the first difficulty of performance-based allocation (PBA), a category of so-called fragile states (or transition states) has been arbitrarily allocated a specific envelope. However, this does not allow for the different degrees of fragility or vulnerability to be taken into account, either between countries that are said to be fragile and benefit from the envelope, or between other countries that are also fragile to some extent. Similarly, the most vulnerable countries, especially to disasters whose recurrence severely limits borrowing and debt capacity, are not always the poorest or the most fragile. Similarly, the countries most vulnerable to the effects of climate change or subject to unfavorable regional dynamics (i.e. cross-border terrorism) are not clearly identified through the three indicators of the PBA formula (Performance, GNIpc, Population). As with the treatment of fragility, the major development banks have elected to multiply dedicated windows rather than integrate these considerations into the PBA.

A simple and coherent solution, however, is to recognize the structural vulnerability of countries, which is exogenous in the sense that it does not depend on their current policies, as a criterion for allocating concessional funds. This can avoid resorting to categories of countries that are always debatable, and in no way leads to abandoning the traditional criteria of performance (or governance), which can be improved, and income per capita. Faced with acute and multidimensional vulnerabilities (economic vulnerability, vulnerability to climate change, socio-political vulnerability, and vulnerability to COVID-19), it has become essential to help developing countries deal with their vulnerabilities in a preventive manner, knowing that almost all of them, albeit in varying forms and degrees, are vulnerable to exogenous shocks. This would mean moving from a "Performance Based Allocation" to a "Performance and Vulnerability Based Allocation" (PVBA). The same principle should guide the *ex-post* analysis of the selectivity of the various donors in judging the quality of the allocation of their aid between countries according not only to their governance and per capita income, but also to their structural vulnerability.

It should be recalled that in 2012 the United Nations General Assembly (A/RES/67/221, 21 December 2012), in a resolution on the graduation of least developed countries, invited development partners to use the three criteria for identifying LDCs, namely income per capita, low level of human capital and economic (structural) vulnerability, as criteria for allocating their development assistance. The European Union did so in 2014, using the same criteria and adding a governance criterion to define the allocation criteria for the European Development Fund and for the Development Cooperation Instrument.

A fair, effective and transparent principle

Taking structural vulnerability into account in the allocation of aid is a fair, effective and transparent principle. It is an equitable principle because structural vulnerability in its various forms is a handicap for sustainable development and international justice aims at equalizing opportunities between countries. It is also an effective principle, because research over the past two decades has shown that aid has a higher marginal effectiveness in situations of vulnerability, as it helps to cushion shocks (see Guillaumont and Wagner, 2014, for a summary). Similarly, preventive targeting of vulnerabilities would also limit the risks associated with political fragility. Indeed, in their latest joint report on fragility and conflict, both the World Bank and the United Nations estimate the costs of avoided damage to conflict-affected countries as well as the 'savings' to the donor community if more resources were devoted to prevention, i.e. if additional resources were dedicated to high-risk situations before the outbreak of violence. Finally, it is a way to improve the transparency of the allocation rules established in multilateral institutions, where the need to combine the pursuit of performance with the response to specific country needs as well as to major global public issues has led to a proliferation of exceptions to the basic rule of performance-based allocation and to its lack of transparency in practice, to the extent that it may have been considered as not really applied. Taking structural vulnerability into account in a logical and simple framework alongside performance makes it possible to better reward true performance while leading to greater consistency.

[33]The content of this Box relies on several works of the authors in particular Guillaumont P., Guillaumont Jeanneney S., and Wagner L. (2021)

The challenges: assessing structural vulnerability and protecting the losers

If there were to be agreement on the principle that vulnerability combined with low average income justifies relatively large amounts of aid and should simultaneously guide allocation between countries, two practical objections would need to be addressed.

The first is the difficulty of establishing vulnerability indicators that can be used as criteria for allocating multilateral aid, as well as for geographical selectivity in assessing bilateral aid. It should be possible to promote a consensus on indicators, provided that their purpose and method are well established, particularly their relevance for use as allocation criteria: only exogenous vulnerability in relation to the current policy of the countries should then be taken into account. In this context, building a new MVI that could be used for aid allocation is of critical importance.

The second difficulty with a reform of the allocation rules is that it may be politically difficult to apply on a constant budget basis, since, while it increases the share of some countries, it decreases that of others. The mobilization of increased financial resources should politically facilitate a reform of their allocation, so that the resulting decrease in relative share for some countries does not correspond to an absolute decrease or is mitigated.

Vulnerability to go beyond per capita income and categories

The current architecture of access to concessional finance is essentially based on the categorization of countries in a dichotomous way. A per capita income of less than US$1185 opens access to the World Bank's International Development Association (IDA) concessional window. Among other criteria related to armed conflict and the presence of refugees, a CPIA value arbitrarily set below 3 implies that the country is considered fragile by the World Bank. A relatively similar system is also implemented at the African Development Bank in order to benefit from the resources of the Transition Support Facility (TSF). The complexity of the issues combined with the multiplication of development objectives has led to a proliferation of instruments for which countries are eligible or not, without taking into account in any way the continuous nature and complexity of all the interactions between structural handicaps. Thus, the use of per capita income for eligibility purposes hides a very large heterogeneity in terms of structural vulnerability between countries, notably small island states, which although among the most vulnerable in the world, do not have access to concessional financing or debt relief mechanisms. Taking vulnerability into account not only as a criterion for allocation but also for access to resources would allow for a more equitable distribution.

Another source of reluctance to use an indicator of vulnerability in an allocation formula is the fear that it would weaken the impact of the performance factor, making performance seemingly less important, with a negative influence on donors' opinion and parliament members. This argument is highly debatable. It has been shown that when using a structural vulnerability indicator in the allocation formula it is possible to increase the allocation share going to the most vulnerable countries without diminishing the share going to the best performers (thanks to a reallocation within the best performers and within the poor performers, according to their vulnerability) (see Guillaumont et al., 2020).

A related and legitimate concern is to support the policies of countries to reduce their vulnerability. This issue can and should be addressed by including the resilience policy in the design of the performance indicator (the political component of resilience). In other words, the acceptability and use for aid allocation of the structural MVI designed according to the principles defined above involves a consistent design of a performance indicator taking into account the quality of resilience policies, which presently is not sufficiently the case. It should be noted that the inclusion of policy resilience in the performance indicator, impacting the allocation in the same direction as the lack of structural resilience and the structural vulnerability, would underline the difference between structural vulnerability and policy vulnerability. If it makes sense to include the low level of infrastructure, education, or health as reflecting a lack of structural resilience, or the recurrence of climate shocks as reflecting a structural vulnerability among the elements of general vulnerability, which justifies a higher allocation, it simultaneously makes sense to include in the performance indicator an assessment of recent results achieved by the country to lower these factors of vulnerability (or of the policy devoted to these purposes, such as the shares of the public budget). In this framework the level of a given variable (e.g. infrastructure or education) may have a negative impact on allocation (structural resilience) and its change a positive impact (policy resilience).

A final issue should be raised. The MDBs might wish (or need) to keep per capita income separately among the criteria introduced in their allocation formulas rather than included in an indicator corresponding to a lack of structural resilience (human capital, infrastructure, etc.) as described above. By being separable, the MVI may then be used, limited to its structural vulnerability components, as an additional criterion for aid allocation, insuring flexibility for the users and their freedom to choose the formula weights.

Determining the way debt is handled: debt management and vulnerability

Vulnerable countries are often exposed to debt risk, and hence to shifts in international financial markets, including rising interest rates, lower risk tolerance, and potential contagion effects from emerging markets. The link between vulnerability and debt management raises two issues.

The first issue is to know whether debt situation should be considered in the design of a MVI. This issue has generated various and contradictory answers. Rather than the debt stock the debt service may be a factor of vulnerability, since it limits the capacity to react to external shocks: thus a debt service ratio to exports or to GDP could be a candidate component of the index. However, such a component cannot be interpreted without considering the other (exogenous) factors of vulnerability affecting the rest of the balance of payments. Moreover, the debt service ratio may appear to mix structural and policy factors, a feature leading to avoid components of the MVI with the same feature. This argument may itself be debated, since the absolute level of debt service is largely inherited (thus exogenous), but the ratio -at least to GDP- depends on the present exchange rate policy.

The second issue is the use of a MVI in the international debt treatment. Small states seem to have higher debt vulnerabilities than the average developing country, with a higher share of high-risk cases. Creating cases of high risk of debt distress and in debt distress, the COVID-19 and natural disaster shocks, as other strong exogenous shocks, make debt sustainability challenging. According to the IMF, debt sustainability analysis (DSA) shows that it is extremely challenging to maintain debt sustainability for SIDS in cases of a large natural and environmental shocks. Extreme weather events and disasters, such as droughts, tropical storms, landslides and glacial lake outburst floods, can have devastating effects for all LDCs, LLDCs and SIDS. Among them in case of shocks middle income countries currently have fewer concessional sources for addressing immediate needs, recovery and resilience building[34].

This may lead to a reconsideration of eligibility for concessional financing to SIDS by considering also their MVI, besides the only income criteria, as it is an argument for using the MVI as an allocation criterion, as seen above. This also holds for other vulnerable countries. In this context there is a rationale for considering the whole set of vulnerabilities through the MVI in the international treatment of debt. This seems a global requirement. A similar rationale can be put forward for the possible re-allocation of SDRs by the G7 countries which will

[34]Assa and Meddeb (2021) estimate that non-LDC SIDS would save close to 1.5% of GDP annually if their long term external public and publicly guaranteed (PPG) debt was funded at the same average interest rate of LDC-SIDS

receive the bulk of the new emission of SDRs: it would be reasonable that these new resources, likely to serve both as a reserve instrument and a development instrument, could be allocated to some extent according to the multi-dimensional vulnerability index, granted a global agreement of this index.

Here again, as for aid allocation, it will be necessary to separate in the MVI what is out of the present will of countries (what is exogenous) and what depends on their present policy.

Conclusion: Towards a consensus on a MVI

The UN General Assembly has requested the Secretary General to present recommendations on the potential development and coordination of work within the UN system on a multidimensional vulnerability index for Small Island Developing States, including its potential finalization and use. Such a multidimensional vulnerability index is needed to assess the vulnerability of small island states and to serve as a criterion for access to and allocation of concessional resources among countries.

The purpose of this report was to examine the main indicators currently available and their relevance regarding the General Assembly's request. After analysing the main indicators, it considered the main criteria or conditions that any new indicator should meet in response to the General Assembly's request and, beyond that, the need for an indicator that is applicable to various groups of countries and circumstances. These criteria and requirements are summarized below and simultaneously applied to existing indicators, assessing their relevance and suitability. This assessment is followed by a few considerations on the way by which such an indicator could be set up, accepted and used.

The required indicator must meet three conceptual criteria and three practical conditions.

1. The required vulnerability indicator must be multidimensional, with its three essential dimensions being economic, environmental and social. The three dimensions and their perimeters should be clearly defined and redundancy among components should be avoided. At the same time, the indicator should reflect the vulnerability of each country in its specific dimension.

   It is possible to define the three dimensions in different ways, but the simplest and most logical one consists in differentiating dimensions according to their manifestations. Economic vulnerability is the risk for the economy to be affected by exogenous shocks, either of external or natural origin (thus including the economic effects of environmental or health shocks). Once natural shocks are taken into account with respect to their possible economic impact, environmental vulnerability consists heavily in the physical vulnerability to climate change (today's major challenge and whose economic consequences cannot be assessed for the different countries in a comparative and robust way). Furthermore, some aspects of the current physical environmental vulnerability as well as environmental anthropogenic shocks could also be considered if sufficient data could be obtained and a consensus on their exogeneity could be reached. Finally, social vulnerability is the risk of being impacted by social shocks, mainly episodes of violence but also health shocks such as epidemics. Alongside the three dimensions of vulnerability, the resilience of a country is its capacity to face and manage exogenous shocks, either economic, environmental and linked to climate change or, social. This resilience (or lack thereof) results from factors that are either structural or related to present policy. The structural factors reflect the inherited capacity of countries and their populations to face and cope with external shocks. Taking resilience into account allows for a better understanding of the structural handicaps faced by developing countries, and also allows to better capture the vulnerability of population to exogenous shocks.

   For each of the three dimensions of vulnerability, the index should aim at capturing both the exposure to exogenous shocks and the likelihood of their occurrence, as mainly reflected by their past recurrence or trends. Most indicators detailed in this report acknowledge this view. It is also noticeable that the former Commonwealth Index used only exposure components, while the latest revision now includes components reflecting both exposure to shocks and intensity of past shocks.

   While covering all three dimensions of vulnerability, the indicator should be able to provide an accurate vulnerability assessment and to show a country as very vulnerable even if vulnerable in only one of the dimensions. In other words, the multidimensionality of the indicator should not mask the particular vulnerability of a country in one of the specific dimensions. This is why the methodology used to aggregate the different dimensions of vulnerability in a synthetic indicator should not rely on an arithmetic average, but rather on a quadratic one.

   While all of the indicators examined above are to some extent multidimensional, they rarely cover all three dimensions. For example, the CDP's EVI and the SDSN's MVI cover, imperfectly, only the first two dimensions, as does the UNCTAD EVI, which is derived from it. Only, the Commonwealth's UVI and the CDB's EVI, cover the three dimensions and only the Commonwealth's index systematically uses a quadratic mean.

2. The multidimensional vulnerability index must be universal, which means it should reflect the vulnerability of all categories and groups of developing countries, even if it is designed at the request of and for SIDS. There are two major reasons for this.

   The first reason is that it is not possible to show how vulnerable SIDS are if there is no way to fairly compare them with other countries. In other words, to be useful to SIDS, the index must not be specific to SIDS. Even an indicator that would be applicable to all developing countries, but including components focused on the specific situation of small states, would not satisfy this condition of equity or comparability. For instance, some non-island states, such as the Sahelian countries, may also present a high vulnerability to climatic factors, but evidenced differently from that of SIDS. The use of a quadratic average recommended above is precisely a way of highlighting, in a general or universal indicator, one or another vulnerability dimension that is specific to a particular country or group of countries, such as SIDS, LDCs and LLDCs.

   The second reason for having a universal indicator is that if the indicator is to be used to allocate concessional funds, it must be able to equitably capture the various kinds of vulnerability faced by developing countries, regardless of their geographical location. The very creation of a financing institution exclusively devoted to small island states, which remains hypothetical, could not be proposed without comparing the vulnerability of these countries and of other developing countries.

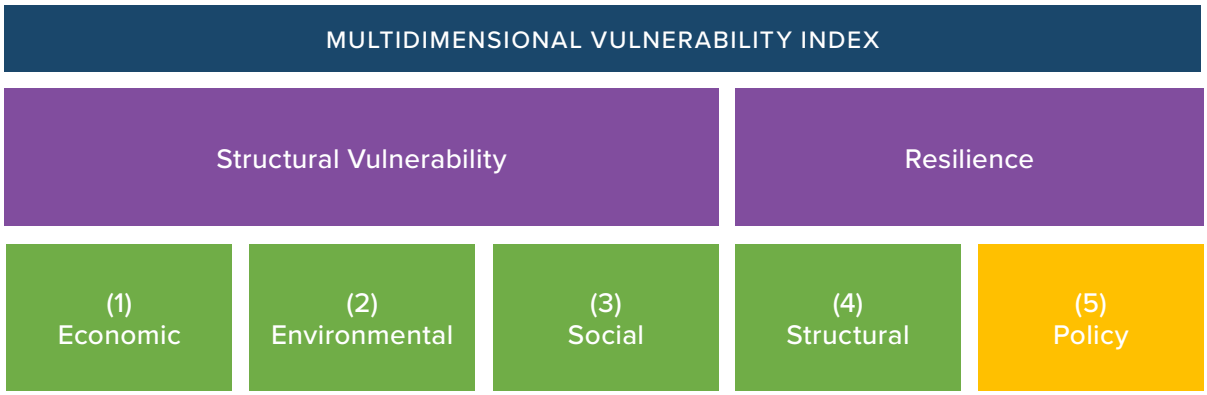
   Most of the indicators examined, when applied to all developing countries, seem to meet the universality criterion, but for the reason given above those specifically targeting SIDS (like the CDB's MVI, related to Caribbean countries, or the SDSN's MVI) do not really meet it in its current form.

3. The multidimensional vulnerability index must be separable in its components, namely between those reflecting factors that are truly exogenous with regard to the current policy and those that depend on current policy. This requirement, here called the separability criterion, is essential if the indicator is to be used by donors to allocate concessional resources between countries, or even to give access to concessional funds (eligibility). Indeed, it is only when vulnerability is independent of current policies, because it is inherited from the past and constitutes a structural handicap, that it justifies special support to countries affected, in order to make development opportunities between countries more equal. The vulnerability of a country that depends on its current policy and could be mitigated by its own will is perceived by donors as a sign of poor performance and will lead them to allocate less resources. This is the case of multilateral development banks, that use a "performance-based allocation" formula for concessional resource and may be reluctant to systematically take vulnerability into account as an allocation criterion if it is not clearly exogenous. In designing the multidimensional vulnerability index It is therefore essential to be able to distinguish in the indicator between truly exogenous or structural vulnerability, which alone can be used as a criterion for allocating concessional resources, and general vulnerability, including both the structural vulnerability and the vulnerability linked to present policy, which can be used more broadly to guide economic policy.

   The resilience of countries, which is their capacity to cope with exogenous shocks and thus dampen their adverse effects, is strongly linked to their current policies, but also depends on structural factors such as the level of per capita income, of human capital, and infrastructure, among others. This structural resilience component is of course influenced by the policies conducted by the country in the past, but it is not the result of present policy, and as such it should be taken into account in an assessment of structural vulnerability. The lack of structural resilience can be treated separately from the rest of structural vulnerability, since donors and particularly multilateral ones who are asked to use structural vulnerability as a financing criterion, want or may want to keep specifically low per capita income and/or human capital as specific allocation criteria. The need to isolate in the vulnerability indicator what is truly exogenous and what is policy-dependent applies distinctly to all three dimensions of vulnerability, but resilience, whether policy or structural, is undifferentiated across all three dimensions.

With regard to economic vulnerability, as identified above, particular attention has been given by the CDP to defining its EVI as an indicator relying on exogenous components so that it can be used as a criterion for identifying the least developed countries, precisely defined as low-income countries suffering from structural handicaps to their development. This exogenous or structural character of the EVI and its successive revisions has been preserved, whereas it has not always been the case for the indicators that have been based on it. This exogeneity (or separability) criterion constitutes a constraint when circumstances seem to push for the introduction of new components in the index: Such is the case of debt, whose status is ambiguous since debt ratios result both from the present governance and a long term accumulated stock due to past policies and structural factors. The very concept of debt vulnerability shares the same ambiguity. The concept of health vulnerability often used in the context of the COVID-19 pandemic to design the risk of the population to be affected also appears to depend both on the present policy and structural factors.

Figure 8: Potential MVI Framework



Regarding the physical vulnerability to climate change, separability appears to be less of an issue, since all its components may be chosen with respect to their exogenous or physical nature, independent from current policy. However, if attention was paid more generally to environmental vulnerability and notably anthropogenic shocks, one would have to disentangle what is exogenous in environmental degradation and what results from good policies. Clearly the environmental indices (such as the ones described in the first chapter) besides the fact they are not multi-dimensional, do not meet the separability criterion, as they mix exogenous and present policy related components.

For the social dimension of vulnerability the separation between what is exogenous and what is not seems more complex. For this reason, for many years it has been difficult to introduce an appropriate indicator of social vulnerability in an operational indicator of vulnerability, in spite of the need to do it. Indeed, social vulnerability appears to be highly dependent on current policy. However, the work of the last 20 years has highlighted the extent to which this fragility is also linked to structural factors leading to recurring violent episodes but also health shocks such as epidemics. Therefore, in order to take into account this structural component of social vulnerability, it is increasingly accepted to consider the recurrence of health shocks but also violent events over time, as well as violence in neighbouring countries, as acceptable components of the social dimension that should be included in a multidimensional vulnerability indicator, all the more so because besides these components the structural economic vulnerability and the environmental vulnerability that include climate change concerns, as well as those of structural resilience, capture other well identified factors of the risk of violence or civil conflict.

Consideration should be given to how the index can be used by the international institutions for which it is intended to serve. This is, of course, the case with the CDP for the identification of the least developed countries, although the CDP is free to choose another solution. The main issue is the acceptability of the index by multilateral development banks and other international institutions, which could fittingly use it for the allocation of their resources, at least their concessional resources. To this end, it is necessary to bear in mind the constraints faced by these institutions, which may have an influence on the design of the index. The first is that these institutions might want to keep per capita income among the variables introduced in their allocation formulas rather than, or in tandem with, an indicator corresponding to a lack of structural resilience (human capital, infrastructure, etc.) as described above. By being separable and providing flexible use of its components, the MVI might be used as an additional criteria for aid allocation.

The second constraint is that these institutions in their allocation model traditionally take into account the performance of countries. Their reactions to the inclusion of a structural vulnerability indicator indicate a legitimate concern to address in their formula the policy of countries to reduce vulnerability, in other words the political component of resilience (the 5th component of Figure 8 below). This therefore implies an in-depth reflection on how the quality of resilience policies should be taken into account in the performance indicator, which is not sufficiently the case in the ones currently in use. At the same time, the inclusion of criteria related to the quality of resilience policies in the performance indicator would make it possible to clarify concretely the difference between structural vulnerability and political vulnerability. For example, if it makes sense

to include the low level of infrastructure, education, health or natural hazard-related shocks including those exacerbated by climate change, and other climate-related shocks among the elements of general vulnerability, which justifies a higher allocation, it is simultaneously makes sense to include in the performance indicator an assessment of recent results achieved by the country with regard to these elements (or the share of the budget devoted to this purpose).

Accordingly, the MVI framework can include 5 components as described in Figure 8, 3 of which design a three dimensions indicator of structural vulnerability, a 4th one an indicator of structural lack of resilience, these four indicators covering the structural factors of general vulnerability. A 5th indicator corresponds to the non-structural or policy lack of resilience, the five indicators taken together designing a general (multi-dimensional) vulnerability indicator.

Considering the existing (multi-dimensional) vulnerability indicators with regard to the criterion of separability between structural and policy-related components. The CDP's EVI since the beginning clearly uses only structural or exogenous components (although it does not fully cover the three dimensions of vulnerability, in particular the social one). The UNCTAD EVI+, in spite of relying on the CDP EVI and the PVCCI, meets the exogeneity criterion partially but still mixes exogenous and policy components through an heterogenous productive capacity index. The same can be said for the UNDP's EVI with its new financial vulnerability component and notably FDI flows, which might not be structural. Similar concerns can be raised for the last version of the CDB's EVI with regard to components such as the volatility of current health expenditures, and for the SDSN's MVI with the introduction of aid flows. The Commonwealth Secretariat's UVI seems to satisfy this criterion, as it gives separately both an (exogenous) indicator of structural vulnerability and an indicator of general vulnerability (including lack of present policy resilience) even if the exogeneity of some aspects of social vulnerability it considers may be a matter of discussion.

To be internationally accepted and used an MVI should not only meet the three previous conceptual criteria (multidimensionality, universality, separability), but also three other more practical conditions.

A fourth condition that the MVI must satisfy is the availability of reliable data.

With regard to universality criterion the need of available and reliable data covers all developing countries. This may raise a difficulty particularly in the case of small and poor countries. It seems that in most of the existing indicators the authors have taken this difficulty into account in the choice of the component indicators. Sometimes imputation systems are proposed for data available for neighbouring countries or countries with a similar structure.

It is more difficult to judge the reliability and comparability of the statistics collected. A case-by-case examination could be necessary. With regard to the operational use expected for the indicator the reliability of the statistics from which the indices are drawn is a key issue. It may lead to give up a highly relevant component relying on a poor statistical basis. This possible trade-off has been often considered by the CDP, precisely because the EVI was to be used (as well as the HAI) for the inclusion and graduation of LDCs.

Data availability should be obtained over time so that the evolution of vulnerability, as well as resilience could be assessed, what means monitoring both the evolution of structural factors of vulnerability and of policy-related resilience.

The fifth condition to be met by the MVI is its readability and transparency.

This condition is also all the more important because the indicator should support the political and operational goal of helping the most vulnerable developing countries. The financial implications of its use requires transparency.

The transparency should first be the result of a clear conceptual framework where the three dimensions and their main sub-components are well defined. The objective cannot be to limit the number of components (or sub-components) on which it is based by simply invoking transparency and readability. The process leading to the selection of components reflecting truly exogenous factors of vulnerability is itself an element limiting their number. In other words, it is a problem of selection of relevant indices rather than of a simple issue of an optimal number of variables.

Final conditions refer to the acceptability and implementation of the vulnerability indicator, within and beyond the UN.

The MVI should be designed and finalized so that it can be accepted within the UN system and likely to be so beyond it.

As for its acceptance within the UN, it may be useful that a proposal should be submitted, possibly amended and finally endorsed by a group of experts on the basis of the principles defined by the UN Secretary General in its own report. To make the work of the group of experts effective, it is important that a framework should be proposed with the main components and possibly sub-components of the indicator to ensure the consistency of the proposal. Experts would have to validate or possibly modify the definition and measurement of each component or sub-component, the choice of the most reliable sources and the various combinations of the components,

The Nuku'alofa Urban Development Sector Project will support the establishment of a municipal government in Nuku'alofa and enhance municipal services, including water supply, solid waste, and sanitation.

Photo: Asian Development Bank 2.0

according to the expected use of the indicator. In order to facilitate the work, it might be recommended to use as a basis the corresponding multidimensional indicator that best meets the stated criteria.

Consideration should also be given to how the index can be used by the international institutions for which it is intended to serve.

A main issue is the acceptability of the index by donor countries, multilateral development banks and other international institutions, which could use it for the allocation of their resources, at least their concessional resources, but are facing constraints in designing their allocation rules.

First, they might wish (or need) to keep per capita income separately among the criteria introduced in their allocation formulas rather than included in an indicator corresponding to a lack of structural resilience (human capital, infrastructure, etc.) as described above. By being separable, the MVI may then be used as an additional criterion for aid allocation, ensuring flexibility for the users and their freedom to choose the formula weights.

Second, these institutions in their allocation model traditionally take the performance of countries into account. They may fear that including a structural vulnerability indicator in the PBA formula would weaken the importance of performance in the allocation. However, it has been shown that, when using a vulnerability indicator, it is possible to increase the allocation share going to the most vulnerable countries without diminishing the share going to the best performers (Guillaumont, Guillaumont Jeanneney and Wagner, 2020).

Another legitimate concern, is to support the policy of countries to reduce their vulnerability. This issue can and should be addressed by including resilience policies in the design of the performance indicator (the political component of resilience I.e. the 5th component of Figure 6 above), including those related to disaster risk reduction. In other words, the acceptability and use for aid allocation of the structural MVI designed according to the principles defined above involves a consistent design of a performance indicator taking into account the quality of resilience policies, what presently is not enough the case. It should be noted that the inclusion of policy resilience in the performance indicator, impacting allocation in the same direction as the lack of structural resilience and the structural vulnerability, would underline the difference between structural vulnerability and policy vulnerability. If it makes sense to include the low level of infrastructure, education, or health as reflecting a lack of structural resilience, or the recurrence of shocks, either related to climate change, natural hazards, external events or violence as reflecting a structural vulnerability among the elements of general vulnerability, which justifies a higher allocation, it is simultaneously makes sense to include in the performance indicator an assessment of recent results achieved by the country to lower these factors of vulnerability (or of the policy devoted to these purposes, such as the shares of the public budget). In this framework the level of a given variable (e.g. infrastructure or education) may have a negative impact on allocation (structural resilience) and its change a positive impact (policy resilience).

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ANNEX 1

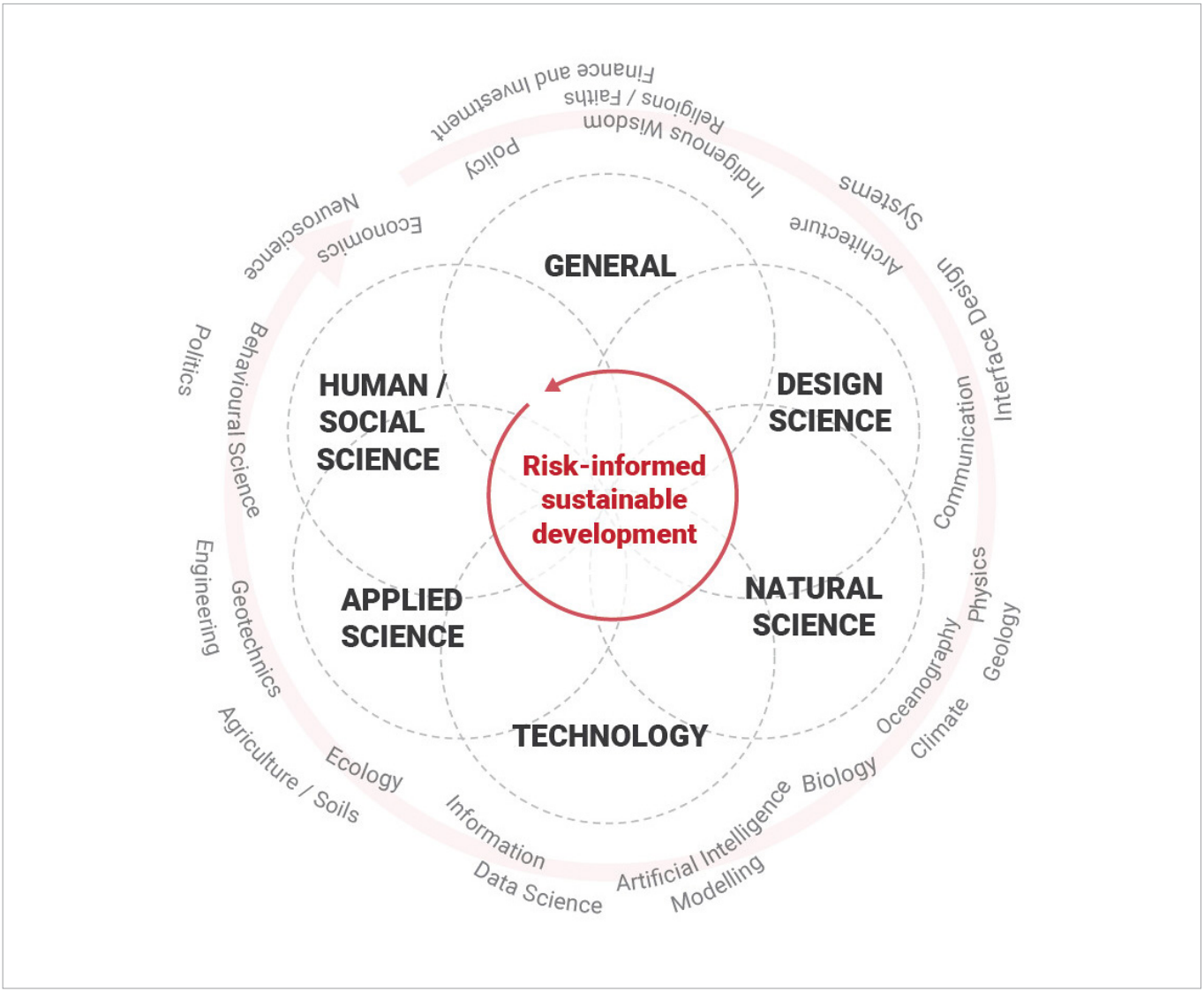
UN CDP Supplementary Graduation Indicators

Source: Adopted from UN-CDP

ANNEX 2

The Global Assessment Report on Disaster Risk Reduction

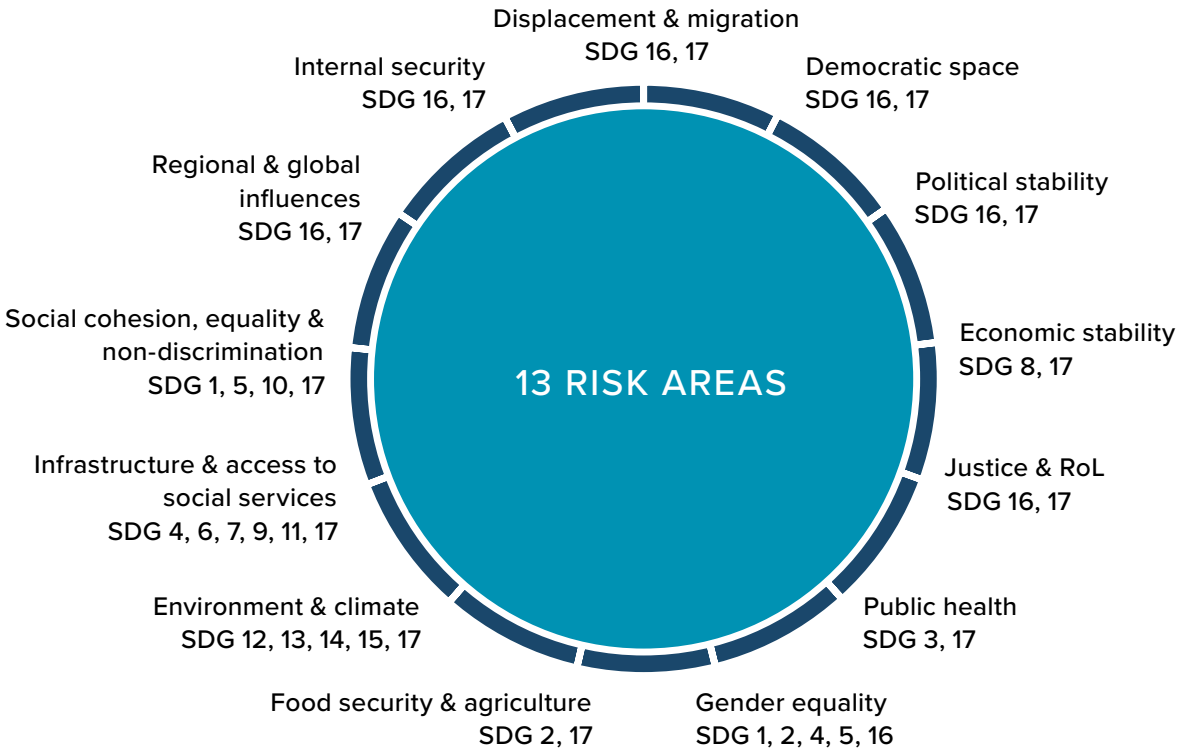
The Global Assessment Report on Disaster Risk Reduction (GAR) is a periodic report released by the United Nations Office for Disaster Risk Reduction which investigates the state of global risk.[35] The 2019 GAR considered the pluralistic, systemic nature of risk. In line with the Sendai Framework for Disaster Risk Reduction, the 2019 GAR calls for adaptive, anticipatory planning frameworks that take into account non-linear change and identify the drivers of risk across systems to prevent and mitigate risk. It argues for transdisciplinary, integrated, multisectoral risk assessment and decision-making to improve efficiency, reduce duplication of efforts and allow for connected, collective action towards the implementation of the Sendai Framework as an integral part of the 2030 Agenda.



Source: 2019 Global Assessment Report on Disaster Risk Reduction

[35]Available from https://gar.undrr.org/report-2019

To advance this approach, UNDRR is advancing work on the Global Risk Assessment Framework (GRAF) which is linked to the UNDRR Hazard Definition and Taxonomy36 to encourage standardization, and draws on UN, government, global, regional and third-party datasets, aiming to strengthen national risk data ecosystems. Work is ongoing in Fiji, Bangladesh, Pakistan, Eswatini, Sudan, Somalia, and Costa Rica, providing support to UN Member States in accessing risk science to support risk-informed planning, including technical assistance on vulnerability and exposure mapping to multiple hazards and systemic risks.



Source: Adopted from United Nations Office for Disaster Risk Reduction

[36]Available from https://www.undrr.org/publication/hazard-definition-and-classification-review

ANNEX 3

A Review of Available Fragility Indices

There are 3 types of fragility analysis that correspond to 3 different objectives:

1. The first type aims at defining a category of fragile states, which has historically been done by development partners that have a special window for allocating concessional funds set aside for fragile countries. As developing countries are all potentially fragile to varying degrees and in different ways, defining a category of fragile states implies defining thresholds for criteria of fragility against which a state is or is not considered fragile. Identifying states that will be described as "fragile" is more difficult than identifying fragility itself, and may rapidly become arbitrary, as does any category whose definition depends on a discretionary threshold. Multilateral Development Banks use Country Policy Institutional Assessment (CPIA), sometimes with other criteria, to determine countries' eligibility for their specific window for fragile states. The CPIA is or was used in 2 ways, either as an absolute threshold indicating fragility (for instance 3.2 on a scale from 1 to 6), or as a relative threshold: countries with CPIAs in the bottom two quintiles (OECD Development Assistance Committee, OECD Department for International Development, United Kingdom DFID, Asian Development Bank). Until 2016, the OECD used a "list of fragile states" to distinguish between "fragile" countries and territories on the one hand and "other" developing countries on the other. This list was based on the "Harmonized List" of fragile situations established jointly by the World Bank, the Asian Development Bank, and the African Development Bank. It was supplemented by the use of other indices: first, the Country Indicators for Foreign Policy (CIFP) of Carleton University and the Brookings Institution's Index of State Weakness, then the Fragile States Index of the Fund for Peace. But in 2016, the OECD stopped listing fragile states, considering that fragility is multi-dimensional and certainly affects all countries in the world, including developed countries, to varying degrees. On the contrary, the World Bank has reaffirmed its wish to maintain a list of Fragile States while trying to adapt this list to take into account the varying degrees of fragility. From 2020, the list includes 3 types of situations: high intensity conflict, medium intensity conflict, strong institutional and social fragility. "High intensity conflict" and "medium intensity conflict" cases are based on the number of deaths due to armed conflict. The "Institutional and social fragility" case is based on the CPIA for which the threshold value has been lowered to 3.0 as well as on the number of refugees coming from neighboring countries (or the presence of UN forces).

2. The second type consists of identifying the different forms of fragility that will guide the nature of donors' interventions. This is the purpose of the AfDB strategic document Operational guidelines for the implementation of the strategy for addressing fragility and building resilience in Africa and for the transition support facility (AfDB, 2014). According to this document, fragility is characterized by "a high risk of institutional breakdown, social collapse or violent conflict". It is a multidimensional phenomenon, with many drivers both internal and external, especially regional. The analysis of the different aspects of fragility, as well as its roots, is essential to the choice of the right intervention strategy, whose objectives and instruments must be adapted to each specific situation. In order to strengthen the capacity to analyze fragility in its various dimensions, the AfDB has built a new analytical tool, called the Country Resilience and Fragility Assessment (CRFA), which gives an overview of fragility for eligible African countries on the basis of 7 criteria (which cover 91 indicators): 1. legitimacy of policy, 2. security, 3. justice, 4. economic and social inclusion, 5. social cohesion, 6. exogenous shocks (economic and regional), 7. climatic vulnerability. In addition, the 7 criteria are themselves divided into 2 components, representing the capacities of the countries but also the pressures faced by each of them. This framework, useful for guiding the bank's operations, does not offer a relevant indicator of state fragility or social vulnerability likely to be used as a component of a MVI, since it does not clearly distinguish the three main dimensions of vulnerability, and above all does not allow for disentangling exogenous and present policy related components of fragility.

   A similar objective and a similar limit emerge from the OECD's new approach, which has been developed following the abandonment of the list of fragile states and is a quantitative synthesis of the different sources of fragility. This new tool developed by the OECD has 5 major

sources of fragility (economic, environmental, political, security, and social), which is indeed multidimensional, measured using a statistical classification method and aggregating a large number of underlying quantitative variables, but once again mixing structural and non-structural or policy variables. The fragility resulting from each of the 5 categories is then measured on a scale of 1 to 6.

The World Bank is also currently considering a new strategy for identifying and integrating the various dimensions of fragility, conflict, and violence to take them into account in its operations. Its framework focuses on factors related to both horizontal and vertical inequalities, in order to strengthen its action in countries, including strengthening its preventive approach to conflict and fragility.

3. The third type of fragility analysis, more directly related to our present concern, consists of selecting indicators of fragility in order to classify countries according to their degree of fragility. Many indicators of state fragility have been built over the last decade by various institutions, some of them have been already quoted. It is easy to refer to a distinction made by the OECD in 2015 between 3 kinds of fragility indices: (i) "function-based indices" which cover the different areas of government intervention, (ii) indices that aim to capture "constraints and tensions" that may lead to war and the collapse of institutions, (iii) "event-based" evidence who seek to measure the degree of insecurity. From the start, it is clear that only the third group might allow isolating the structural components of the societal vulnerability. Let us however briefly review these indices.

a) indices based on the function of states

The Country Policy Institutional Assessment (CPIA). The best known of these is the CPIA developed by the main multilateral development banks. The CPIA rates countries against a set of 16 criteria grouped in four clusters: (i) economic management; (ii) structural policies; (iii) policies for social inclusion and equity; and (iv) public sector management and institutions. The criteria are focused on balancing the capture of the key factors that foster growth and poverty reduction, with the need to avoid undue burden on the assessment process. The CPIA has a dual and contradictory role, first as a positive performance criterion and second as a negative fragility criterion.

The Country Indicators for Foreign Policy (CIFP) Fragility Index of the University of Carleton. The CIFP fragility index is based on the idea that a state needs to exhibit three fundamental properties: Authority, Legitimacy, and Capacity (ALC). Weaknesses in one or more of these dimensions have an impact on the overall fragility of the country. In addition to the ALC assessment framework, the index is based on structural indicators grouped into six clusters capturing facets of state fragility and robustness: Governance, Economics, Security and Crime, Human Development, Demography, and Environment. Scores ranges from 1 to 9 where a lower score translates situation of lower fragility.

The Index of State Weakness (ISW) of the Brookings Institution (Rice and Patrick, 2008, no longer published). The ISW had a big success when it was created, because it was temporarily used by the OECD, alongside the CPIA, to establish a list of the most fragile countries, but it fell into disuse because it has not been updated since 2008. The objective of the index was to capture weakness of countries according to their relative performance in four spheres: economic, political, security, and social welfare[37].

The State Fragility Index (SFI). The SFI is produced by G. Marshall and R. Cole of George Mason University, and is published in the Global Report series. It focuses on the effectiveness and legitimacy of the state. The SFI is closely linked to the capacity of the state to: 1. Manage conflicts, 2. Decide on and implement state policies, 3. Supply essential service and well-being to populations. In addition, the SFI takes account of systematic resilience of countries by considering social cohesion and quality of life, according to whether or not the state provides an effective response to problems and crises which menace the existence of societies. The index aggregates eight indicators measuring two qualities of state performance, namely effectiveness and legitimacy, across four areas each: security, political, economic and social. It also includes qualitative indicators on: armed conflict; regime type; net oil production or consumption; and regional effects.

b) indices based on constraints and tension factors

The Fragile States Index (FSI) of the Fund for Peace. The FSI produced by the Fund for Peace has been regularly updated and published since 2005 in the review Foreign Policy. It was created with the aim of identifying not only the tensions and

[37]It defines a weak state as a country that lack the essential capacity and/or will to fulfill four sets of critical government responsibilities: fostering an environment conducive to sustainable and equitable economic growth; establishing and maintaining legitimate, transparent, and accountable political institutions; securing their populations from violent conflict and controlling their territory; and meeting the basic human needs of their population. The index is based on 20 indicators classified within 4 clusters: economic; political; security; and social welfare. While the economic cluster assesses the state's ability to provide its citizens with a stable economic environment, the political cluster assess the quality of political institutions and the extent to which citizens accept the system of governance. The security system measures whether the state is able to provide physical security to its citizens; and the social welfare cluster evaluates how well the state could satisfy their basic human needs.

constraints in the life of each country, but also at what moment the tensions and constraints risk leading the country to the edge of the precipice. The FSI is built from 12 principal indicators and more than 100 sub-indicators concerning politics, economic, military, and social which might capture factors likely to lead to the onset of conflicts.38 The countries are classed into 4 categories, according to a growing level of threat – Sustainable, Stable, Warning, and Alert. The purpose of the index is to measure various kinds of pressures that can push a state towards the brink of failure.

The Country Resilience and Fragility Assessment (CRFA) of the AfdB developed in partnership with the Fund for Peace presented above also falls in this category.

c) indices based on events

Considering events could allow to capture what is more clearly exogenous. But this third category of works not giving any overall index of fragility, but like the preceding ones, only aims at assessing the situation of insecurity of the country. Two examples can be mentioned.

The Political Instability Task Force (PITF) of the Centre for Development and the Management of Conflicts of the University of Maryland. The PITF was originated in 1994 and is regularly updated. The PITF is composed of 4 different types of events: revolutionary wars, unconstitutional regime changes, genocides, and "politicides". The PITF is not really an index but rather a listing of events which allows identification of the countries which facing high intensity episodes of violence risk falling into situations with a lot of political instability. This is why the PITF is put forward as a method for preventing crises and violence such as genocides and wars.

The Political Stability and Absence of Violence (PSAV). The PSAV is part of the Worldwide Governance Indicators (WGI) of the World Bank. It is 1 of its 6 dimensions. The other 5 measure quality of governance. The PSAV captures the risk that a government could be destabilized, or overthrown by unconstitutional means by violence or terrorism.

The economic literature on the determinant of onsets of conflict can itself be grouped into seven main groups: demography, geography, climate, natural resources, history of conflict and violence, economic characteristics and political institutions (Feindouno and Wagner, 2020)[39]. This literature is reflected by the different indices presented above. Those dimensions tend to also be central to the vulnerability literature as exposure to and the recurrence of external, natural and social shocks constitute the multiple dimensions of vulnerability in several indices. The key issue is the fact the fragility indicators do not differentiate between the structural and non-structural aspects of fragility. This, in turn, implies that fragility indicators while somehow similar do not amount to (structural) social vulnerability indicators for which the main manifestation or source of shocks is the recurrence of conflicts and violent events that the organization of society is unable to ward off. It is accepted today that the insecurity, in which a large part of the population in the developing countries lives, hinders the development chances of these countries. Poverty and political fragility are inextricably linked to the degree of violence experienced by many countries (UNDP 2008).

[38]The social indicators assess the state capacity to provide security and protect citizens from such things as demographic pressures (disease and disasters); population displacement; tension and violence between groups; and such phenomena as human capital flight. The economic component tries to capture unevenness of economic development related to ethnic, religious, or regional groups in a given country. It also attempts to measure how much poverty and economic decline can strain the ability of a state to provide its citizens equal access to economic opportunities. Lastly, the political indicators attempt to measure a state's legitimacy and its capacity.

[39]This study is particularly relevant in the context of this review as the authors estimate separately the long-term or structural risk and the short-term or non-structural risk of triggering new conflicts in developing countries. According to the authors, the outbreak of a new conflict is the result of the interaction of two types of factors: structural risk and non-structural risk. Structural risk is considered to be long-term risk, changing slowly over time, and capturing the structural characteristics and vulnerability of a country. Non-structural risk, which fluctuates more, is mainly related to short-term shocks or a change in the national, regional, or international context. The accumulation or intensification of structural risk influences and reinforces the impact of non-structural risk, which in turn contributes to the outbreak of conflict. This new approach makes it possible to synthesize empirical work from the economic literature by classifying the determinants of conflict into these two categories, making it easier to identify and understand the risks. For a given country, the results provide additional information on the time trend of structural risk, and non-structural risk. Such a tool can be used as a powerful warning system, while remaining simple to analyse and use, and it could enable preventive conflict reduction actions to be taken, particularly through the allocation of more targeted resources.

United Nations