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# Measuring Structural Vulnerability to Allocate Development Assistance and Adaptation Resources*

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**Abstract**

Assessing the vulnerability which is independent of present policy is needed both to identify the most vulnerable poor countries, and to design criteria for the allocation of international resources. With this regard two kinds of vulnerability and corresponding indices are considered: the structural economic vulnerability (as measured by the UN Economic Vulnerability Index, EVI) and the physical vulnerability to climate change (as measured by the Ferdi PVCCI Index); the former is more likely to be used for the allocation of development assistance, the latter for the allocation of adaptation resources. The two indices and their possible use are compared, while the rationale for their aggregation and for an integrated process of allocation is respectively discussed.

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## Introduction

I wondered whether there could be a specific approach for a "fusion lecture" on vulnerability, in other words a "fusion approach" to vulnerability. In fact vulnerability is a multi-dimensional concept, even when taken at the macro or national level, and its multiple facets are important. By definition and in a number of different ways, vulnerability is a threat, or an obstacle, to sustainable development. For this reason vulnerability calls for international action, focused on the most vulnerable developing countries. Such action 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 resources. Depending on the kind of vulnerability to be addressed, either economic or climatic, and on the resources to be allocated, indices should be differentiated, or "fusioned".

A few words are needed on the semantics of vulnerability. Vulnerability, at the *macro* level (as at the *micro* level) is the risk of being hampered by exogenous shocks, either 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 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 with either the risk generated by economic instability or 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). Finally, economic shocks have detrimental *environmental consequences*, environmental degradation and shocks have economic consequences for long term growth. Vulnerability is the opposite of sustainability in its broader meaning.

So it is not surprising that vulnerability has been going up the international agenda, in various ways. Implicitly, then since 2000 explicitly, the *Least Developed Countries* (LDCs) are identified by the United Nations Committee for Development Policy as low income countries suffering from a low human capital and a high structural economic vulnerability (which is measured by a specific index the "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) and Mauritius (2004) UN Conferences, then later

when tsunamis had affected Asian and Pacific islands, and also in recent UN resolutions. A different concern, but which is related to vulnerability, and which is a growing one in international institutions and meetings is the concept of *fragile states,* in particular 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 2000s (e.g. oil prices, food prices, world demand downturn), as well as, and increasingly so, from *climate change,* a new and major source of vulnerability.

There are various ways to tackle structural vulnerability. Of course, appropriate policy responses first depend on the kind of vulnerability to be addressed, economic or environmental (e.g. commodity price instability or climate change), and on the source of each of them. This holds notably for the actions aimed at reducing vulnerability (e.g. economic diversification, or adaptation to climate change), but also to some extent for policies aimed at compensating countries for the consequences of exogenous shocks. A key way to tackle vulnerability is to precisely allocate international resources (either ODA or adaptation resources) according to the needs generated by structural vulnerabilities (either economic or climatic). For this, relevant quantitative indicators are needed.

The remaining sections of this paper aim to address two complementary issues:-

1. How to design structural (versus general) vulnerability indicators, independent of present policy, focusing on the economic vulnerability index (EVI), developed by the UN and the physical vulnerability to climate change index (PVCCI), developed by FERDI.

2. Why and how to use these two indicators for the allocation of international resources (mainly the concessional resources): the economic vulnerability index as a criterion for the allocation of development assistance (ODA), and the physical vulnerability to climate change index as a criterion for the allocation of adaptation resources.

## Designing indicators of structural vulnerability

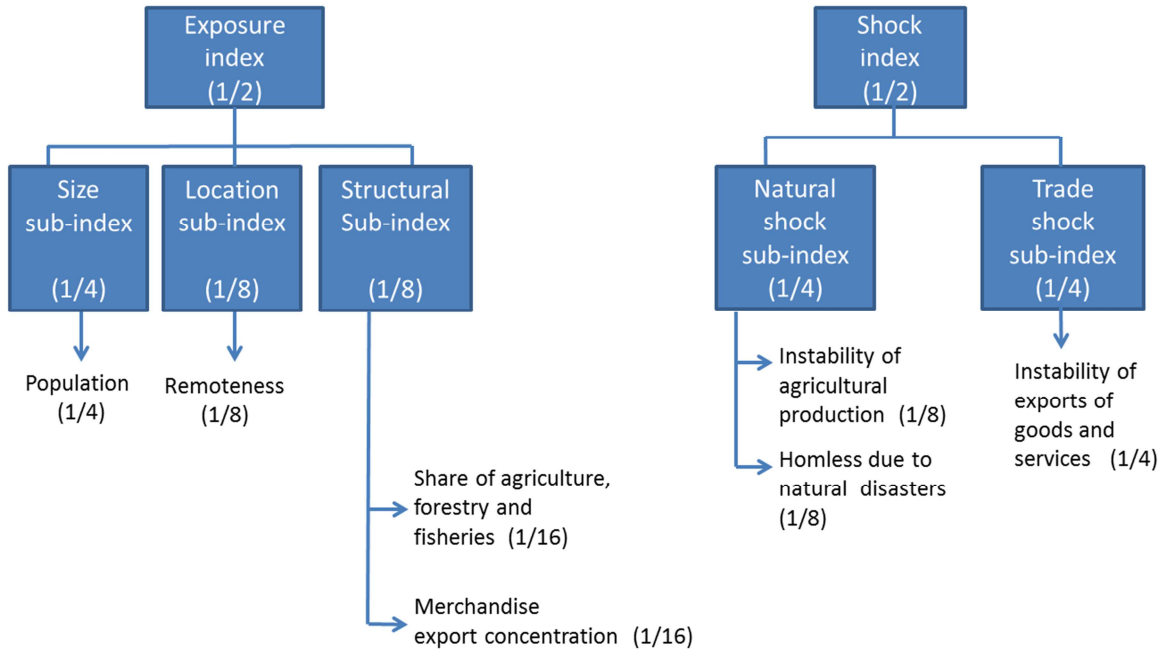
The design of (either economic or climatic) vulnerability indicators, likely to be used for international policy, should follow some general principles. To be really considered as "structural", the indicators should be independent of present policy, i.e. independent of the present will of the country. They should rely on long-lasting factors, so that they reflect either medium-term economic 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. Here we examine and compare two indicators, already calculated as indices, and meeting these principles, EVI, the Economic Vulnerability Index (developed at the United Nations) and PVCCI, the Physical Vulnerability to Climate Change Index (developed at FERDI).

### Structural economic vulnerability

#### *Structural economic vulnerability, as measured by the Economic Vulnerability Index (EVI)*

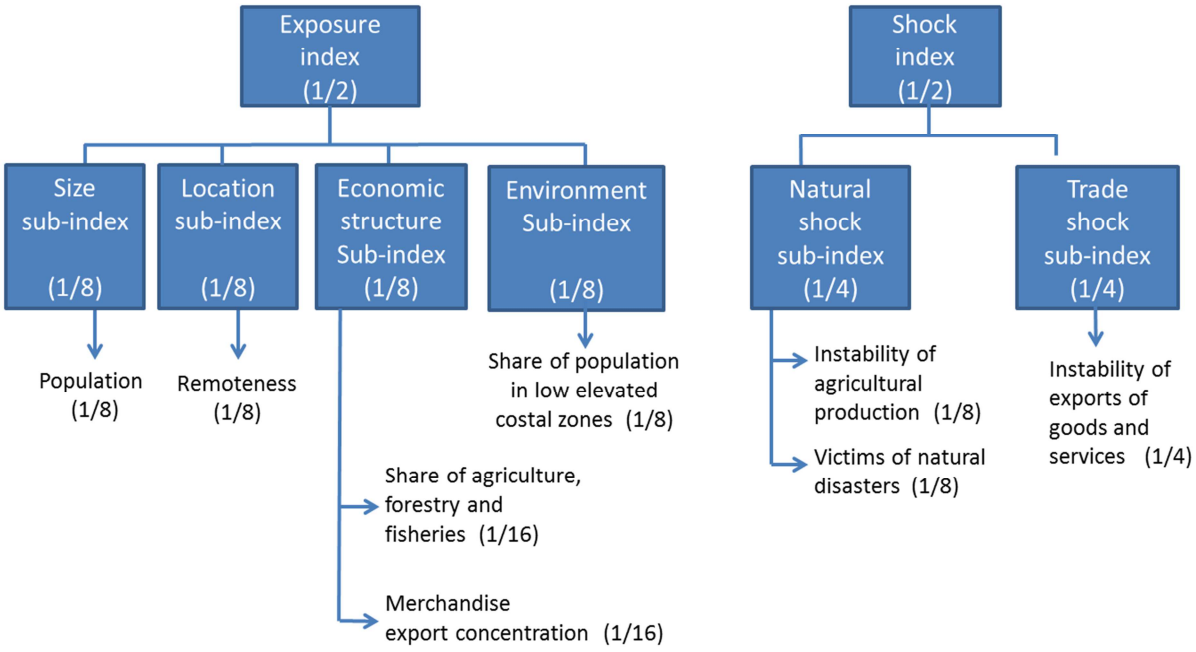
Developed by the UN Committee for Development Policy to characterize the LDCs, the EVI was set up first in 2000, largely revised in 2005, then slightly revised in 2011. EVI captures only the structural components of economic vulnerability, chosen with regard to their expected effect on economic growth, as explained in *Caught in a trap* (Guillaumont, 2009) and several other papers (Guillaumont 2009, 2010). Having been involved in the design of EVI as a member of the CDP, and chair of the working group in charge of its design and of the identification of the LDCs, the author endorses the logical grounds as well as the practical reasons behind its design. Transparent and parsimonious, the EVI relies on four main (structural) exposure components (ex ante vulnerability), and three (exogenous) shock components measuring past recurrent shocks, likely to re-occur in the future and already hamper future economic growth. The composition of the UN EVI, as designed in 2005, and used for the 2006 and 2009 triennial reviews of the list of LDCs, is given in Figure 1 below (see UN CDP, 2005; for the revision see UN CDP 2011; for the triennial reviews see UN CDP 2006, 2009, 2012).

**Figure 1. Economic Vulnerability Index (EVI) (2005 composition)**




**Source:** designed from UN CDP (2005)

**Figure 2. Composition of the Economic Vulnerability Index (EVI), 2011 design**




**NB:** Numbers in parenthesis indicate the weight in the overall EVI
**Source:** designed from UN CDP (2011)

Why is structural resilience excluded? While it is clear that only "structural" components should be included in the EVI, 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, well captured by GNIpc and the Human Assets Index (HAI)[1], which with EVI, are already used as complementary criteria for the identification of LDCs. Including them in the vulnerability index would blur the specificity of the vulnerability concept. It does not mean they should be forgotten in any policy-oriented assessment of structural vulnerability.

***Level and trend of EVI (2005 design)***

As expected from the origins of the index, the level of EVI is significantly higher in LDCs than in other developing countries (see Table 1). It is higher in Low-Income LDCs than in Low-Income non-LDCs. Also, while SIDS have a high level of EVI, the level is significantly higher for LDC SIDS than for non-LDC SIDS (the vulnerability of SIDS and LDCs is compared in Guillaumont 2009).

**Table 1. EVI, by group of countries, from 2012 LDC review**

| Group of countries | Number of countries | Mean EVI | Median EVI | Standard Deviation |
|---|---|---|---|---|
| All Developing countries non-LDCs | 66 | 33.08 | 30.90 | 11.17 |
| Least Developed Countries (LDCs) | 48 | 45.75 | 45.45 | 10.90 |
| Low and Lower Middle Income countries | 73 | 40.19 | 38.50 | 12.25 |
| Low and LMI countries non-LDCs | 28 | 32.01 | 30.70 | 9.75 |
| Small Islands Developing States (SIDS) | 30 | 46.44 | 45.90 | 12.56 |
| SIDS non-LDCs | 21 | 42.29 | 39.20 | 10.73 |
| SIDS LDCs | 9 | 56.13 | 53.40 | 11.52 |
| Landlocked Developing Countries (LLDCs) | 22 | 42.55 | 43.25 | 7.71 |
| LLDC non-LDCs | 6 | 43.63 | 43.90 | 6.03 |
| LLDC LDCs | 16 | 42.14 | 38.70 | 8.39 |

**Source :** United Nations CDP Report on the 14th session, 2012 LDC review

[1] The HAI is a composite index averaging four components, two of which are related to education (literacy and secondary enrolment ratio), and two others related to health and nutrition (child survival and % of population not undernourished).

Lessons can be drawn from a "retrospective EVI" produced by Ferdi in cooperation with UN DESA for the period 1970 to 2008 for 128 countries (LDCs and other developing countries), using the 2005 design of EVI (i.e. using the same structure and components as for the 2006 and 2009 reviews of the list of LDCs). Figures 3, 4, & 5 illustrate this evolution. The overall index is approximately stagnant for LDCs, and decreases for the other groups. The exposure index slightly decreases for LDCs, as for the other groups. The shock index increases for LDCs, and decreases for the others

The retrospective measurement of EVI shows a trend to a reduction in the structural economic vulnerability for the whole set of developing countries, at least since 1995. But the trend in LDCs is significantly different from that of the other developing countries. For the LDCs EVI increased from 1985 to the end of the 90s, then decreased, reaching a level in 2008 similar to that of 1984-85, while EVI in the other developing countries has been regularly decreasing since 1985. Considering only the "Low-Income countries", the difference between the two groups appears even stronger: the LDC EVI decreased less in the second part of the period covered than it increased in the first part while it has decreased sharply in the "Other Low-Income countries", so that the gap between the two groups has become wider. This wider gap is essentially due to the differences in the trend of the shock components across the groups of countries. The exposure index shows a progressive decline in all the groups of countries (see details and graphs in Cariolle 2011, and Cariolle & Guillaumont 2011).

With regard to exposure, population size increased in all groups, although a little faster in LDCs; the average export concentration increased in LDCs, decreasing elsewhere; remoteness of LDCs did not significantly change on average, and the share of agriculture, fishery and forestry decreased by a similar amount in both the LDCs and the other developing countries. The increase in the shock index of LDCs, in contrast with its decline in other developing countries, results mainly from a more rapid increase of the homeless index, and from a long term stagnation of the two instability indices (agricultural output and exports), while the instability of exports strongly decreased in other developing countries and that of agricultural production slightly decreased.

Since structural vulnerability is a major obstacle to development, its persistence in LDCs and the increasing gap between LDCs and the other developing countries, in particular those that have been or are still low income, indicates that addressing LDC vulnerability should be a main priority in the future.

**Figure 3. Evolution of EVI by group of countries**

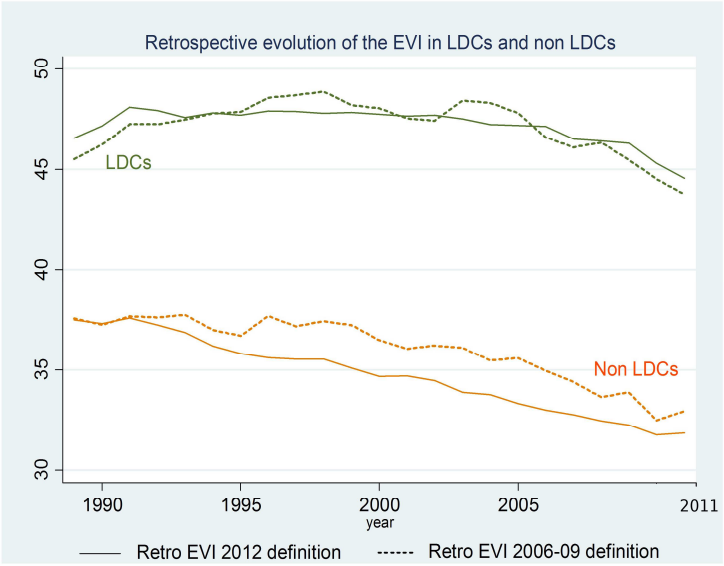



**Figure 4. Evolution of the exposure index by group of countries**

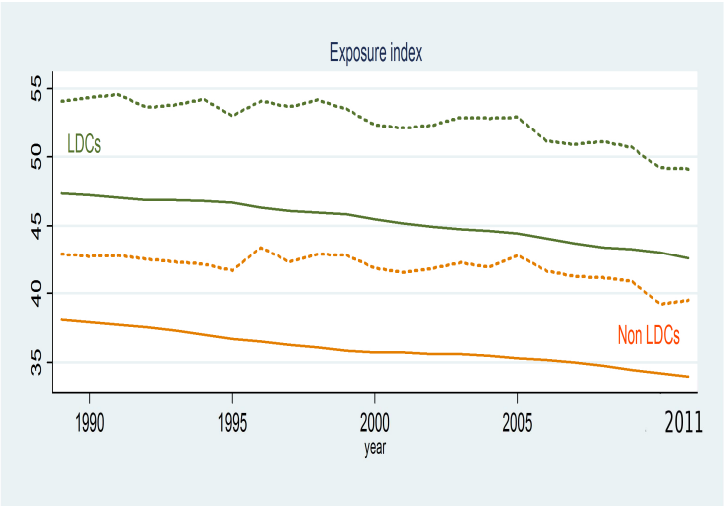
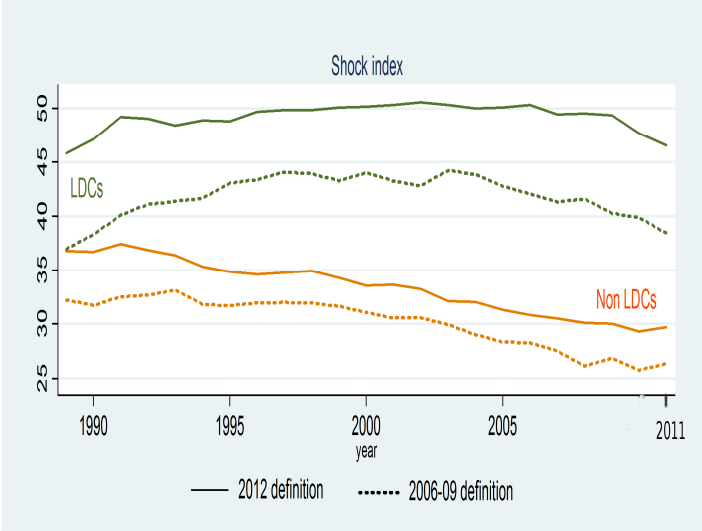



**Figure 5. Evolution of the shock index by group of countries**




**Source:** Tables from Cariolle and Guillaumont 2011

***Recent changes in the EVI… and challenges***

Some changes were made to the EVI by the UN CDP in 2011 for the 2012 triennial review of the list of LDCs. They were mainly motivated by the wish of the Committee to better reflect the environmental aspects of vulnerability (see Bruckner 2012). This issue had been discussed at length in the past, but it was considered that the EVI should reflect environmental factors of vulnerability only as they affect the medium term prospects for economic growth. This concern was reflected in the exposure components by the weight given to the smallness of population size (which is indeed a high factor of vulnerability for various reasons including those related to natural shocks), as well as by the inclusion of the share of agriculture, fishery and forestry, and in the shock components (by treating external shocks and natural shocks equally).

The 2011 revision takes a step further. The structure of the index remains unchanged, but besides a minor change in the shock components (homeless population due to natural disasters is replaced by population affected)[2], a new exposure component is added - the percentage of population living in low coastal areas (less than 5 meters above sea level). The same weight is given to each of the new four sub-components (see Figure 2 above). It might be asked why only the risk of sea level rise has been included (and this at a high threshold of 5 meters), and not the parallel risk of desertification when the percentage of arid areas is high (or to be symmetric the percentage of population living in arid or nearly arid areas). Moreover the decrease in the weight given to the population size indicator weakens the impact of all the structural factors of vulnerability associated to the smallness of this size. While the overall impact of the change, assessed through the rank correlation between the 2012 review EVI and its calculation according to the 2009 definition, is small (rank correlation coefficient of 0.94[3]), the rank of few countries is significantly modified (Bruckner 2012)[4].

So the change may be too much or not enough. With regard to the initial definition of the LDCs, as poor countries suffering the most from structural handicaps to growth, the revision appears to be not relevant because the new component is positively and not negatively correlated with growth, thus weakening the negative link between EVI and growth[5]. And with regard to a new definition of

[2] And a change is the way by which some other component indices are calculated (e.g. length of the trend used for calculating instabilities)

[3] Calculated on a reference group of 60 countries including all LDCs plus the other developing countries with an income per capita not exceeding twice the ordinary gradation threshold…

[4] In terms of vulnerability ranking, the seven most downgraded countries are République Centre-africaine, Equatorial Guinea, Vanuatu, Sao Tome e Principe, Bhutan, Togo and Ivory Coast, and the seven most upgraded are Myanmar, Zambia, Cambodia, Sierra Leone, Niger, Afghanistan and Bangladesh.

[5] We here refer to the partial correlation : if in a model explaining economic growth by the three indicators corresponding to the LDCs criteria, as that used in Guillaumont 2009 or more recently in Drabo and Guillaumont (2013), we add as an explanatory variable the new EVI component (low coastal area) besides the previously designed EVI, the coefficient of the new component is significantly positive, while that of the previous EVI is significantly negative.

LDCs as countries suffering the most of structural obstacles to sustainable development, it seems too narrow.

The changes brought in 2011-12 mean a small movement to identify LDC as poor countries facing structural obstacles to long term sustainable development, rather than only to medium term economic growth. It is not sure that they meet the requests of such a change. Anyway they raise a debate about the distinction between economic and climatic vulnerability, which is considered below. Another and parallel debate is about the distinction between economic vulnerability.

***Structural economic vulnerability and state fragility***

As noted in the introduction, a growing concern of the international community is the *fragile states*. Although often taken as similar, the two concepts of state fragility and economic vulnerability are very different, which leads us to clearly distinguish between LDCs and Fragile states (FS). State fragility is designed and identified from present policy and institutional factors (lack of state capacity, political will and political legitimacy), with many changing definitions, and often through a synthetic index such as the CPIA (the Country Policy and Institutional Assessment, used by the multilateral development banks for the allocation of their concessional assistance). Structural economic vulnerability, on the other hand, is designed from factors (exogenous shocks and exposure) which are independent of policy (see Guillaumont and Guillaumont Jeanneney, 2009). But structural vulnerability significantly influences state fragility, as shown by the impact of EVI and its components (mainly export instability) on CPIA (Guillaumont, Mc Gillivray & Wagner 2013). As a result, many LDCs are also Fragile states (most are or have been so by one or another definition).

## Physical vulnerability to climate change

Vulnerability to the present climate is already taken into account through several components of EVI (population affected by natural disasters, instability of agricultural production), and now, more specifically, by the risk of being flooded due to sea level rise. But vulnerability to climate *change* differs from economic vulnerability by its nature (more physical) and by its time horizon (longer): it reflects a long term risk of change in geo-physical conditions, not a structural handicap to economic growth in the medium term. Moreover, it is a vulnerability to only one environmental factor, although the major one.

***Which vulnerability to climate change index is needed?***

The required index of vulnerability to climate change depends on the goal being pursued. In fact there are many analyses and many indices available concerning country level vulnerability to climate change (see a review in Guillaumont & Simonet, 2011). We now need an index capable of being used (among other reasons) to allocate resources for adaptation, with the idea of giving more to the most vulnerable countries. So, as with EVI, it should be independent not only of current policy, but also of future policy: the index should not lead to reward countries which are more vulnerable because of a present or expected poor policy or resilience. In other words it

should be used as an indicator of structural problems. Moreover, since vulnerability to climate change is essentially long term, it is extremely difficult and risky to evaluate the potential damage likely to result from climate change: the size of any damage will depend both on policy and technological progress. So the structural vulnerability to climate change should preferably be captured through *physical* components, rather than socio-economic ones. This is the aim of the recent Ferdi *Physical Vulnerability to Climate Change Index* (PVCCI) (Ibid, 2011), which differs from other attempts (Wheeler, 2011, Barr et al, 2010).

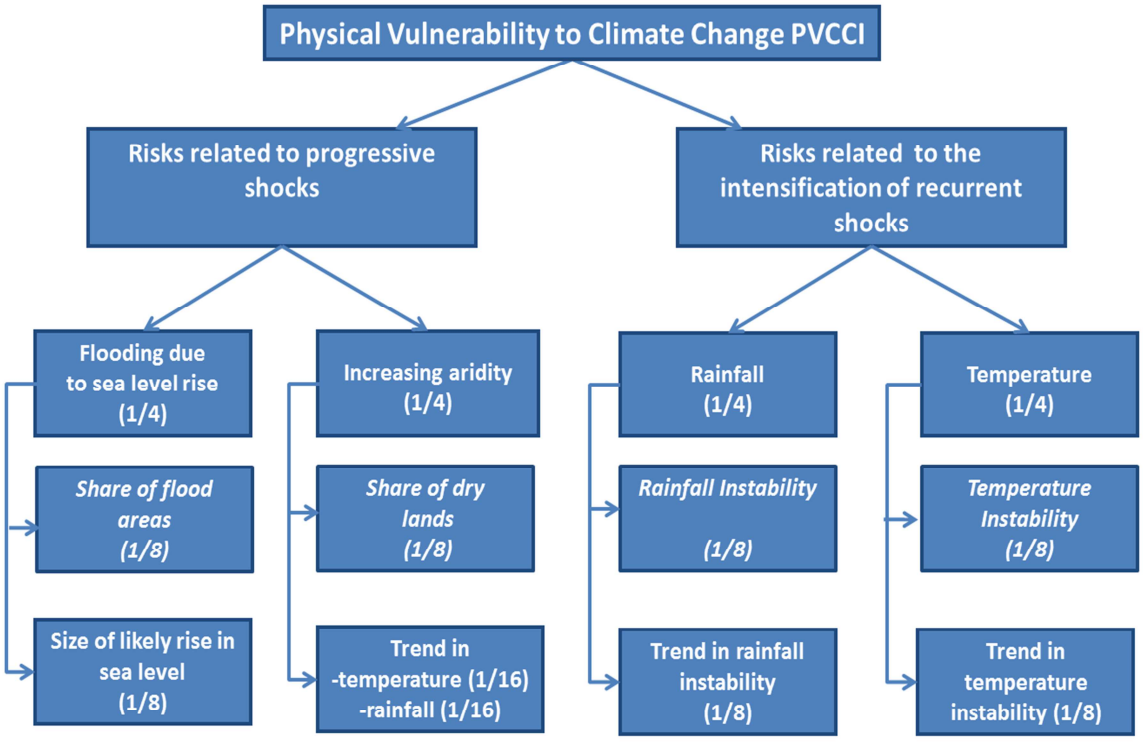
The FERDI Physical Vulnerability to Climate Change Index, still a tentative one, can be characterized as follows. First, it is forward-looking and likely to capture long term risks. Second, it includes only geo-physical components, without any debatable socio-economic component. Third, it relies on two distinctions; one distinction is between two kinds of risks due to climate change, the risks related to progressive shocks (such as sea level rise) and the risks related to the intensification of recurrent shocks (in rainfall or temperature); the other distinction is between these risks (of shocks) and the exposure to the shocks. Finally, because any of the main components of the index may be of crucial importance for a country, the components cannot be considered as perfectly substitutable, and for that reason are aggregated using a quadratic average (or a reversed geometric average).

It should be emphasised that "adaptive capacity" is excluded, as was economic resilience in EVI. Adaptive capacity is often considered as one of the climate vulnerability indicators. As is the case for economic resilience, it is heavily dependent on the present policy factors not being taken into account, and also on various structural factors which, as for economic resilience, are very broad:, including them would lower the specificity of the vulnerability concept. It seems better to separately take them into account through indicators such as income per capita or the human assets index, as is done for economic vulnerability with the EVI.

The PVCCI levels differ strongly between countries, and between groups of countries, as shown in Tables 2 and 3 (see more details in Guillaumont & Simonet, 2011).

According to the PVCCI, vulnerability to climate change appears to be higher in LDCs than in other developing countries, as was already the case (to a larger extent) for economic vulnerability (as per the EVI). On average it is approximately the same as that of the SIDS, but it is higher for the LDC SIDS than for the non-LDC SIDS. On average, the higher PVCCI level of the LDCs is due to the risks related to the intensification of recurrent shocks, rather than to the risks related to progressive shocks. Similar findings are obtained for Sub-Sahara African countries. These countries show a higher average PVCCI than other developing countries. This is not due to the magnitude of the risk associated with the progressive shocks index, which is itself a result of two opposing effects: a lower impact of the sea level rise in Africa, and a higher "increasing aridity" component (because the increasing trend in temperature is more pronounced in Africa). The higher PVCCI in Africa (compared to non–African developing countries) results from the impact of the increasing recurrent shocks.

**Figure 6. Composition of the Physical Vulnerability to Climate Change Index**




**NB:** The boxes in the two last rows of the diagram refer to exposure components *(in italics)* and to size of the shocks components

**Source:** Guillaumont & Simonet (2011)

### *Comparative levels of PVCCI*

**Table 2. PVCCI for several groups of developing countries (2014)**

| Group of countries | Number of countries | Mean PVCCI | Median PVCCI | Standard Deviation |
|---|---|---|---|---|
| All Developing countries non-LDCs | 95 | 40.69 | 39.96 | 8.48 |
| Least Developed Countries (LDCs) | 49 | 44.41 | 43.16 | 9.11 |
| Low and Lower Middle Income countries | 95 | 43.75 | 43.87 | 8.7 |
| Low and LMI countries non-LDCs | 47 | 42.89 | 44.25 | 8.27 |
| Small Islands Developing States (SIDS) | 31 | 38.86 | 36.80 | 9.77 |
| SIDS non-LDCs | 20 | 37.33 | 36.35 | 8.29 |
| SIDS - LDCs | 11 | 41.65 | 39.80 | 11.93 |
| Landlocked Developing Countries (LLDCs) | 29 | 46.90 | 45.97 | 7.55 |
| LLDC non-LDCs | 13 | 48.84 | 50.58 | 7.07 |
| LLDC LDCs | 16 | 45.33 | 44.42 | 7.78 |

**Table 3. PVCCI components compared between groups of developing countries (2014)**

| Group of countries | PVCCI | | | | PROGRESSIVE SHOCKS | | | | RECURRENT SHOCKS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number of countries | Mean | Median | Standard Deviation | Number of countries | Mean | Median | Standard Deviation | Number of countries | Mean | Median | Standard Deviation |
| All Developing Countries (DCs) | 142 | 41.93 | 41.61 | 8.86 | 142 | 32.04 | 26.25 | 16.04 | 142 | 48.12 | 47.92 | 8.67 |
| African Developing Countries | 47 | 44.19 | 43.30 | 8.50 | 47 | 33.79 | 28.21 | 15.13 | 47 | 51,06 | 51.37 | 8.72 |
| Least Developed Countries (LDCs) | 49 | 44.41 | 43.16 | 9.11 | 49 | 32.60 | 24.88 | 16.88 | 49 | 51.80 | 53.01 | 9.14 |
| African LDCs | 32 | 44.71 | 42.55 | 8.46 | 32 | 32.78 | 26.25 | 14.84 | 32 | 52.74 | 53.18 | 8.29 |

**Source:** Guillaumont & Simonet (2014)

## Mixing the two indices?

One can wonder whether the assessment of economic and climatic vulnerabilities should be made separately. It can indeed be stated that overall what matters is the risk of a country's sustainable development being hampered by exogenous shocks or factors, which encompasses both economic vulnerability and climatic vulnerability. A small movement in that direction was noted above, concerning the composition of EVI as revised in 2011.

There is however a rationale for keeping two separate indices. First, their time horizon is different (longer for climate change than for economic vulnerability). Second (and following on from the first), their scope is different (geo-physical components or expected impacts for Climate change; socio-economic components for EVI). An index is meaningful if it enlightens something well specified. Broadening the scope may result in blurring the message. Both EVI and PVCCI may themselves be more informative through their components than as composite indices.

Keeping this caveat in mind it is always possible to adopt a *fusion approach* and build an *extended structural vulnerability index*, combining the two indices, as they have been respectively defined. [ESVI = f( EVI, PVCCI)]. There would only be one redundant component in EVI, the share of population living in low level coastal areas, which in this case should be deleted,. The relative weight then given to each of the two indices would reflect the time preference of users, as well as their relative concern about economic growth and long term climate change impact.

Another and more progressive approach would be to add to the changes to EVI in 2011 so that it gives a more balanced picture of the climatic risks which are likely to occur and are likely to affect development prospects. In particular, if the share of population living in low coastal areas was retained, it would be reasonable to average it with an index of the share of dry land in total area, because the two indicators reflect the same risk resulting from climate change[6] (or to retain the higher of the two indices, since a high level for both generally does not occur in the same country).

The usefulness of a "fusion" of EVI and PVCCI, or more simply of an EVI augmented by a few balanced climatic indicators, would depend on the use to be made of the indices, in particular for international policies, as we will see now.

[6] The most appropriate average would then be the difference to one (or one hundred) of the geometric average of the two component indices so that a maximum value is reached when it is reached by one of the two.

## Using vulnerability indicators for the international allocation of resources

The previous two indicators are intended to be used for guiding policy. We now examine their possible use for the international allocation of resources, either Official Development Assistance (ODA) or the concessional resources for adaptation to climate change. Such a use faces the difficult issue of the principles and criteria of international resources allocation

### Geographical allocation of development assistance: the present debate and the vulnerability challenge

Traditional wisdom is dominated by the "PBA", "performance based allocation". This means that aid should be mainly allocated to countries according to their "performance". The PBA is a formula used by the multilateral development banks (MDBs), and some bilateral donors, for the allocation of their concessional resources, performance being measured by a composite indicator of policy, namely the "CPIA" (Country Policy and Institutional Assessment). The PBA is also a kind of general principle on which the international community is supposed to agree, and which is used to assess the quality of the geographical aid allocation from various donors (their "aid selectivity"). This principle and its use through the PBA formula have been strongly debated for the last decade.

***Performance Based Allocation (PBA), a debated formula***

Let us briefly recall what the PBA is

*PBA formula at the World Bank for the International Development Association (IDA)*

- $A_i = CPR_i^{5.} . \ GNIpc_i^{-0.125} . P_i$
- $CPR_i = 0.24\ CPIA_{ABC} + 0.68\ CPIA_D + 0.08\ PORT$

  with CPR : country policy rating,

  $CPIA_{A,B,C,D}$, Country Policy and Institutional Assessment, clusters A,B,C,D

  PORT rating of the portfolio performance in the country

*PBA formula for the African Development Bank/Fund (AfDF)*

- $A_i = CPA_i^{4.} . \ GNIpc_i^{-0.125} . P_i$
- $CPA_i = 0.26\ CPIA_{ABC} + 0.58\ CPIA_D + 0.2\ PPA$

  with CPA country policy assessment

  PPA portfolio performance assessment

*PBA formula for the Asian Development Bank (AsDB*)

- $A_i = CCPRI_i^{2.}.\ GNIpc_i^{-0.25}.P_i^{0.6}$
- $CCPRi^{2.00}$ = (policy and institutional rating)$i^{1.40}$ × (governance rating)$i^{2.00}$× (portfolio performance rating)$i^{0.60}$

  with CCPR the "Composite country performance rating"

Why is there a debate? The PBA gives an overwhelming importance to the assessment of policy and governance of recipient countries (through "CPIA" and its governance component). It does not take into account their vulnerability (although this has been a matter of concern for a long time), neither their distance from the MDGs (in particular in health and education). In spite of criticism, there is a strong reluctance by some donors to change. However a change in ideas and a better appreciation of the need to take vulnerability into account are visible. This can be seen in the United Nations Secretary General report to the ECOSOC Development Cooperation Forum in 2008 and 2010; by the Joint Ministerial Declaration on Debt Sustainability, from the Commonwealth and OIF, 2009 or by new initiatives of the AfDB (see details in Guillaumont 2011). More significant is a recent resolution of the UN General Assembly (A/C.2/67/L.51, December 2012) on the Smooth transition for countries graduating from the list of least developed countries (LDCs), which in its paragraph 23 "invites development partners to consider the least developed countries indicators, gross national income per capita, the human assets index and the economic vulnerability index as part of their criteria for the allocating official development assistance".

***Improving the PBA by taking into account vulnerability***

We summarize here five reasons to improve the PBA, all of which are related to vulnerability

Restoring the *real meaning of performance* is the first one. Everybody favours performance. Genuine performance refers to outcomes with respect to given initial and external conditions, but the CPIA is an assessment of policy rather than a real measure of performance. Moreover, it is a subjective assessment, according to uniform norms, which does not really fit the alignment and ownership principles of the Paris Declaration, and the Accra Agenda for Action. And it does not take into account the initial and external conditions, in particular vulnerability to shocks.

A second reason is the need *to enhance equity by compensating structural handicaps,* and avoiding double punishment. Aid allocation should aim for equity. For countries or individuals, promoting equity means equalizing opportunities, and capabilities. Opportunity equalization involves compensating structural handicaps. The main structural handicaps to growth in the low income countries are the vulnerability to exogenous shocks, and a low level of human capital. Two obstacles which reinforce each other, and which are not taken into account in the PBA. These two handicaps, along with a low level of income per capita, are the main features of LDCs, and are consequently used as criteria for the identification of LDCs. Moreover, if aid is allocated mainly

according to governance, populations suffering from bad governance, in particular from state fragility, are at the same time penalized by aid allocation: they are punished twice. Bad governance should indeed be taken into account in aid policies, but when designing *aid modalities,* more than through geographical aid allocation.

Thirdly, the principles leading the allocation of development assistance should draw on the lessons of the *aid effectiveness* literature over the last 15 years. Two main lessons may be drawn. Aid effectiveness is conditional on the features of recipient countries, but, although present policy is a significant *positive* factor of growth, its impact on aid effectiveness is *uncertain*. On the other hand although vulnerability is a significant *negative* factor of growth, its impact on aid effectiveness is *positive*, due to its macro-economic stabilizing impact (Chauvet & Guillaumont 2001, 2004, 2010; Collier & Goderik, 2010). So, if only for effectiveness reasons, it is legitimate to take vulnerability into account in aid allocation. It is a way by which aid can be made more effective.

Fourth, taking into account structural economic vulnerability in aid allocation would help to increase its *transparency and consistency,* by making the rules general and effective, and treating fragile states in an integrated framework. Presently PBAs are implemented with multiple exceptions: country or per capita caps, floors, and above all special treatment for fragile states or post conflict countries. These exceptions weaken the relationship between "performance" and allocation, reducing the transparency of allocation rules. The treatment of fragile states and post conflict countries in aid allocation should be not only transitional and curative, as at present, but also continuous and preventive, through the consideration of structural vulnerability.

Finally, including an indicator of structural vulnerability such as EVI would make the allocation more stable, more predictable and less pro-cyclical. In the present formula, due to its structure, the effects of small changes of policy rating (CPIA, CPR, CPA, CCPR, etc) on a country allocation are quite big (there is a high elasticity of allocation with respect to the rating indicator, which is itself not very stable). Moreover, the rating (e.g. CPIA) is often pro-cyclical with regard to exogenous shocks (such as the terms of trade ones). Taking into account structural handicaps would make allocation less sensitive to the amounts of aid, and to changes in policy and governance rating, and so more predictable.

These various reasons give a robust rationale for taking into account structural vulnerability, as well as low level of human capital, in aid allocation. The allocation formula can be easily improved. It can be done by using available and commonly agreed indicators, such as EVI (for structural vulnerability) and HAI (for human capital), which are used at the UN for LDC identification along with GNIpc, also a relevant aid allocation criterion. That is precisely the meaning of the paragraph 23 of the December 2012 UN Resolution, quoted above. It would still be possible to include an appropriate indicator of "performance/policy", but due to the presence of additional criteria, it would receive a lower weight than at present.

*Two main approaches* are possible to implement such a reform, and which meet the principles of equity, effectiveness, transparency, and simplicity. The first approach would be to include EVI and

HAI in the measurement of the so-called performance, the assessment of which would then be adjusted for the structural handicaps faced by the countries: it would be an "augmented PBA". The second approach would be to include EVI, HAI, GNI per capita, and an index of policy, in a simple allocation formula balancing effectiveness and equity goals through its four components, with equal weights, or with weights differentiated according to individual donor preferences.

Referring to the criteria used at the UN for the identification of LDCs does not require that EVI and HAI should be kept totally unchanged. The principles are more important than their translation into specific indices. Once the principles on which the indices are built have been met, each donor may have its own HAI and EVI indices, as each multilateral development bank already has its own CPIA. For the index of structural economic vulnerability, the use of EVI as an aid allocation criterion will probably involve some adaptation. As suggested above, the new EVI, designed in 2009, should be revised to be made more adapted to this use. It would be a better index given two changes. First, the the component "export concentration" should be deleted because it gives an undue premium to mineral exporters, in particular oil exporters, while a possible negative effect of the concentration of exports is already taken into account through the instability of exports. Second, and more important, the inclusion of a new environment component, in fact a climate change related component (the percentage of population in low coastal areas) should either be balanced by another (additional or alternative) component reflecting the exposure to desertification (e.g. the percentage of dry land), or deleted if the vulnerability to climate change is captured in a separate index and used for the allocation of adaptation resources other than the traditional ODA.

## Performance versus vulnerability, also an issue for the allocation of climate finance

Climate change is recognized as a dominant issue for world economy and policy. While mitigation is a global issue calling for action in all countries, and mainly the more developed ones, adaptation is a challenge more or less important for all countries, but more significant in poor countries, although they are the least responsible for climate change. In the search for new resources for "climate finance" adaptation and mitigation ought to be as distinct as possible, which is not obvious (see the review by Neil et al. 2012). The concern of the international community has led to a search for resources to finance adaptation to climate change through special initiatives under the United Nations Framework Convention on Climate Change (UNFCCC), such as the Adaptation Fund and the Least Developed Countries Fund housed at the GEF (Global Environment Fund). (The IPCC reports show the growing interest in the problem and the search for solutions.). While more and more resources will be devoted to adaptation to climate change, the total amount available is limited, enhancing the need for consistent criteria for allocation of resources between countries.

### *Criteria for the allocation of adaptation resources: a strong rationale for a vulnerability criterion*

The allocation of adaptation resources *a priori* faces the same issue as that of ODA, namely the need to combine performance and vulnerability criteria. Presently it seems from the practice of the GEF that the performance or policy considerations still have a major role in the allocation of climate

finance, with a specific reference to environment policy, but without a clear rationale when the resources are to be allocated for adaptation. There is indeed a consensus to consider that the low-income countries are not responsible for the climate change they face, which weakens the basis for an allocation primarily determined by performance. For some authors, resources should even be seen as a compensation, their allocation corresponding to the recognition of an entitlement, which leaves no room for recipient policy in the allocation formula (Birsdall & de Nevers, 2012). While the assessment of an entitlement seems difficult, it appears equitable that the concessional funds for adaptation be allocated mainly according to the vulnerability to climate change (see Guillaumont 2008, Wheeler 2010, Guillaumont & Simonet 2011).

To meet an equity principle, we need to consider the *physical vulnerability to climate change*, through an indicator such as PVCCI, neither dependent on policy, nor on any socio-economic factor. This means that the adaptation resources are intended to help a developing country to face the challenge raised by climate change, expressed in physical terms, without necessarily assessing its possible economic impact. This economic impact, tentatively taken into account by some other measurements of vulnerability to climate change (e.g. Wheeler 2010, following Cline, 2007), actually depends on quite uncertain factors, some of which may be to some extent exogenous, such as technological progress, some others being related to the country capacity to adapt, which is mainly a policy factor: as seen above for ODA, the vulnerability associated to poor policy should not be lead to a higher allocation of adaptation resources. Indeed there may be some factors leading to a low capacity to adapt which are independent of present policy (corresponding to what was called a low structural resilience earlier in this paper). But they should be considered separately and captured, for instance, by the level of income per capita and human capital, as was proposed for the allocation of ODA, by using GNI per capita, HAI, and EVI.

Notwithstanding the similarities, there are some significant differences between the treatment of vulnerability in the allocation of resources for development assistance, and in the allocation of resources for adaptation. The reference to structural vulnerability, because it is more clearly exogenous (and all the more so since it is taken from physical indicators), seems more easily accepted by the international community for adaptation resources than for ODA. But if it was agreed to take physical vulnerability to climate change as a criterion for the allocation of adaptation resources, it would be easier to move in the same direction for ODA, by using structural economic vulnerability. The ODA allocation debate would then be influenced by the debate on climate finance.

***Criteria for the allocation of adaptation resources: what place for performance?***

Should a performance criterion be added for the allocation of adaptation resources, and if so what kind of performance rating should be used? When adaptation resources are seen only as an entitlement to compensation for recipient countries, there is no room for criteria other than those reflecting the damage, or the risk of damage, caused by climate change (which is, as noted above, the conceptual framework of Birdsall & De Nevers, 2012 - who take into account the level of income

per capita to limit the compensation to countries below a given level of income). Nevertheless, in this framework, a weak policy or performance could lead to *specific modalities* of support (e.g. projects versus budget support), as also suggested for development aid allocation. On the other hand, some authors, strongly influenced by the PBA model of aid allocation, keep a significant importance for performance criteria, in several aspects (Barr, Fankhauser & Hamilton 2010, Wheeler 2011). It is worth recalling that in the present practice at the GEF, a strong weight is actually given in allocation to "performance". Considering that the allocation of adaptation resources may not be determined purely as a compensation (the amount of which is indeed difficult to assess), and that the donors are concerned that resources should be used effectively for adaptation, it could be suggested to keep a performance criterion with a significantly smaller weight than presently. Which kind of criterion would then be relevant?

If a reference to effectiveness (or "performance") is used for the allocation of adaptation resources in the same way as for development assistance, it may not have the same meaning for both. In particular, it is not clear what kind of performance is relevant for the allocation of resources aimed at adaptation to climate change. Three options come to mind.

One would be to consider the performance in management of the environment or the quality of policy with respect to climate change (e.g. the contribution to mitigation), as is partly the case for the allocation of GEF resources: it is a "moral", but debatable argument. In no way does it offer a guarantee that the adaptation resources will be effectively used.

A second option is to refer to general performance or policy, also partly considered at the GEF: probably the same factors have an impact on the effectiveness of development and of adaptation, but since they are broad and not easily identifiable factors, they may be debated for adaptation even more than for development assistance.

The third option would be to differentiate the assessment of performance according to the goal of the expenditure. In the case of aid allocation, it has been suggested that there should be a focus on the assessment of the "portfolio" component of the country's policy, or the "performance" rating of the main sectors to which development assistance is targeted. In the case of adaptation resources, it would be logical to formulate an assessment of the quality of the implementation of the adaptation projects or policies. In the climate change literature this effectiveness criterion is named "capacity to implement", a weak capacity being expected to lead to a significantly poorer implementation (cf. Barr, Fankhauser & Hamilton, 2010). The assessment of performance through the capacity to implement would then be differentiated according to the purpose of the expected expenditure or projects. However this supposes that the goals of adaptation and development can be clearly differentiated, and that the projects and policies really differ.

## Mixing the two allocation processes?

Economic development and adaptation to climate change in poor countries are actually very close goals. While the needs of resources for development and adaptation seem to depend respectively on two clearly distinct measures of (structural) vulnerability, the use of the corresponding resources cannot often be clearly separated. How can we combine the two allocation processes, bearing in mind that vulnerability is a double-sided concept?

It is often assumed that the respective levels of official development assistance (ODA) and concessional resources for adaptation (CRA) are determined independently, so that the level of CRA is additional to that of ODA. Of course, this is by no means certain, especially at a time of strong budget constraints; rather than additional, the resources for the two goals are likely to be partial substitutes. So it would be logical to simultaneously consider and assess the levels of resources dedicated to both goals, which does not mean they should be fully merged, in particular when their geographical allocation and their use at the country level are examined.

With regard to the allocation of resources between countries, there are two options. In the first one, ODA and CRA are treated separately: the allocation of both of them uses the relevant concept of structural/physical vulnerability among its criteria, and refers to performance in a specific definition. If, in a second option, the two kinds of resources are merged, their geographical allocation should be treated simultaneously, and the two kinds of vulnerability measured through a synthetic index, which combines indices of structural economic vulnerability and physical vulnerability to climate change (e.g. an average of the revised EVI and the PVCCI, as explained above). The relative weights given to each index would then depend on the preference expressed by the donors or the international community, reflecting their time preference for development achievement. Moreover the effectiveness or "performance" indicators and criteria, if any, may differ and the aggregate index used would also reflect international preferences (of course the allocation of resources for mitigation would be treated differently).

Once the country envelopes are determined, according to criteria reflecting the relevant vulnerabilities of recipient developing countries (among other criteria), their use in each country should again be examined simultaneously (or at least in coordination). Thus if a possible trade-off between development and allocation goals is unavoidable, it may be for the mobilization of resources, for their geographical allocation, or for the choice of their use. At each step, it is necessary to disentangle, then to assess, the respective significance of the structural economic vulnerability and of the physical vulnerability to climate change, but that is especially needed for the allocation between countries. At the end of the day the allocation of international resource is a policy choice.

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*"Sur quoi la fondera-t-il l'économie du monde qu'il veut gouverner? Sera-ce sur le caprice de chaque particulier? Quelle confusion! Sera-ce sur la justice? Il l'ignore."*

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