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**The concept of structural economic vulnerability and its  
relevance for the identification of the Least Developed  
Countries and other purposes  
(Nature, measurement, and evolution)***Patrick Guillaumont*

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**Background**

This paper was prepared by Professor Patrick Guillaumont, as a contribution to the expert group meeting of the Committee for Development Policy on climate change, conflict and other issues related to the review of the criteria for the identification of least developed countries (LDCs) which took place in New York, 2-3 February 2011. Structural economic vulnerability is a major obstacle for the development of LDCs. The paper discusses the conceptual, methodological and empirical issues related to the economic vulnerability index (EVI) developed and used by the Committee for Development Policy (CDP) in the identification of LDCs. The note also addresses the relation between physical and economic vulnerability to climate change as well as the role of the EVI in allocating official development aid and as tool for development research.

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# The concept of structural economic vulnerability and its relevance for the identification of the Least Developed Countries and other purposes (Nature, measurement, and evolution)

*Patrick Guillaumont*<sup>1</sup>

## I. Introduction

This note summarizes and updates analyses presented in previous work by the author on the economic vulnerability of the Least Developed Countries (see references at the end of the note).

It is well evidenced in the academic literature that exogenous shocks and related instabilities of economic variables have detrimental effects on the economic growth of developing countries and on the rate of poverty reduction. There are both short term and long-term effects. The economic vulnerability is the risk for a country to have its development hampered by these shocks and instabilities. As long as vulnerability is not the result of current or recent policies and rests on persisting factors and features it is considered as “structural”.

The LDCs are designed as low-income countries facing structural obstacles to development, and seemingly “caught in a trap”. Economic vulnerability to exogenous shocks and related instabilities are a major structural handicap to sustained growth and poverty reduction, and thus considered as a relevant criterion for the identification of the LDCs.<sup>2</sup>

## II. On the origin of Economic Vulnerability Index (EVI): economic vulnerability, a long lasting concern of the Committee for Development Policy

Following a recurrent concern on the economic vulnerability of the LDCs, the Committee for Development Policy (CDP) has made the choice to build an economic vulnerability index (EVI) after having considered whether other available indices were adequate to designate countries as LDCs. The need of building a specific vulnerability index for the LDCs identification was recognized in 1999 with the objective of having a simple and transparent index, possibly supplemented by a “vulnerability profile” in the case of those countries meeting the criteria for graduation from the LDC category (see details in Guillaumont 2009a, pp. 33-5, 173-5).

The first version of the CDP index, retained for the 2000 triennial review of the list of LDCs, had been strongly influenced by the structure of a previous criterion, the Economic Diversification Index (EDI). EVI was intended to replace EDI as one of the three identification criteria of LDCs along with income per

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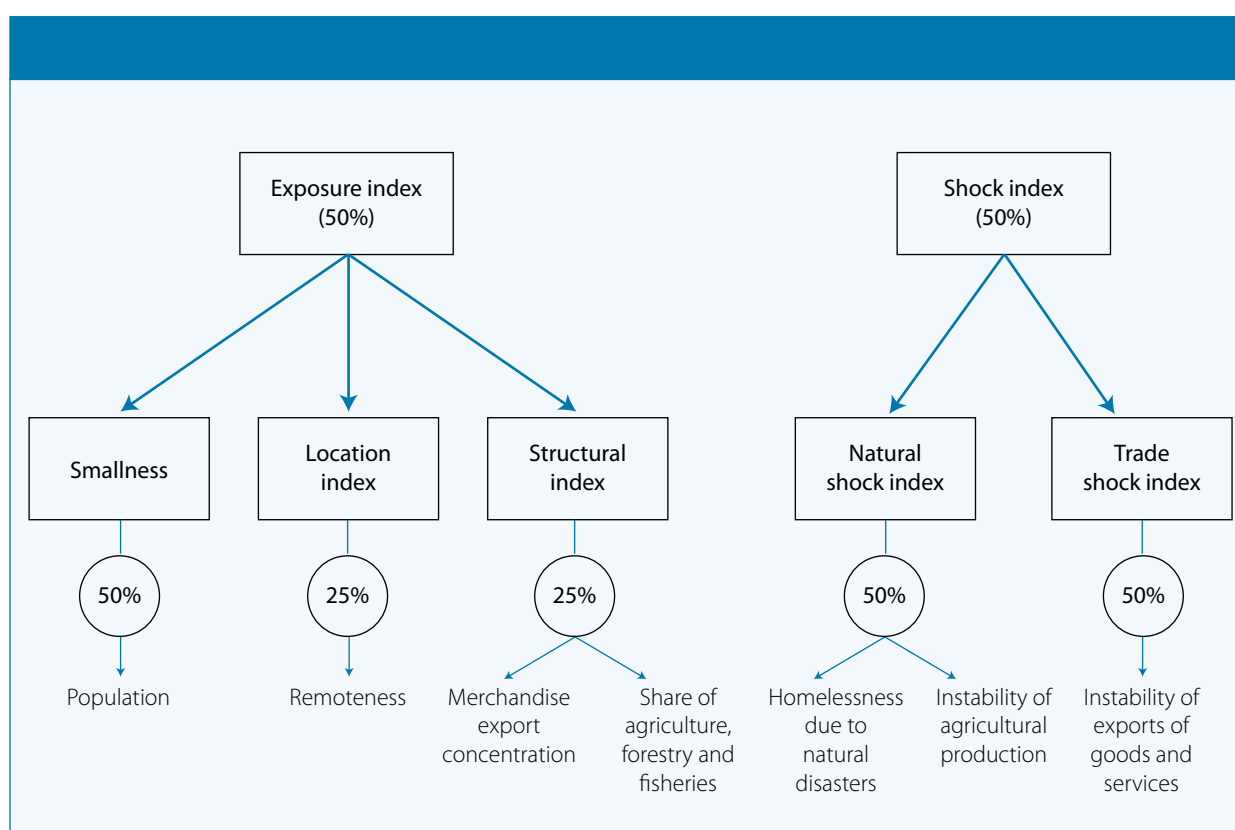
1 Ferdi. Ana Cortez, UN-DESA, provided acknowledged useful comments, without being engaged by any of the views expressed.

2 Structural economic vulnerability can also be considered for other purposes, in particular as an indication of the need of development assistance and as such as a criterion for its allocation among countries.

capita and the level of human capital. High vulnerability and a low human capital are considered as complementary obstacles to growth: a high economic vulnerability is an obstacle to growth all the more important when human capital and per capita income are low.

An improved and more comprehensive EVI was developed in 2005 and used for the 2006 and 2009 triennial reviews. It relies on two groups of components, each group with equal weights, one reflecting the size of the recurrent shocks, the other the exposure to the shocks. The shock components capture both external economic shocks and natural shocks, both again with equal weights. Among the exposure components the size of population (smallness) has a weight equal to 50 per cent. The EVI used in 2006 and 2009 reviews of the list of LDCs has seven components and is structured as follows:

### Economic Vulnerability Index



Source: CDP and UN/DESA (2005).

### III. On structural economic vulnerability

The EVI differs from other existing vulnerability indices, not only because of its simplicity and clear structure, but also and mainly because it captures vulnerability caused by structural factors only. For equity and fairness reasons, LDCs identification requires an index of vulnerability which should be relatively independent from current or recent policies so as to avoid favouring countries following misguided policies. This is an essential feature of EVI. Moreover, in order to avoid instability in the LDC category (and having countries frequently joining and leaving the list) indicators included in EVI should change rather slowly.

As far as the vulnerability of a country would be linked to poor present policies, it would no longer be a reason for this country to benefit from the specific support associated to the membership in the LDC category. The LDC category is intended to give support to developing countries suffering from structural handicaps and not from misguided policies. EVI is designed in this spirit and this is why it fundamentally differs from other vulnerability indices which most often have both structural and policy components.

From the beginning of the work by the CDP on building an EVI (Guillaumont 1999), a distinction has been made among three elements underlining vulnerability: (i) the size of the shocks, (ii) the exposure to these shocks; and, (iii) the country resilience. While the first two elements can be considered as largely structural, resilience is mainly related to policy. This is the reason why the EVI relies on two groups of components: one related to the exposure (4 components) and the other to the size of the shocks (3 components).<sup>3</sup> Additionally, the exposure components of EVI are designed to capture only the structural factors of exposure.

This notwithstanding, there have been proposals to consider the trade to GDP ratio, or trade dependency, as one of the indicators of vulnerability. Yet, this is not a good indicator of structural exposure. The trade to GDP ratio depends not only on (i) structural factors such as population size but also on (ii) economic policy (some authors have mistakenly taken this ratio as an indicator of policy openness). What matters for the LDCs identification is to know whether exposure (in the example discussed here, trade dependency) results from structural factors, rather than from policy. In this regard, the size of population as a component of exposure captures the structural factor behind the ratio of trade to GDP.

The same argument can be made for other (so-called) “dependency” indicators, such as aid, remittances and foreign direct investment (FDI) to GDP ratios, also strongly influenced by the population size of the country. In any case, these flows should be considered as a benefit, not as a handicap to development. In fact, one of the support measures adopted for the category is specific targets for ODA flows by bilateral donors in view of the limited capacity by LDCs to mobilize resources either domestically or in financial markets.

#### IV. Some questions about EVI

Of course EVI is not a perfect index, but it is simple, parsimonious and transparent. To be recalled, the most successful HDI (Human Development Index), also very simple and transparent (indeed corresponding to a less complex concept), has not ceased to be criticized, but at the same time it has been increasingly accepted and used.

A concern about EVI may have come from a misunderstanding of how vulnerability is measured and how it is used as a criterion for LDCs identification. The concern has emerged on the occasion of the recommendation to graduate small island developing states (SIDS), still considered as highly vulnerable. But their eligibility to graduation is not the result of an underestimation of their vulnerability. It results from the rationale of the category and the complementarity of the criteria (all three criteria are required to be met for inclusion in the category while no longer meeting any two criteria—not only one - would make a country eligible for graduation). In this regard, countries having high structural vulnerability qualify to graduation if they are above a certain level of income and human resource development. A given level of income and

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<sup>3</sup> Resilience depends on many aspects of policy, and as such is very difficult to capture in an appropriate index (Guillaumont 2009a, pp.185-7, 200). It also depends on human capital and income per capita, which are independently taken into account as criteria for the identification of the LDCs.

human assets enables countries to better overcome their structural vulnerability and its negative impacts. In fact, at the last two triennial reviews, the two indices, in their present composition, have been averaged to give the CDP supplementary information on borderline cases,<sup>4</sup> without changing the conclusion on the eligibility to graduation. Thus even with a high EVI, countries could still be recommended to graduate.

One concern is that the EVI does not sufficiently reflect the vulnerability to unexpected and non-recurrent shocks. This could partly be addressed by changing the way by which the components are averaged, in particular by using a semi-geometrical average of the shock and the exposure indices, as explained in Guillaumont 2009a pp. 199-201, and 2010. In doing so, a very high exposure index would lead to a high EVI, even if the country has a rather low shock index, and could better capture vulnerability to unexpected or non-recurrent shocks. However, semi-geometric averaging would also result in higher EVI scores for countries with low exposure but high shock indices.

Another concern refers to the fact that EVI may not be considered “forward-looking” enough and reflects retrospective vulnerability. This observation however does not seem to be applicable to the exposure components of the index which are unlikely to be rapidly changing in the future. Is this consideration also valid for shock components, which rely on past averages? Actually, as far as the components of the shock index reflect recurrent shocks, they provide a proxy of the likelihood of occurrence in the future. Moreover, either recurrent or exceptional (e.g. earthquakes), natural shocks are likely to have a negative impact on future growth. Past shocks are handicaps for future growth.

In any case, if refinements were to be introduced to EVI by including new components they should be few (for simplicity), and clear (for transparency). The new indicators should also correspond to available and reliable statistical information.<sup>5</sup> Above all, to be consistent with the rationale of the category, these additional components should clearly reflect a handicap to growth in the medium term. In this regard, it should be noted that the time horizon considered in the preparation of UN IV Conference on LDCs—which provides the development strategy framework for these countries and the corresponding support by the international cooperation—is a decade, with a wish expressed by member States to see the number of LDCs reduced by half during the next ten years.

### V. EVI and the vulnerability to climate change

Vulnerability to climate change is a complex issue, well examined by Bruckner (2011). The construction of a relevant indicator of vulnerability to climate change is highly desirable and there is already some significant literature on this concept (most noticeable and recent references are Adger, 2006, Fussel, 2010). But the relevance of an index should be assessed with regard to its aim. Vulnerability to climate change takes place not only on a medium term horizon, but also on the long term, with a specific concern that there is an increasing uncertainty about potential impacts the longer the period considered is.

#### *Climate change as it impacts on EVI*

Of course climate change also has detrimental consequences on developing countries even on the medium term as any other natural shocks may have. For this reason two indicators of recurrent natural shocks have

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<sup>4</sup> Averaging the two indices results in a *structural handicap index* (Guillaumont 2009a).

<sup>5</sup> To limit the number of components, it can also be relevant to delete the export concentration index from the exposure components, for reasons already examined (Guillaumont 2009a, pp. 193-4, 262, 325).

been included in EVI (homelessness and instability of agricultural production). These shock indicators—whose respective magnitudes have progressively changed over time—may already reflect an impact of climate change, as far as climate change can increase the frequency and/or the size of events leading to homelessness or instability of agricultural production.

A large part of the vulnerability to climate change (and other natural shocks) can be reflected in EVI's exposure components, as they presently stand, in particular the size of population and remoteness. Vulnerability to climate change can also be reflected by the addition of new components such as the share of the land (or population) at risk to be flooded. However, the risk of being affected by sea level rising is more a long-term risk than a medium term one (except in few cases, such as for Tuvalu). For consistency reasons, only the risk to be flooded in the medium term—that is to say the risk resulting from exposure by those land areas at rather low altitude—should be considered to be included in EVI.

***Beyond the LDC criteria: an index on the physical vulnerability to climate change to be used for the allocation of adaptation funds***

Naturally, an index of vulnerability to climate change could be for a purpose other than the identification of LDCs. The most obvious purpose of such effort is to have an indicator to allocate external resources for the adaptation to climate change (Guillaumont, 2008). On the international agenda, vulnerability to climate change and necessary adaptation measures seem to be addressed separately from the LDCs treatment, even if a significant number of LDCs are likely to be vulnerable to climate change. This is due to the fact that many developing countries, which are not LDCs (middle-income countries), are also highly vulnerable to climate change. In this perspective, the relevant indicator of vulnerability to climate change as an indicator of vulnerability should not depend on present policy but reflect the pertinent structural features underlining such vulnerability, in this case “physical”. Moreover, it should also be clear and transparent.

A tentative indicator of geo-physical vulnerability to climate change has recently been set up at Ferdi (Guillaumont and Simonet, 2011). As an environmental index, the index relies on components reflecting the physical consequences of climate change that can directly affect population welfare and activity, rather than an assessment of their potential long term economic consequences, which would be more debatable. This index relies on a small number of components respectively capturing the risks related to progressive and cumulative shocks and the risks related to the intensification of recurrent shocks, and, again as EVI, combining exposure and (likely) shock indicators.

This Physical Vulnerability to Climate Change Index (PVCC) has the following structure:

- *Index of the risks related to progressive shocks*, or continuous hazard, which refer to possible persistent geophysical consequences of climate change at the country level, with two parts:
  - risk of flooding due the rise of sea level, which depends on the size of the rise (shock) and on the altitude of the country (exposure);
  - risk of increasing aridity and desertification, which depends on the temperature trend and/or the rainfall trend (shocks) and on the share of arid areas (exposure).
- *Index of the risks related to the intensification of recurrent shocks* such as droughts, typhoons, floods, etc., also with two parts:
  - The exposure component uses measures for past rainfall and temperature instabilities;
  - The shock component captures the risk of an increase in the size of the recurrent shocks as a result of climate change, and is more forward-looking. It uses measures of the trends in

rainfall and temperature instabilities. It thus assumes that that these trends are determined by climate change and are likely to go on in the future.<sup>6</sup>

PVCC differs from EVI, for three main reasons. First, its focus is narrower, since it is related to only one source of vulnerability (climate change), while EVI refers to natural shocks independently of their source (including climate change) captured by their socio economic impact by using indicators such as the share of population which becomes homeless or affected by natural disasters and/or the instability of agricultural production. Second, PVCC captures *risks of changes in geophysical conditions*, which may or may not affect economic growth, and as such may not be necessarily considered as handicaps to development, but all leading to a need of adaptation, while, as just noted, EVI captures socio economic impacts of the shocks. Third, PVCC refers to a potentially longer term horizon than EVI. Thus the nature and purpose of these indices are quite distinct. Accordingly, PVCC is not a suitable potential component for EVI.<sup>7</sup>

## **VI. Using EVI beyond LDCs identification**

Although imperfect, EVI has gained increasing recognition in the international community. Not only it is now intimately linked to the meaning of the LDC category, what is important in the perspective of the next UN LDC IV, but also it has been used in other contexts.

A large debate has been engaged at the UN (United Nations 2008a, 2008b, 2010) and as at some multilateral development banks, in particular at the African Development Bank (Guillaumont Jeanneney et Vencatachellum 2009) and the International Development Association (IDA) of the World Bank (Guillaumont, Guillaumont Jeanneney, Wagner, 2010) on how EVI can be used as one of the criteria of aid allocation.

Support to considering structural vulnerability as a possible aid allocation criterion has initially been expressed at UN (United Nations 2008a, §36; 2008b, pp2 and 16; 2010, §48 and 127). It was also expressed by the Finance Ministers of the Commonwealth and the Organisation Internationale de la Francophonie (2009, §9). It has been recently and noticeably reiterated by the Commonwealth Secretariat (2010, pp10-11), with explicit reference to EVI as an appropriate index. The debate at the Multilateral Development Banks the point under discussion has focused on whether there could be a move from the traditional PBA (“performance based allocation”)--which relies essentially on a subjective measurement of the quality of policy (CPIA, the Country Policy and Institutional Assessment)--to an allocation taking into account the structural economic vulnerability through an index such as EVI.

Finally, EVI has appeared to be a useful concept and measure for research works, as illustrated in several academic papers in peer reviewed journals using extensively the EVI (e.g. Amprou et al. 2007, Ferrarini, 2009, Guillaumont 2009a, 2010b, Guillaumont and Guillaumont Jeanneney 2010). In this regard, several researchers have expressed the wish to obtain time series of EVI, likely to be used in quantitative studies of the effects of vulnerability.

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<sup>6</sup> It should be noted that the average frequency of rainfall or temperature shocks differs from the present two indicators of natural shocks in the EVI, which are not specific to climate change and are supposed to reflect any kind of natural shock.

<sup>7</sup> The same can be said on the vulnerability index recently presented by Wheeler (2011) at the Center for Global Development and also to be used as a criterion for the allocation of adaptation funds, but which are less clearly structural than the Ferdi index.

## VII. A retrospective EVI: results and lessons learnt

Due to the successive revisions, EVI values calculated for the 2003, 2006 and 2009 reviews are not comparable. A retrospective evaluation of EVI according to the last and present definition is needed for research purposes. A “Retrospective EVI” was first and tentatively established on a 5 year and 10 year basis (Guillaumont 2007). Thanks to the collaboration with the UN/DESA, the Ferdi has now calculated a retrospective EVI on an annual basis, covering 128 developing countries over the period 1975-2008. This more robust and less rigid (yearly) series relies on a methodology very close to that used for the last two reviews of the list of LDCs (2006 and 2009), and allows researchers to make consistent comparisons over time (Cariolle and Guillaumont 2011 for the brief, Cariolle 2011 for the full document).<sup>8</sup> It also confirms previous findings, as analyzed in *Caught in the Trap* (Guillaumont 2009a pp. 209-14).

During the period of analysis, the least developed countries (LDCs) have showed a level of EVI higher than the other developing countries, and even more so when compared to the other low-income countries. In order to permit a relevant comparison of the long term evolution of EVI between groups of countries, the group of low income countries has been defined as including all the countries that are or have been low income during the period covered (the number of countries still low income, but not LDCs, has become very small).

The retrospective measurement of EVI indicates a decreasing trend 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. The LDCs EVI has been increasing from 1985 to the end of the nineties, and then decreasing, with a level in 2008 similar to that of 1984-85. Meanwhile EVI in the other developing countries has been decreasing steadily since 1985. Considering only the “low income countries”, the difference between the two groups appears even stronger: the decline in EVI in LDCs during the second half of the period of analysis was not sufficient to offset the increases observed during the first half, while EVI has decreased sharply in the “other low income countries”. Therefore, the gap between the two groups has become wider by the end of the period. This increasing gap is essentially due to the differences in the trend of the shock components across the groups of countries, while the exposure indices show a progressive decline in the various groups of countries (see details and graphs in Cariolle 2011 and Cariolle and Guillaumont 2011).

As for exposure, population size has been increasing in all groups, although a little faster in LDCs; the average export concentration has increased in LDCs, decreasing elsewhere; remoteness of LDCs has not significantly changed on average and the share of agriculture, fishery and forestry has decreased by a similar magnitude in both the LDCs and the other developing countries. The increase in the shock index of LDCs, contrasting 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 the LDCs and the other developing countries, in particular those that have been or still are low income, indicates that addressing LDCs vulnerability should be a main priority in any programme of action for LDCs. Facing the LDCs vulnerability involves both increasing their resilience to exogenous shocks and lowering their structural vulnerability.

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<sup>8</sup> At the same time a “Retrospective HAI”, also giving comparable annual time series, has been set up (Korachais, 2011).

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