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The Economic Vulnerability Index

2010 Update

Joël Cariolle

Joël Cariolle, Phd Candidate, is a Research assistant and Statistician for Ferdi on vulnerability issues since 2008. He is also a consultant on anticorruption issues.

1. Introduction

Economic vulnerability can be defined as the likelihood that a country's economic development process is hindered by the occurrence of exogenous unforeseen events, often called external shocks (Guillaumont, 2008; 2009). Since the 90s, the interest in developing countries' economic vulnerability has been growing. Indeed, the numerous worldwide economic crises of this decade pointed out their vulnerability to international market fluctuations. In 2000, economic vulnerability, measured by the economic vulnerability index (EVI), was an additional criterion to the GDP per capita and the human capital (measured by the Human Asset Index) for the identification of least developed countries (Guillaumont 2009, chapters 2 and 6). Since then, the EVI has been revised for the 2006 and 2009 reviews proposed by the United Nations Committee for Development Policy1 (UNCDP) to identify Least Developed Countries.

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Glossary

CERDI: Center for Studies and Researches on International Development

EVI: Economic Vulnerability Index

DC: Developing Countries

LICs: Low income countries

LDCs: Least developed countries

LDCLICs: Least Developed Countries also Low Income Countries

LIC/non LICs: Low Income Countries non Least Developed Countries

UNCDP: United Nations Committee for Development Policy

UNDESA: United Nations Department of Economic and Social Affairs

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1. Introduction

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Economic vulnerability results from three main determinants: the *size and likelihood of shocks*, the *exposure to these shocks*, and the *resilience* or the capacity for reacting to them (Guillaumont, 2009, chapter 6). While the two former determinants mostly depend on country structural features (geographic localization, human capital, economic diversification, and so on), resilience relies rather on country current economic policy.

However, since the EVI aims to measure developing countries' structural vulnerability, vulnerability resulting from transitory features such as economic policy cannot be used as a criterion for long run aid allocation. The EVI is hence a synthetic index of the magnitude of shocks and the exposure to shocks. Two main categories of shocks are considered. On the one hand, the EVI intends to capture the effects of domestic *natural shocks*, including natural disasters – such as earthquakes or tsunamis – and climatic shocks – such as droughts, floods, or typhoons. Other domestic shocks such as civil wars, political and social instability are not taken into account since they can be somewhat endogenous. On the other hand, the EVI also reflects the impacts of *external shocks*, which are related to trade and exchange, such as international commodity price volatility, slumps in external demand, or world interest rates fluctuations. In regards to exposure to shocks, it is likely to be higher when country size is small, when countries specialize in primary commodities, and/or remote from world markets.

Thus, the EVI is the arithmetic average of:

- The **exposure index**, which is a weighted average of *population size* (50%), *remoteness from world markets* (25%), *exports concentration* (12.5%), and the *share of agriculture, forestry and fishery in GDP* (12.5%).
- The **size and likelihood of shocks**, which is a weighted average of the *annual mean share of homeless due to natural disasters in the population* (25%), the *instability in the agricultural production* (25%), and the *instability in exports of goods and services* (50%).

The EVI is an index between 0 and 100, since its components are also measured on a 0 to 100 scale and since the cumulative sum of their weight equals 1. A high score corresponds to a high level of vulnerability while a low score corresponds to a low level of vulnerability.

The two 2006 and 2009 triennial reviews of the EVI are available on the United Nations Department of Social and Economic Affairs (UNDESA) website. These reviews are based on a similar methodology and provide

[1] Guillaumont (2009, Chapter 2) provides an exhaustive historical analysis of the evolution of the EVI as criterion used by the United Nations to identify least developed countries.

vulnerability scores for 130 developing countries. However, the 2006 and 2009 reviews, as well as the former 2000 and 2003 reviews, do not allow intertemporal comparisons for the following reasons:

- Three major changes in the calculation method have been made: first, between the 2000 and 2006 reviews, the EVI switched from a **simple arithmetic average** of five components to a **weighted average** of seven components; second, **the two additional components** have been included since the 2000 review, namely the share of homeless due to natural disaster in the population and remoteness; third, **the share of manufacturing goods and modern services in GDP has been replaced by the share of agriculture, forestry and fisheries in GDP**.

- These reviews have not been revised in order to be comparable over time.

As a consequence, triennial reviews do not allow an assessment of progress made by countries regarding their structural vulnerability. The retrospective EVI database aims at giving researchers and policy makers the opportunity to make cross-section and/or intertemporal comparisons by providing annual scores of economic vulnerability from 1975 to 2008. Despite the retrospective nature of the data, we tried to follow as far as possible the method employed by the UNCDP to construct its 2009 review, detailed in the UNCDP (2008) « handbook on the least developed country category ». This document presents the method employed to construct the annual retrospective EVI, compares the new database to the scores of by the UNCDP 2009 review, and exposes the main findings and trends of the retrospective series by country categories.

2. Definitions and general principles of calculation

The retrospective EVI is a weighted average of seven components, gathered into five sub-indexes (size, specialization, location, trade shock and natural shock) among which are two shock sub-indexes (natural and trade shocks) and three exposure sub-indexes (size, specialization, location). The EVI results from the simple arithmetic average of the exposure index and the shock index. Table 1 below connects components, sub-indexes and indexes and presents their related data sources.

Table 1. Indexes, sub-indexes, and components of the retrospective EVI.

Components	Data sources	Sub-indexes	Indexes
Population (in log)	World Bank (except Afghanistan, for which the United Nations data has been used)	Size	EXPOSURE
Share of agriculture, forestry and fisheries in GDP. Exports concentration	United Nations Statistics Division, United Nations National Accounts Main Aggregates Database UN Conference on Trade and development	Specialization	
Remoteness from main world markets, adjusted for landlockness	CERDI (exports of goods in current dollars, World Development Indicators)	Location	
Instability of exports receipts	CERDI (deflated exports of goods and services, United Nations).	Trade shocks	SHOCKS
Instability of agricultural production Homelessness due to natural disasters	Food and Agriculture Organization, United Nations Emergency Disasters Database (EM-DAT) – WHO in collaboration with the Centre for Research on the Epidemiology of Disasters (CRED) –, and the World Bank – World Development Indicators database.	Natural shocks	

2.1 EVI components.

EVI components are the main determinants of structural vulnerability hampering economic growth and poverty alleviation in developing countries.

2.1.1 The exposure to shocks

Exposure to shocks is taken into account since impacts of shocks is all the more important when country exposure to shocks is strong. Moreover, exposure also reflects the likelihood for a country to be harmed by future shocks. Exposure components consist of:

- *Population size*: because countries with small population size are more likely to be open to international trade, which in turn increases their exposure to trade shocks.
- *Concentration of export proceeds*: because when countries export a limited number of goods, the impact and likelihood of shocks are expected to be higher.

- The *share of agriculture, forestry and fisheries in GDP*: because countries depending on those sectors are more vulnerable to climatic shocks and international commodity price fluctuations.

- *Remoteness from main world markets*: while being a structural handicap to growth and poverty reduction, remoteness from world markets particularly explains a greater exposure to trade and natural shocks.

2.1.2 Size and frequency of shocks

Climatic shocks and other natural shocks – earthquakes, hurricanes, tsunamis, droughts, floods, etc. – represent an important source of vulnerability in many developing countries. Natural or climatic shocks are proxied by two variables: the annual mean share of homelessness due to natural disasters in the population, and the instability in the agricultural production, which reflects the impact of frequency and size of shocks on the agricultural production. *Trade shocks* are proxied by the instability in exports of goods and services, which reflects exogenous trade-related events such as slumps in external demand, or domestic events independent from economic policy, such as climatic shocks (Guillaumont, 2008).

2.2 Normalization of components

EVI scores, as well as those of its components, are normalized through the *min-max* procedure. It ranges original data from 0 to 100, where 0 and 100 are the normalized values for minimum and maximum values actually observed in our sample of countries. However, upper and lower time-invariant boundaries have been imposed to the distributions, in order to prevent from possible distortions arising from distributions containing outliers or presenting excess kurtosis, i.e. distribution presenting infrequent extreme deviations from the sample mean. Applying this procedure allows us to obtain index values comparable over time. Each normalized component contributes positively to vulnerability (the closer to 100 the index, the more vulnerable the country).

2.2.1 The *min-max* procedure

Except for the *population size*, variables underlying the calculation of EVI components contribute positively to structural vulnerability. In regard to these variables, the *min-max* procedure consists in applying the following formula:

$I = [(\mathbf{Value}\text{-}Min)/(Max\text{-}Min)] \times 100.$

Population size, which is negatively related to vulnerability, is normalized through the following operation:

$II = [(Max\text{-}\mathbf{Value})/(Max\text{-}Min)] \times 100 \quad \text{or} \quad II = 100 - I$

2.2.2 Lower and upper boundaries

Table 2 exposes lower and upper boundaries used to normalize values of each component. These limits are the same as those used by the UNCDP in its 2009 review, except for the *homeless* component. Indeed, the *homeless* component has been computed on an annual basis in our retrospective series, while homeless in the

UNCDP¨2009 review is based on the cumulative sum of homelessness over 1990-2004[2]. Thus, we had to modify boundaries used by the UNCDP so that they fit for annual data, dividing them by the number of years from 1990 to 2004, i.e. 15 years. Section 3 provides further details on the way components have been computed.

Table 2. Boundaries used for normalization.

Variables/components	Lower boundary	Upper boundary
Population	150 000	100 000 000
Remoteness	0.100	0.900
Export concentration	0.100	0.950
Share of agriculture, forestry, and fisheries in GDP (%)	0	60.00
Homeless due to natural disasters (mean annual % of the population)	1.3	0.0001
Instability in the agricultural production	1.50	20.00
Export instability	3.00	35.00

2.3 Averaging of EVI components

As for the UNCDP 2009 review, the EVI is a simple arithmetic averaging of exposure and shock indexes:

$$EVI = 0,5 \times Exposure + 0,5 \times Shock.$$

Exposure Index is the weighted average of the following sub-indexes:

$$Exposure = 0,5 \times Size + 0,25 \times Location + 0,25 \times Specialization.$$

… and the specialization sub-index the simple arithmetic average of the following components:

$$Specialization = 0,5 \times Export\ concentration + 0,5 \times Share\ of\ agriculture,\ forestry,\ fisheries\ in\ GDP.$$

The Shock index is the arithmetic average of natural shock and trade shock sub-indexes…

$$Shock = 0,5 \times Natural\ shock + 0,5 \times Trade\ shock$$

… and the natural shock sub-index the arithmetic average of homeless and instability in the agricultural production components:

$$Natural\ shock = 0,5 \times Homeless + 0,5 \times Instability\ in\ the\ agricultural\ production$$

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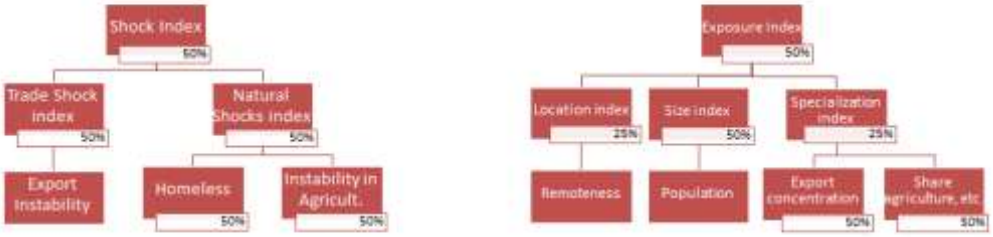
2 See United Nations, *Handbook on the Least Developed Country Category : Inclusion, Graduation and Special Support Measures*, Committee for Policy Development and United Nations Department of Economic and Social Affairs, Novembre 2008, p. 53.

Thus, the EVI presents the following architecture:



When aggregating weights of each component, export instability represents 25% of the EVI, the homeless and instability in the agricultural production components 12.5%, the size of population 25%, remoteness from world markets 12.5%, export concentration and the share of agriculture in GDP 6.25%.

Given that component scores are between 0 and 100 and that the sum of their weight equals 1, the EVI is between 0 and 100, a high score corresponding to a high level of vulnerability.

2.4 Sample characteristics

We built series covering 128 developing countries over 1975-2008. The sample is similar to that of the UNCDP 2009 review, except for two countries that have been removed, namely Israel and Brunei, because of their high level of GDP per capita. The sample includes 49 Least Developed Countries (LDCs) and 63 Low Income Countries (LICs). The classification of LDCs corresponds to the list of LDCs established by the United Nations in 2007 (excluding Cap Verde from the list), while LICs have been identified according to the World Bank income group classification. In this **document we considered all countries presently LICs or formerly LICs between 1987 and 2009 as LICs**. Moreover, we excluded Papua New Guinea and Zimbabwe from the "non LDCs" category since they have been eligible for their inclusion in the LDCs category but refused it in 2006 and 2009, respectively. Results are averaged by country income group and presented in section 4.2 (and in Annex C). Annex A provides a list of countries included in our sample and their corresponding category.

3. Calculation of the retrospective EVI

The construction of the retrospective EVI consisted in combining contemporaneous values (at time *t*) of each component following the averaging method explained in section 2.3. Constructing retrospective and annual series imposed some variables to be marginally adjusted to the UNCDP calculation principles. We explain in detail the calculation of each variable below.

3.1 Population size

We did not face difficulties when computing this component since annual raw data is available for the entire sample from the WDI database (except for Afghanistan, see the box below). Population size is expressed in a logarithm and normalized using the inversed *min-max* procedure with the corresponding bounds presented in table 2.

SPECIAL TREATMENTS

For Afghanistan, data prior to 1990 are World Bank's, while data posterior to 1990 are United Nations'.

3.2 Remoteness from world markets, adjusted for landlockness

The remoteness component is the trade weighted average distance from world markets. Two sets of data are hence required: the bilateral distance (in kilometers) between the country and its trading partners, and the share of each trading partner in the world market (the share of trading partner's exports in total world exports). Then, trade-weighted bilateral distances are summed up until the cumulative share of exports of all possible combination of trade partners reaches 33% of the world markets (the UN established a threshold of 50%). It is then minimized according the following formula:

$$\textbf{Distance from world markets} = \text{Min} \sum_{j=1}^{k} Dij * \frac{Xj}{Xwld}$$

With the country *i*, the trade partner *j*, *k* the whole set of trade partners allowing to reach 33% of the world market with a minimal distance, D_{ij} the bilateral distance between country *i* and partner *j*, X_j and X_{wld} total exports of trading partner j and total world exports respectively.

Beyond the proper effect of distance, *landlockness* is another structural handicap, which is often associated with increased barriers to trade and higher transport costs, for a given distance to the world markets. *Distance* has hence been adjusted for this additional handicap by applying an adjustment coefficient of 15% for landlocked countries. Thus, the remoteness component finally consists in the resulting formula:

Remoteness = [0,85*lnD + 0,15*L]

With *D* the normalized *Distance from world markets* (min-max procedure), and *L* a dummy variable indicating whether the country is landlocked (L=1) or not (L=0). The remoteness index is available from 1975 to 2007 on an annual basis. In 2008, we used data of 2007.

SPECIAL TREATMENTS

Data is missing in the following countries: **Kiribati, Maldives, St Kitts & Nevis, Timor Leste, Tonga, Tuvalu** and **Vanuatu**. We fill in missing data by copying scores of relevant neighboring countries. Thus,

- **Kiribati** = **Tuvalu** = **Vanuatu** = Salomon Island
- **Maldives** = Sri Lanka
- **St Kitts & Nevis** = Antigua & Barbuda
- **Timor Leste** = Indonesia
- **Tonga** = Samoa

3.3 Merchandise export concentration index

The export concentration index is derived from the Herfindhal index applied to export of merchandises (excluding services) as categorized by the three-digit level of the Standard International Trade Classification (SITC). This index is between 0 and 1, a high level of concentration being associated with a score close to 1. A country exporting only one product would score 1 according to this index. The derived Herfindhal Index formula is the following:

$$H_j = \frac{\sqrt{\sum_{i=1}^{n}\left(\frac{x_i}{X_j}\right)^2} - \sqrt{1/n}}{1-\sqrt{1/n}}$$

Where j is the country index, x_i is the value of exports of commodity I, X_j the total exports of country j, and n the number of products at the three-digit SITC level. The index is then normalized using the min-max procedure with the boundsspecified in table 2.

SPECIAL TREATMENTS

In 1971, 1977, 1978 and 1979, data is missing for the whole sample. Gaps have been filled using a centered moving average of the closest past and future available data:

$$Concent\_1 = (concentration_{t-k} + concentration_{t+k})/2$$

k is set according to the availability of previous and future data. For instance, in 1971, interpolated data is the average of 1970 and 1972. In 1977, data is the average of 1976 and 1978; in 1978, data is the average of 1976 and 1980; and in 1979, we averaged data from 1978 and 1980.

When missing data is dispersed, two additional methods have been applied:

- Data is copied from previous (t-k) or later (t+k) available data.

$$Concent\_2 = Concentration_{t-/+k}$$

- Data is interpolated by adding to the last observation a variation corresponding to the difference between this last observation (t-p) and the next one (t+q), weighted by the ratio of the number of years passed since the last observation over the total number of years between the last and the next observations:

$Concent\_3 = concentration_{t-p} + [(p+1)/(p+q+1)]^* (concentration_{t+q} - concentration_{t-p})$

Finally, data is missing in 2007 and/or 2008 for the following countries: Vanuatu, Tuvalu, Tonga, Timor Leste, Somalia, Salomon Island, Sierra Leone, Mauritania, Lesotho, Kiribati, Iraq, Dominica, Djibouti, Comoros, Chad, Bahrain, and Afghanistan. To address this issue, we extrapolated missing data using the annual mean growth rate of country export concentration index between 1975 and 2006/2007.

3.4 Share of agriculture, forestry and fisheries in GDP

Raw data has been retrieved from the United Nations National Accounts Main Aggregates Database. The *min-max* procedure with the bounds specified in table 2 has then been applied to the data.

SPECIAL TREATMENTS

For Timor Leste, the value in 1995 has been applied to previous years from 1975 to 1994. For Yemen, values from 1975 to 1988 are the weighted averages of two Yemen values.

3.5 Homeless due to natural disasters

The construction of the *homeless* component required to adapt the method is followed by the UNCDP in a manner that we obtain annual data and fill in missing data for a large number of countries. Raw data is gathered from various databases (Emergency Disasters Database (EM-DAT) – WHO in collaboration with the Centre for Research on the Epidemiology of Disasters (CRED) –, and the World Bank – World Development Indicators database) and covers 1970-2008. In some countries, data is missing over the whole period, while in other countries data is missing for a few years, which required us to make some approximations or extrapolations.

In the UNCDP 2009 review, the *homeless* component is the cumulative sum of homelessness from 1990-2007, divided by the national population during the middle of the period (1998/99). In order to obtain annual series, we computed, for each year, the cumulative annual mean share of homelessness in the population.

First, we computed the cumulated yearly-averaged number of homeless for each year. For instance, in 1979, we added up the number of homeless people from 1970 to 1979 and divided it by the number of years since 1970, i.e. 10 years. In 1980, we added up the number of homeless people from 1970 to 1980 and divided it by the number of years since 1970, i.e. 11 years, and so on. We then computed each year the ratio between the yearly-averaged number of homeless and the national population. This annual mean share of homeless in the population is then expressed in logarithm and normalized through the *min-max* procedure (using bounds presented in table 2). Thus, the construction of an annual retrospective homeless component consists in applying the following formula:

$$Homeless_{1970+k} = \min \max \left[\log \left(100 \times \left(\frac{\sum_{1970}^{1970+k} Homeless \Big/ (k+1)}{population_{1970+k}} \right) \right) \right]$$

SPECIAL TREATMENTS

For countries with missing data over the whole period, we applied three procedures to approximate it.

*1st procedure: Predict missing data by a regression of the logarithm of the annual mean share of homeless in the population upon the annual mean share of people **affected by natural disasters** in the population of neighboring countries. Estimates are then used to predict homeless from data on people affected.*

- **Country 1**: Equatorial Guinea **neighbors**: Cameroon, Central African Republic, Rep. of Congo, Nigeria, Dem. Rep. of Congo.
- **Country 2**: Timor Leste **neighbors**: Indonesia, Malaysia, Papua New Guinea, the Philippines, and Thailand.

Econometric results are presented in Annex B.

2nd procedure: extrapolate missing data by averaging neighboring countries' annual mean share of homeless in the population.

- **Country 3**: Cote d'Ivoire **neighbors**: Burkina Faso, Liberia, and Mali.
- **Country 4**: Libya **neighbors**: Algeria, Tunisia, Egypt, and Chad.
- **Country 5**: Grenada **neighbors**: Trinidad-&-Tobago, St. Lucie, St Vincent, Dominica, Antigua-&-Barbuda, and Barbados.
- **Country 6**: Gabon **neighbors**: Rep. of Congo, and Cameroon.

3rd procedure: replace missing data by the annual mean share of homeless in the population of a relevant neighboring country.

- **Country 7**: Singapore **neighbors**: Malaysia.
- **Country 8**: Sierra Leone **neighbors**: Cameroon.
- **Country 9**: Surinam **neighbors**: Guyana

3.6 Instabilities in exports receipts and agricultural production

Raw data on exports of goods and services (deflated by the import unit value index in developing countries) and agricultural production (net PIN base 1999-2001 in dollars) has been retrieved from United Nations National accounts and Food and Agriculture Organization, respectively.

Measurement of instability consists in averaging deviations between the observed value of export proceeds and a reference value over a chosen time interval. The reference value may be for instance an average, a median, or a trend estimated over a given period. Hence, measuring instability implies two methodological choices: the method of computing/estimating the reference value, and the method of averaging deviation around this reference value. For these retrospective series of EVI, we follow the general principles governing the calculation of instability in the UNCDP 2009 review: (i) the reference value is a mixt trend (deterministic and stochastic) estimated over a past period, (ii) instabilities are measured as the mean quadratic deviations over a past period. However, instabilities calculated for the retrospective EVI differ from those of the UNCDP 2009 review, in that the retrospective (and annual) nature of the new series constrained us to estimate trends and compute deviations on a rolling basis, over a shorter period than the UNCDP does.

Thus,

- in regard to **the instability in the agricultural production**: while the UNCDP chose a 16-year period (1990-2005) to estimate trends and compute deviations, we chose a rolling 15-year period to compute trends and deviations, i.e. a period covering the current year and the 14 previous years, for each year[3];

- in regard to **the instability in exports of goods and services**: while the UNCDP chose a 28-year period to estimate trends and compute deviations, we proceeded in the same way as we did for instability in the agricultural production by choosing a rolling 15-year period.

Regarding trends estimation, we apply the same formula as the UNCDP's, which consists in a mixed trend including a deterministic component and a stochastic component:

$$Log\, Y_t = \alpha + \beta.\log Y_{t-1} + \gamma..T + \varepsilon_t$$

with Y the export receipts or agricultural production variable, and T the deterministic component. Each year, trends are re-estimated over the current and last 14 years (t-14; t).

The residual ε_t is the difference between the observed value and the trend (equals to $\hat{\alpha} + \hat{\beta}.\log Y_{t-1} + \hat{\gamma}..T$). ε_t is then used to compute instability, according to the following formula:

$$Instability_t = \sqrt{\sum_{t-k}^{t} \varepsilon_t^2 \Big/ (k+1)}$$

Each year, instability is hence measured by the mean quadratic residual computed over 15 years (including the current year).

Finally, the construction of an annual retrospective EVI involved to make marginal adjustments from the UNCDP 2009 review vis-à-vis the method of computing four (among seven) components of the EVI. Concerning the *remoteness* component, the share of world market has been modified and established at 33% of world exports (while 50% in the UNCDP last review). Regarding the *homeless* component, the annual mean share of homeless in the population replaced the share of homeless in the population cumulated from 1990 to 2007, used in the UNCDP 2009 review. Thus, an annual averaging has been preferred to an 18 year-based averaging. In regard to instability components, we chose to compute instabilities of exports and agricultural production over the same reference period, 15 years, instead of two longer and differing periods in the UNCDP review[4]. These changes explain why retrospective EVI scores may in certain cases slightly differ from those of the UNCDP review. We provide in the following section further insights into the way the retrospective EVI behaves, first by comparing scores with respect to those of the 2009 review, and then by analyzing its retrospective evolution by country category.

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[3] As a consequence, computing instability in 1975 requires raw data starting in 1961, which is actually the case for a limited number of countries.

[4] 16 and 28 years for these two instabilities respectively.

4. Results

In this section, we propose a comparative analysis of the retrospective EVI and the UNCDP 2009 review. We also analyze main trends taken by the retrospective EVI and its components, in developing countries and different categories of developing countries. Further results are provided in Annex C and D.

4.1 Comparing the retrospective Economic Vulnerability Index with EVI 2009 Review.

We compare results and rankings of the retrospective EVI in 2006 to those of the UNCDP 2009 review, in order to identify and understand sources of divergences between these two databases. We chose the year 2006 as benchmark since the year and periods covered by the components of the retrospective EVI are the closest to those used in the UNCDP 2009 review. We expect the following variables to show the most noticeable differences:

Exposure index:

- **Remoteness from world markets**: In the UNCDP 2009 review, the share of world market is set at 50%, while in the retrospective series this share is set at 33%.

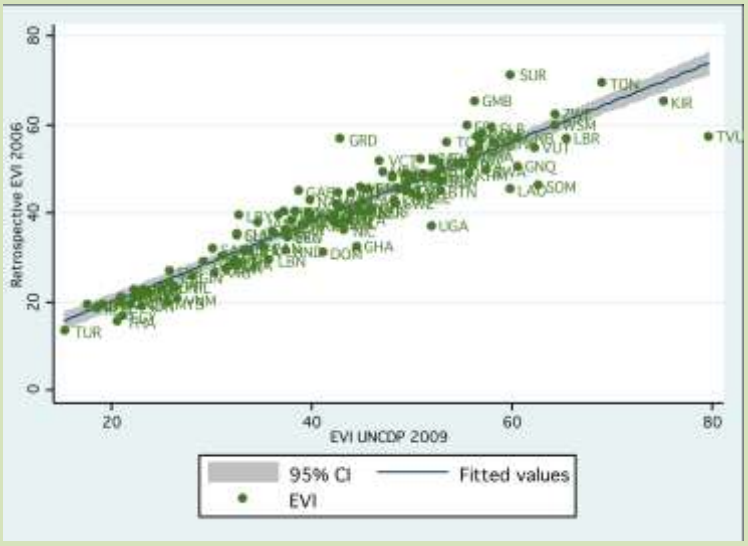
Shock index:

- **Homeless due to natural disasters**: In the UNCDP 2009 review, homelessness has been added over the 1990-2007 period and weighted by national population in 1998/1999. In the retrospective series, we computed each year the annual mean share of homelessness in the population.
- **Instability in the agricultural production**: In the UNCDP 2009 review, the period chosen to compute instability in agricultural production starts in 1990 and ends in 2005, while in the 2006 retrospective EVI the instability in the agricultural production has been calculated over the 1992-2006 period. Given the similarity between the periods chosen, very few differences are expected.
- **Export instability**: In the UNCDP 2009 review, the period chosen to compute instability in exports covers 1980-2007, while in the 2006 retrospective EVI, it has been calculated from 1992-2006.

Thus, the main causes of divergences between these two versions of the EVI should be the "Homeless" and "Instability in exports" components.

Graph 1 – Correlation between the EVI-UNCDP 2009 and the retrospective EVI 2006.

Rank correlation = 94%

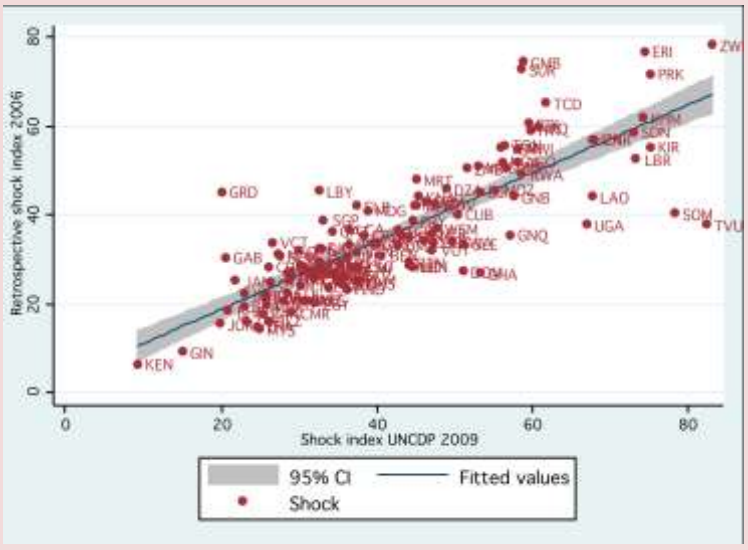


Graph 1 plots scores of vulnerability provided by the UNCDP 2009 review (*x* axis) against those of the retrospective EVI 2006 (*y* axis). This figure shows a strong positive and significant correlation between the two versions of the EVI, confirmed by a 94% rank correlation.

Nevertheless, important gaps can be observed for the most vulnerable countries. As mentionned earlier, changes in the way shock index components are computed have been undertaken. Thus, the main divergences between the two versions of EVI are explained by differences in shock index scores (rank correlation of 83%), as observed in graph 2, while scores between exposure indexes are almost perfectly correlated (see figure 3).

Graph 2 – Correlation between the UNCDP 2009 shock index and the 2006 retrospective shock index.

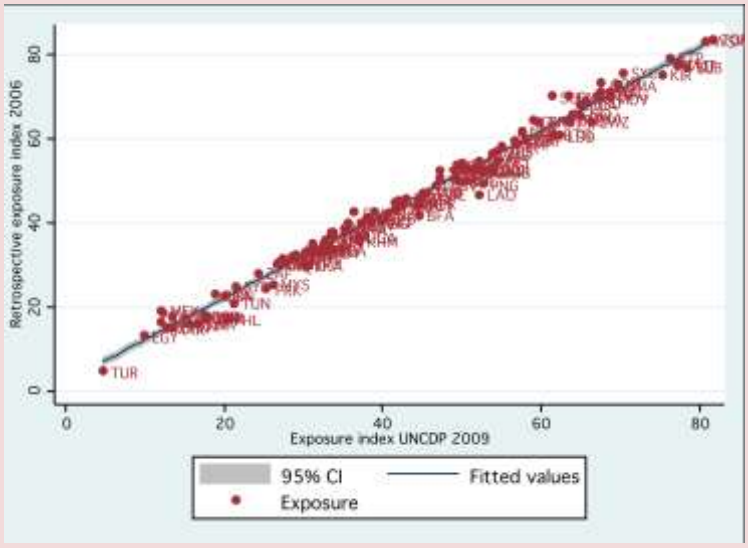
Rank correlation = 83%



Graph 4 compares scores between each component of shock indexes. As stressed earlier, the "homeless" and "exports instability" components are the main sources of divergences between the retrospective EVI and the UNCDP 2009 review, with rank correlations of 68% and 85% respectively. However, the graph plotting scores of "homeless" shows a *de facto* stronger correlation between the two databases than the fitted values suggest. Indeed, the strength and the significance of the correlation appears to be understated since the new retrospective "homeless" indicator gives scores higher than 0 for various countries that used to have null scores in the UNCDP 2009 database.

Graph 3 – Correlation between the UNCDP 2009 exposure index and the 2006 retrospective exposure index.

Rank correlation = 99%

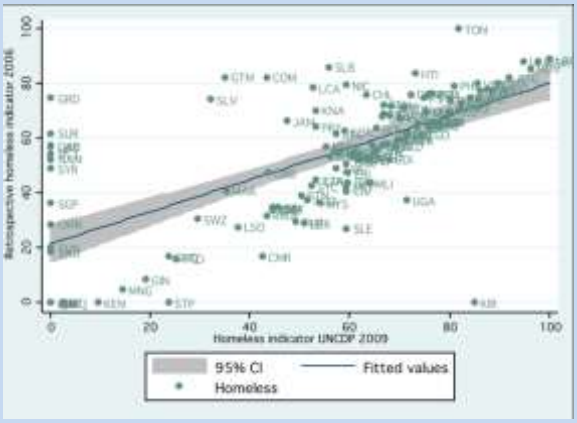


In regard to instability indicators, instability in agricultural production scores present, as expected, a strong rank correlation (96%). Exports instability scores, despite a weaker (but still strong) 85% rank correlation, are sometimes dispersed for more unstable countries. In the new retrospective EVI, yearly exports instabilities have been calculated over a rolling 15-year period (1992-2006 for the retrospective EVI in 2006) while in the UNCDP 2009 review instabilities have been calculated over a 28-year period (1980-2007). As a consequence, exports instability in the UNCDP 2009 review is on average higher than in the retrospective series because: i) important episodes of instability in exports that occurred in the 80's are not taken into account in the retrospective series, ii) trends around which annual deviations are averaged are less sensitive to episodic fluctuations when the period over which they have been estimated is longer. Indeed, as one can observe in graph 4, countries seeing the largest gaps between the two scores are located in the bottom-right side of the chart, meaning that UNCDP instability scores tend to be higher, in average.

Graph 4 – Correlation between components of the UNCDP 2009 shock index and components of the 2006 retrospective shock index.

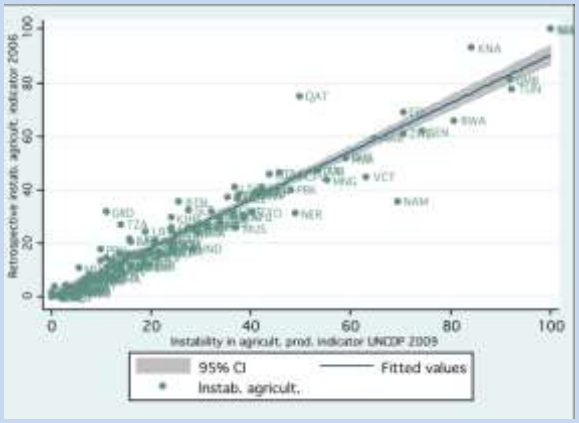
Homeless

Rank correlation : 68%



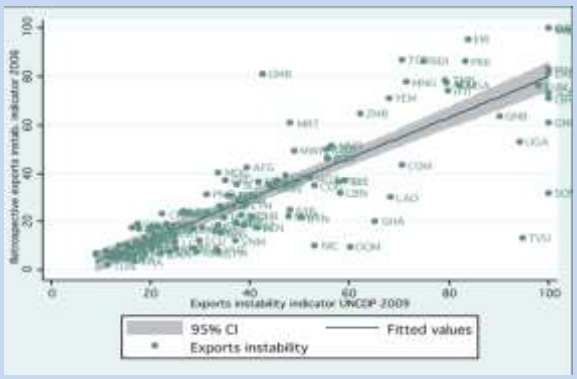
Instability in agricultural prod.

Rank correlation : 96%



Exports instability

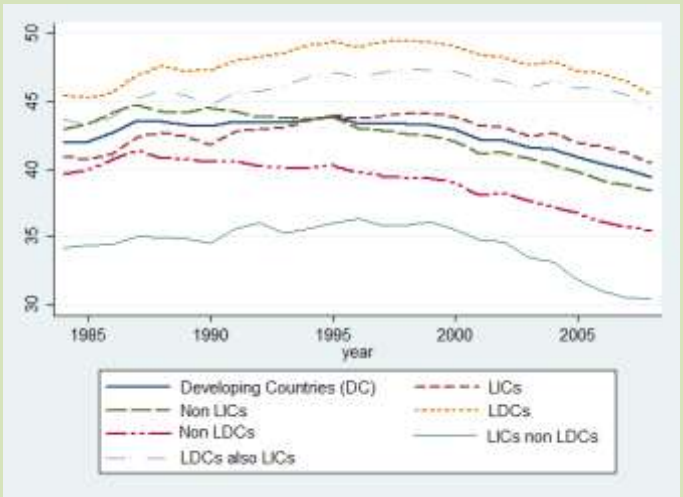
Rank correlation : 85%



4.2. Evolution of the retrospective EVI and its components

What have been the main trends of structural vulnerability in developing countries? The graphs below give some insight into the way EVI behaved during the last decades. They expose averaged evolutions of the EVI and its components by groups of countries[5] from 1984 to 2008[6]. Annex C provides further results regarding average scores of EVI and its components by country groups and decades, as well as their corresponding Wilcoxon tests.

Graph 5 – Evolution of the EVI by group of countries.



Graph 5 presents the average evolution of structural vulnerability in the following groups of countries: all developing countries, LICs, non-LICs, LDCs, non-LDCs, LICs non LDCs and LDCs also LICs. While the EVI has been decreasing considering the whole sample, vulnerability trends by category of countries evidence two main schemes of evolution.

Indeed, vulnerability in LICs, LDCs, LDCs also LICs and LICs non LDCs showed an inversed U-curve evolution with a turning point occurring in the second half of the 90's. Though vulnerability in LDCs and LICs reached a similar level in 2008 as it did in 1984, vulnerability in LDCs also LICs converged toward that of the LDCs. This evidence is not surprising since many LDCs

5 Results presented in this subsection are obtained from a sample of 127 developing countries, among which include 50 LDCs, 63 LICs, 43 LDCs also LICs and 18 LICs non LDCs. Timor Leste (LDC) has been excluded from the sample because data is missing until 2004.

6 EVI scores prior to 1984 are not available for the whole sample.

are also LICs[7]. On the contrary, the LICs non-LDCs group experienced a rapid collapse of its vulnerability since 2000, which made it diverge from LDCs. Second, evolutions of vulnerability in groups of non-LDCs and non-LICs have been declining since 1987 up until 2008. As a consequence, the gap between the most vulnerable groups of countries (LDCs and LICs) and the least vulnerable ones (non-LICs and non-LDCs) increased until the mid-90's and then stabilized during the second half of the 1984-2008 period. From 1984 to 2008, LDCs remained the most vulnerable category of countries, while the group of LICs non-LDCs remained the least vulnerable.

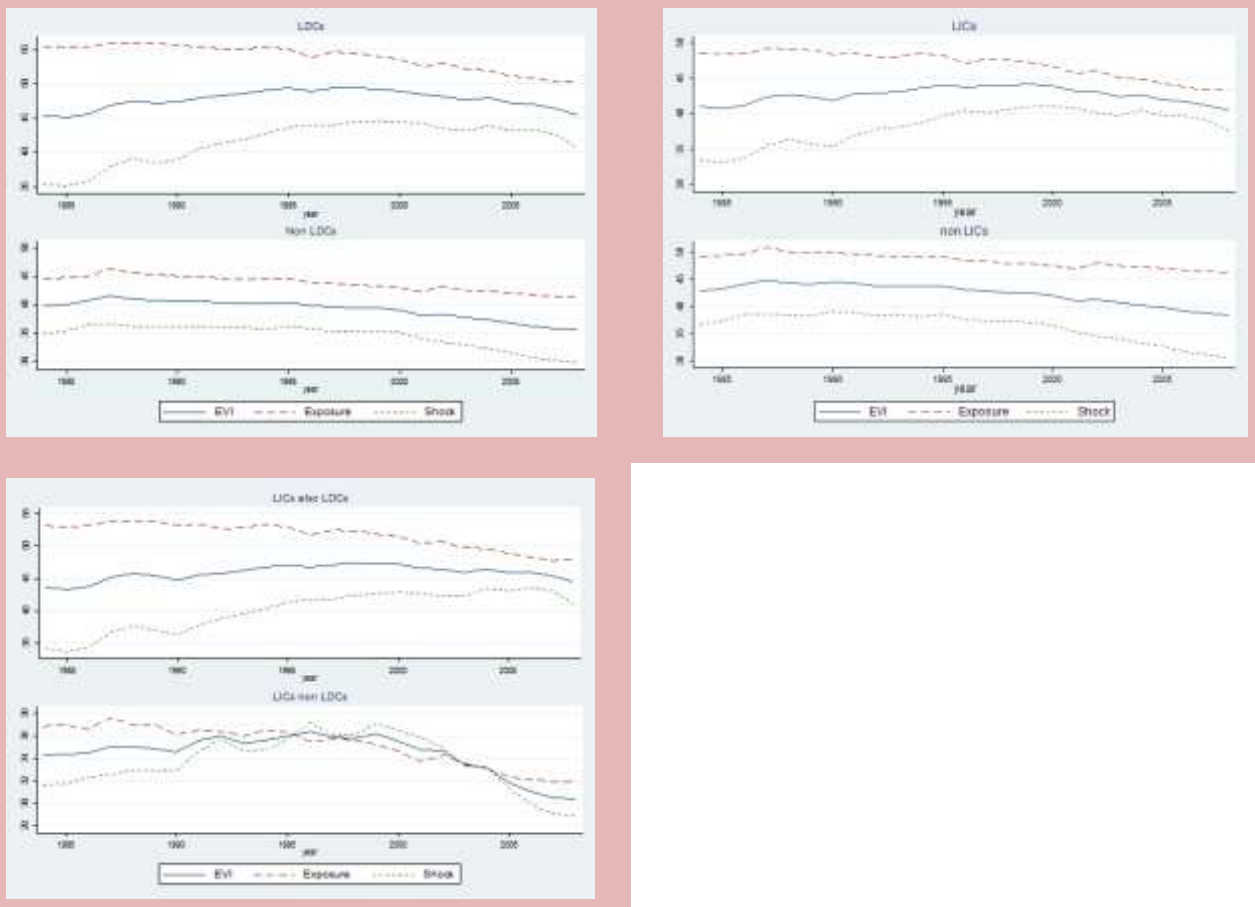
Table 3. Correlations (%) of EVI country standard deviations with those of its components.

	Retrospective EVI
Exposure index	**21%**
Population	10%
Remoteness	3%
Exports concentration	27%
Share of agriculture, … in GDP	30%
Shock index	**96%**
Homeless	19%
Instability in agricultural production	31%
Exports instability	88%

Table 3 exposes correlations of intra-individual (at the country level) standard deviations of the EVI with intra-individual standard deviations of its components. It appears that shock index explains most of the variation in country vulnerability scores. Indeed, shock index country-level standard deviations are found to be 96% correlated with EVI country-level standard deviations, while exposure index standard deviations exhibit a 21% correlation with those of the EVI. Among components of the shock index, exports instability is the main source of fluctuations in vulnerability scores. Actually, exports instability intra-individual standard deviations display an 88% correlation with those of the EVI. Thus, most of the evolution of the EVI seems to be explained by the evolution of the shock index, in particular that of the export instability component.

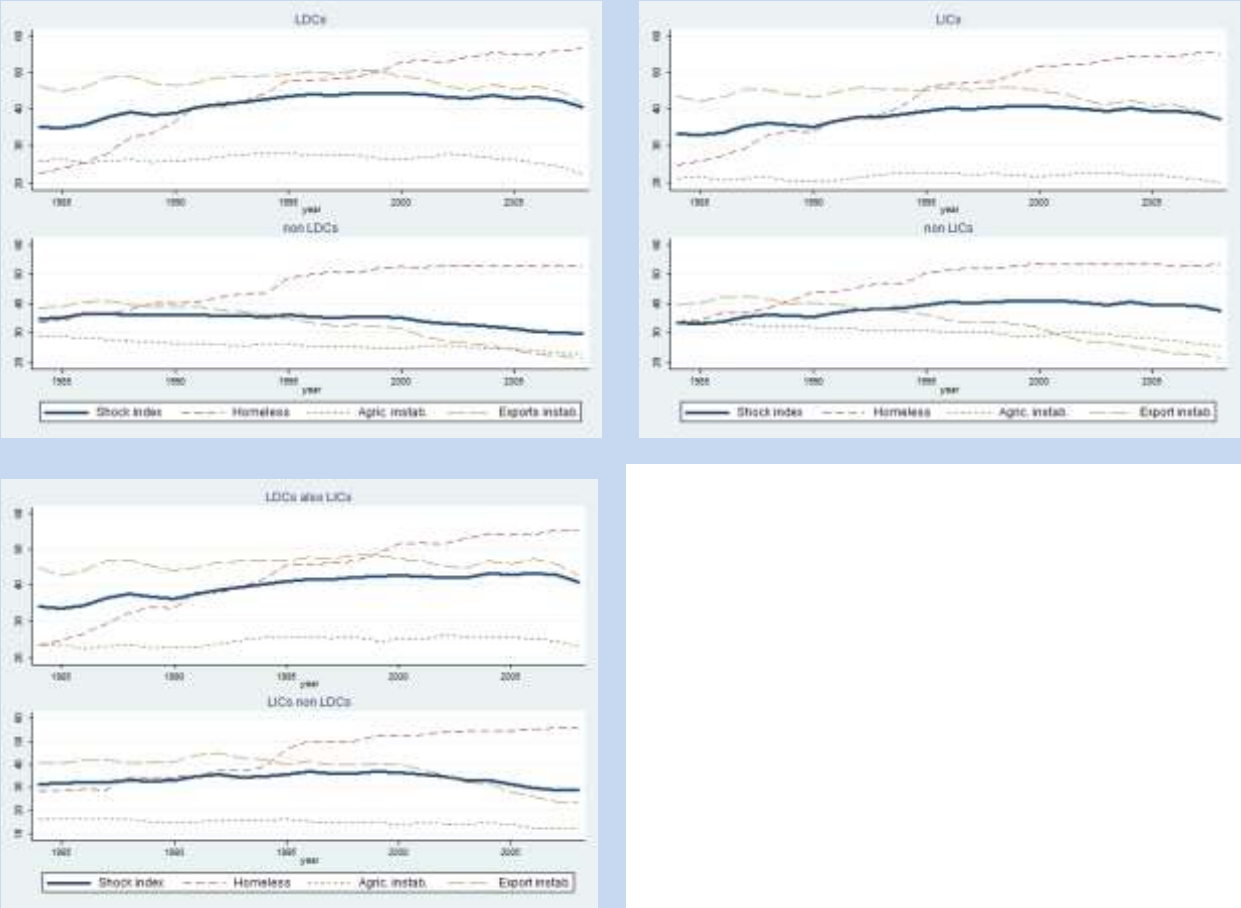
7 Actually six LDCs are not LICs. See Annex A.

Graph 6 – Evolution of exposure and shock indexes, 1984-2008.



Thus, as illustrated in graph 6 and annex C (table C1), though the exposure index declined in all categories of countries, the level of exposure to shocks is a significant source of difference between the categories' vulnerability average scores. However, the shock index is the main driver of variations in vulnerability scores. Indeed, the turning point in vulnerability scores observed in LDCs, LICs, LICs non-LDCs can also be observed in the evolution of shock scores. The sole category seeing a strict increase in shock index between 1995 and 2006 is the group of LDCs also LICs. This feature explains why vulnerability decreases less in this category than in LDCs and why they are both converging since 1995. The category of LICs non LDCs also exhibits specific trends since it is the unique group experiencing a simultaneous decrease in both exposure and shock scores since 1997. This evolution may be explained by the inclusion in this group of current emerging economies that were formerly LICs (e.g. China, India, or Indonesia), and saw their exposure to and experience of shocks strongly decreasing during the last two decades.

Graph 7 – Evolution of shock index components– 1984-2008.



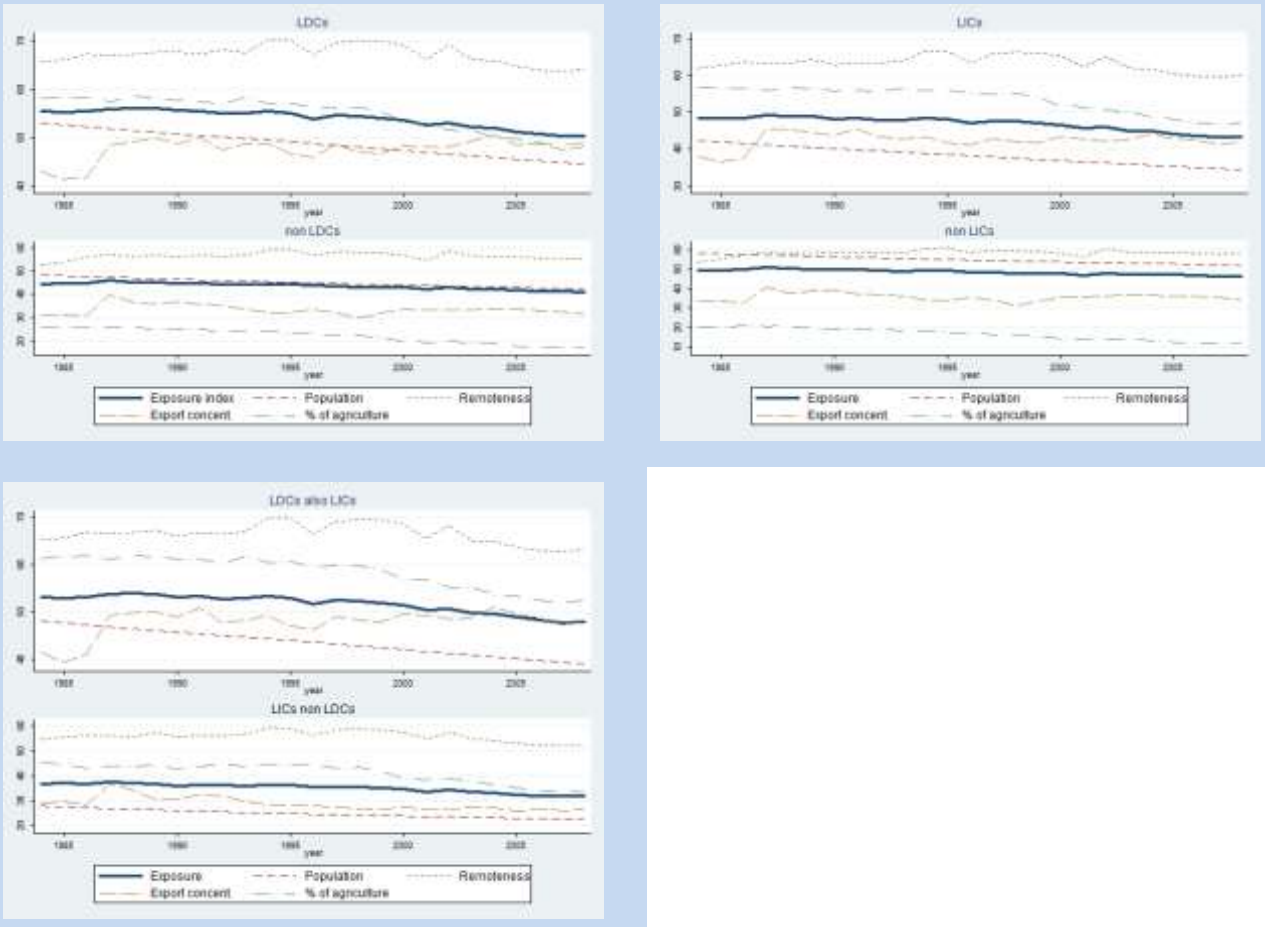
Graph 7 and 8 plot the evolutions of shock and exposure indexes components by country groups. Looking at trends of shock index components, we first observe that all categories underwent, on average, a positive and continuous growth of their homeless component during the entire period. LDCs and LICs experienced a slight increase in exports instability and a relative stagnation of agricultural instability during the first two decades but saw them both decreasing since the late 90's. The decline of the shock index in LDCs also LICs observed in 2006 (see graph 6) is corroborated by a decline of the two instability indexes. In regard to groups of non-LDCs and non-LICs, the decrease in their shock index also seems to be both driven by the diminution of agricultural and exports instability components. These trends tend to therefore confirm that the instability in exports component, in a lesser extent the instability in agricultural production component, contribute significantly to variations of country group vulnerability scores over time.

Comment

It is worth noting that the rise in the annual mean share of homeless in the population observed in all categories is statistically explained by a better coverage of the indicator over time. Indeed, as missing data decreases through time, the number of countries that previously had null scores diminishes, which increases group averages. Thus, the rise in the index observed in graph 7 does not imply a *de facto* rise in country share of homeless in the population since 1984.

In regard to exposure index components, the rise in the size of population and the downturn in the share of agriculture, forestry and fishery in GDP, common for many countries, mostly contributed to the decrease in the exposure index in all categories. The rapid decline of the exposure index in both LDC and LIC categories is partly due to the remoteness component, which has been decreasing in these two groups for the last two decades, while it exhibited a positive trend in the other categories. This feature may be explained by recent changes in the location of world markets in favor of LDCs and LICs, illustrated by the emergence of important exporting countries such as China, Brazil, Mexico, South Korea, and so on.

Graph 8 – Evolution of exposure index components– 1984-2008.



Conclusion

This document first aimed at introducing our new retrospective Economic Vulnerability Index through a comparative analysis of retrospective vulnerability scores with those provided by the UNCDP 2009 review. Although its construction complies with most of the definition and sources of variables used for the elaboration of the UNCDP¨2009 review, the retrospective nature of our index implied some changes in the computation of shock index components – namely the homeless, instability in the agricultural production and instability in exports components. Comparisons evidence a strong 94% rank correlation between the retrospective EVI in 2006 and the UNCDP 2009 review. The retrospective exposure index is highly correlated with its counterpart of the UNCDP 2009 review, while the shock index is the main source of divergence between the two versions of EVI, with an 83% rank correlation.

Then, we exposed retrospective EVI's main trends as well as those of its components. It appears that, according to this new retrospective index, vulnerability in developing countries slightly declined over the 1987-2008 period, in average. However, the evolution of vulnerability displays disparities among groups of countries. In particular, LICs and LDCs categories saw their vulnerability rising continuously until the mid-90s, while other categories (non-LDCs and non-LICs) experienced a decrease by the end of the 80's. A further analysis of EVI components' main trends found the exports instability component to be the main driver of vulnerability trends. Finally, the retrospective series evidenced that LDCs, as classified by the UN in 2007, are the most vulnerable countries, from 1984 to 2008.

Bibliography

Guillaumont, P. (2008), « An Economic Vulnerability Index : Its design and Use for International Development Policy », Research Paper No. 2008/99, UNU WIDER.

Guillaumont, P., *Caught in a trap: Identifying the Least Developed Countries*. Economica. October 2009.

Guillaumont, P. (2009), « A retrospective Economic Vulnerability Index », Policy Brief Series No. 3, FERDI.

United Nations, *Handbook on the Least Developed Country Category: Inclusion, Graduation and Special Support Measures*, Committee for Policy Development and United Nations Department of Economic and Social Affairs, November 2008.

UNCDP triennial EVI review:

http://webapps01.un.org/cdp/dataquery/selectCountries.action

Sources of variables:

World Bank (population, remoteness):

http://data.worldbank.org/data-catalog/world-development-indicators

United Nations Statistics Division (share of agriculture, forestry and fisheries in GDP):

http://unstats.un.org/unsd/default.htm

United Nations Conference on Trade and Development (Exports concentration):

http://www.unctad.org/Templates/Page.asp?intItemID=1584&lang=1

Centre d'Etudes et de Recherches sur le Développement International (Remoteness, exports instability, instability in agricultural production) :

http://www.cerdi.org/

United Nations National Accounts (Exports instability):

http://unstats.un.org/unsd/snaama/Introduction.asp

Food and Agriculture Organization of United Nations (Instability in agricultural production):

http://www.fao.org/corp/statistics/fr/

Centre for Research on the Epidemiology of Disasters (CRED) – Emergency Disaster Database (Homeless due to natural disasters):

http://www.emdat.be/database

Annexes

A. List of countries

Country	LIC	LDC	Country	LIC	LDC	Country	LIC	LDC
Afghanistan	X	X	Gambia	X	X	Papua New Guinea	X	eligible
Algeria			Ghana	X		Paraguay		
Angola	X	X	Grenada			Peru		
Antigua and Barbuda			Guatemala			Philippines		
Argentina			Guinea	X	X	Qatar		
Bahamas			Guinea-Bissau	X	X	Rwanda	X	X
Bahrain			Guyana	X		Saint Kitts and Nevis		
Bangladesh	X	X	Haiti	X	X	Saint Lucia		
Barbados			Honduras	X		Saint Vincent and.		
Belize			India	X		Samoa		X
Benin	X	X	Indonesia	X		Sao Tome and Principe	X	X
Bhutan	X	X	Iran, Islamic Republic of			Saudi Arabia		
Bolivia			Iraq			Senegal	X	X
Botswana			Jamaica			Seychelles		
Brazil			Jordan			Sierra Leone	X	X
Burkina Faso	X	X	Kenya	X		Singapore		
Burundi	X	X	Kiribati		X	Solomon Islands	X	X
Cambodia	X	X	Korea, Republic of			Somalia	X	X
Cameroon	X		Lao PDR	X	X	South Africa		
Cape Verde			Lebanon			Sri Lanka	X	
Central African Republic	X	X	Lesotho	X	X	Sudan	X	X
Chad	X	X	Liberia	X	X	Suriname		
Chile			Libyan Arab Jamahiriya			Swaziland		
China	X		Madagascar	X	X	Syrian Arab Republic		
Colombia			Malawi	X	X	Tanzania, United Rep. of	X	X
Comoros	X	X	Malaysia			Thailand		
Congo,Rep of	X		Maldives	X	X	Timor-Leste		X
Costa Rica			Mali	X	X	Togo	X	X
Côte d'Ivoire	X		Mauritania	X	X	Tonga		
Cuba			Mauritius			Trinidad and Tobago		
Dem. Peo's Rep.Korea	X		Mexico			Tunisia		

Country	LIC	LDC	Country	LIC	LDC	Country	LIC	LDC
Dem. Rep. of the Congo	X	X	Mongolia	X		Turkey		
Djibouti		X	Morocco			Tuvalu		X
Dominica			Mozambique	X	X	Uganda	X	X
Dominican Republic			Myanmar	X	X	United Arab Emirates		
Ecuador			Namibia			Uruguay		
Egypt	X		Nepal	X	X	Vanuatu, Republic of		X
El Salvador			Nicaragua	X		Venezuela		
Equatorial Guinea	X	X	Niger	X	X	Viet Nam	X	
Eritrea	X	X	Nigeria	X		Yemen	X	X
Ethiopia	X	X	Oman			Zambia	X	X
Fiji			Pakistan	X		Zimbabwe	X	eligible
Gabon			Panama					

B. Econometric estimations of homeless due to natural disasters

Dependent variable: Log of annual mean % of homeless in the population.	Sierra Leone (1)	Timor Leste (2)
Independent variables :		
Log of annual mean % of displaced due to natural disasters in the population	0,426	0,696
	(0,253)	(0,173)
Constant	-1,871	-1,404
	(0,001)	(0,016)
Observations	5	5
R2	0,23	0,43

P-values are between brackets. (1) Estimations of the annual mean share of homeless in the population of Sierra Leone. Data is averaged over the 1970-2008 period, of the following neighboring countries: Gambia, Guinea-Bissau, Liberia, Mali and Senegal. (2) Estimations of the annual mean share of homeless in the population of Timor Leste. Data is averaged over the 1970-2008 period, of the following neighboring countries: Indonesia, Malaysia, Papua New Guinea, Philippines, and Thailand.

C. Main results

Table C. 1 Average values for the retrospective economic vulnerability index and its components, by developing country category, 1984-2008.

Country category	Number of countries	Economic Vulnerability Index								
		EVI			Exposure Index			Shock Index		
		1984-89	1990-99	2000-08	1984-89	1990-99	2000-08	1984-89	1990-99	2000-08
Developing countries	121	42,9	43,6	41,3	49,3	48,4	45,9	36,4	38,8	36,7
Low income countries (LICs)	63	41,7	43,4	42,3	48,8	47,9	44,8	34,6	38,9	39,8
Non-LICs	58	44,2	43,8	40,3	49,9	48,9	47,2	38,4	38,7	33,4
Least developed countries (LDCs)	48	46,4	48,8	47,5	55,7	54,9	51,8	37,0	42,6	43,2
Non-LDCs	71	40,4	40,0	37,0	44,8	43,8	41,8	36,1	36,1	32,2
Low-income LDCs	45	44.5	46.5	46.1	53.5	52.7	49.5	35.5	40.2	42.7
Low-income non LDCs	83	34.7	35.7	32.8	37,0	36,0	33.1	32.3	35.5	32.5
Small Islands Developing States (SIDS)	30	53,6	55,4	52,2	67,1	67,0	66,1	40,2	43,8	38,2
Non-SIDS	91	39,3	39,7	37,8	43,5	42,3	39,3	35,2	37,2	36,2
PMA Non-SIDS	39	43,5	45,5	44,6	51,4	50,4	46,5	35,6	40,6	42,8
PMA SIDS	11	57,4	61,5	56,9	71,2	71,1	70,7	43,6	52,0	43,1
SIDS Non-PMA	19	51,4	51,9	49,4	64,6	64,7	63,4	38,2	39,0	35,5
Sub-Saharan Africa (SSA)	48	43,9	45,3	44,6	54,1	53,4	50,6	33,7	37,3	38,7
Non SSA	73	42,2	42,5	39,2	46,2	45,1	42,9	38,2	39,8	35,4
SSA PMA	33	45,4	47,5	46,7	54,4	53,9	50,8	36,4	41,1	42,6
SSA Non-PMA	15	40,6	40,4	40,1	53,4	52,2	50,1	27,9	28,7	30,1

Table C. 2 **Average values for the retrospective economic vulnerability index and its components, by developing country category, 1984-2008.**

Wilcoxon P-values		Economic Vulnerability Index								
		EVI			Exposure Index			Shock Index		
		1984-89	1990-99	2000-08	1984-89	1990-99	2000-08	1984-89	1990-99	2000-08
Non LICs/LICs	Wilcoxon-z	-0,09	-0,85	-2,17	-1,01	-1,04	-0,73	0,64	-0,51	-3,62
	pvalue	0,926	0,393	0,030	0,312	0,296	0,468	0,525	0,608	0,000
Non LDCs/LDCs	Wilcoxon-z	-3,52	-3,56	-3,91	-4,10	-4,05	-3,98	-1,49	-1,54	-2,92
	pvalue	0,000	0,000	0,000	0,000	0,000	0,000	0,137	0,123	0,004
Non SIDS/SIDS	Wilcoxon-z	-5,37	-5,67	-5,31	-6,31	-6,54	-6,80	-1,65	-2,33	-1,07
	pvalue	0,000	0,000	0,000	0,000	0,000	0,000	0,099	0,020	0,283
SIDS non LDCs/LDCs non SIDS	Wilcoxon-z	-2,82	-2,54	-1,38	-3,77	-3,97	-4,38	-0,92	-0,31	2,24
	pvalue	0,005	0,011	0,167	0,000	0,000	0,000	0,358	0,759	0,025
Non SSA/SSA	Wilcoxon-z	-0,88	-1,52	-2,53	-2,60	-2,62	-2,54	1,44	0,67	-1,55
	pvalue	0,376	0,128	0,011	0,009	0,009	0,011	0,150	0,501	0,121

Table C. 3 **Average values for the retrospective economic vulnerability index and its components, by developing country category, 1984-2008 (Exposure Index).**

Country category	Number of countries	Exposure Index											
		Population			Remoteness			Exports concentration			Share of Agriculture, forestry and fisheries in GDP		
		1984-89	1990-99	2000-08	1984-89	1990-99	2000-08	1984-89	1990-99	2000-08	1984-89	1990-99	2000-08
Developing countries	121	48,6	46,1	43,6	60,4	62,6	60,6	39,2	39,2	39,4	40,2	38,3	32,6
Low income countries (LICs)	63	41,4	38,7	35,6	63,4	65,1	62,0	41,3	42,9	42,7	56,6	55,6	49,2
Non-LICs	58	56,3	54,2	52,3	57,2	60,0	59,2	37,0	35,1	35,9	22,4	19,5	14,6
Least developed countries (LDCs)	48	52,1	49,3	45,8	66,9	68,8	65,9	45,6	47,9	48,6	58,2	56,9	50,6
Non-LDCs	71	46,1	44,0	42,0	55,9	58,2	56,9	34,7	33,1	32,9	27,6	25,3	19,9
Low-income LDCs	45	47.1	44.2	40.6	66.4	68.1	65.0	45.2	48.4	49.0	61.6	60.4	54.3
Low-income non LDCs	83	27.1	25.0	23.2	55.8	57.5	54.3	31.5	29.1	26.7	44.1	43.7	36.4
Small Islands Developing States (SIDS)	30	84,0	82,8	81,4	61,6	65,5	65,2	43,3	42,7	46,5	33,9	31,3	26,1
Non-SIDS	91	36,8	34,0	31,1	60,1	61,7	59,1	37,9	38,0	37,1	42,3	40,7	34,7
PMA Non-SIDS	39	42,8	39,7	36,0	66,8	68,3	65,0	45,1	47,9	45,3	60,9	59,7	52,6
PMA SIDS	11	84,9	83,0	80,8	67,0	70,9	69,4	47,3	48,0	60,3	48,8	46,8	43,5
SIDS Non-PMA	19	83,5	82,7	81,8	58,4	62,4	62,8	40,9	39,6	38,5	25,3	22,3	16,1
Sub-Saharan Africa (SSA)	48	49,8	46,8	43,3	68,3	70,2	68,2	47,2	50,2	49,5	49,8	49,3	45,3
Non SSA	73	47,7	45,7	43,7	55,3	57,6	55,6	34,0	32,0	32,7	33,9	31,1	24,2
SSA PMA	33	48,8	45,8	41,9	66,1	68,1	66,1	49,4	52,9	51,9	58,6	59,0	54,5
SSA Non-PMA	15	52,0	48,9	46,4	73,0	74,8	72,7	42,3	44,1	44,4	30,5	28,0	25,0

Table C. 4 Average values for the retrospective economic vulnerability index and its components, by developing country category, 1984-2008 (Exposure Index).

Wilcoxon P-values		Exposure Index											
		Population			Remoteness			Exports concentration			Share of Agriculture, forestry and fisheries in GDP		
		1984-89	1990-99	2000-08	1984-89	1990-99	2000-08	1984-89	1990-99	2000-08	1984-89	1990-99	2000-08
Non LICs/LICs	Wilcoxon-z	2,44	2,51	2,70	-1,65	-0,90	-0,17	-0,90	-1,91	-1,52	-7,98	-8,31	-8,07
	pvalue	0,015	0,012	0,007	0,098	0,371	0,866	0,367	0,056	0,128	0,000	0,000	0,000
Non LDCs/LDCs	Wilcoxon-z	-1,24	-1,13	-0,88	-3,05	-2,52	-2,02	-2,96	-3,89	-3,62	-6,81	-6,76	-6,44
	pvalue	0,214	0,258	0,376	0,002	0,012	0,044	0,003	0,000	0,000	0,000	0,000	0,000
Non SIDS/SIDS	Wilcoxon-z	-7,08	-7,13	-7,21	0,38	-0,32	-1,32	-1,57	-1,49	-2,06	1,43	1,87	2,06
	pvalue	0,000	0,000	0,000	0,703	0,753	0,186	0,116	0,137	0,039	0,153	0,062	0,040
SIDS non LDCs/LDCs non SIDS	Wilcoxon-z	-5,00	-5,10	-5,28	2,53	1,57	0,31	0,51	1,47	1,04	4,81	4,88	4,90
	pvalue	0,000	0,000	0,000	0,012	0,117	0,759	0,613	0,143	0,300	0,000	0,000	0,000
Non SSA/SSA	Wilcoxon-z	-0,77	-0,70	-0,47	-3,33	-2,98	-2,91	-3,43	-4,22	-3,53	-3,41	-3,79	-4,02
	pvalue	0,439	0,481	0,641	0,001	0,003	0,004	0,001	0,000	0,000	0,001	0,000	0,000

Table C. 5 Average values for the retrospective economic vulnerability index and its components, by developing country category, 1984-2008 (Shock Index).

Country category	Number of countries	Shock index								
		Homeless			Instability in agricultural production			Exports instability		
		1984-89	1990-99	2000-08	1984-89	1990-99	2000-08	1984-89	1990-99	2000-08
Developing countries	121	34,1	46,9	55,0	25,7	25,1	23,4	43,0	41,6	34,3
Low income countries (LICs)	63	29,1	42,7	53,8	21,2	22,0	21,8	44,1	45,4	41,7
Non-LICs	58	39,5	51,4	56,3	30,6	28,6	25,1	41,8	37,5	26,2
Least developed countries (LDCs)	48	27,7	44,9	54,7	26,0	27,3	26,0	47,1	49,2	46,1
Non-LDCs	71	38,6	48,3	55,2	25,5	23,6	21,6	40,1	36,3	25,9
Low-income LDCs	45	28.5	42.5	53.6	23.2	24.7	25.1	45.2	46.9	46,0
Low-income non LDCs	83	30.8	43.2	54.5	16.2	15.3	13.6	41.2	41.6	31.0
Small Islands Developing States (SIDS)	30	36,1	58,3	63,8	32,4	32,5	27,8	46,2	42,2	30,6
Non-SIDS	91	33,5	43,1	52,1	23,5	22,7	21,9	41,9	41,4	35,5
PMA Non-SIDS	39	27,9	39,2	52,0	25,0	27,1	27,9	43,8	46,9	46,6
PMA SIDS	11	27,0	65,1	64,5	29,4	27,9	19,4	59,0	57,5	44,1
SIDS Non-PMA	19	41,3	54,3	63,4	34,0	35,2	32,7	38,8	33,3	22,8
Sub-Saharan Africa (SSA)	48	20,4	32,2	47,3	25,4	27,3	25,9	44,5	44,8	40,8
Non SSA	73	43,1	56,5	60,0	25,9	23,7	21,7	42,0	39,5	29,9
SSA PMA	33	25,5	37,0	48,3	24,2	27,1	27,4	47,9	50,2	47,4
SSA Non-PMA	15	9,2	21,7	45,2	28,1	27,6	22,5	37,1	32,8	26,4

Table C. 6 **Average values for the retrospective economic vulnerability index and its components, by developing country category, 1984-2008 (Shock Index).**

Wilcoxon P-values		Shock index								
		Homeless			Instability in agricultural production			Exports instability		
		1984-89	1990-99	2000-08	1984-89	1990-99	2000-08	1984-89	1990-99	2000-08
Non LICs/LICs	Wilcoxon-z	1,76	1,61	0,66	2,79	1,89	1,31	-0,70	-2,15	-4,14
	pvalue	0,079	0,108	0,507	0,005	0,058	0,191	0,487	0,032	0,000
Non LDCs/LDCs	Wilcoxon-z	1,77	0,54	0,07	0,36	-1,05	-1,41	-1,75	-3,11	-5,22
	pvalue	0,076	0,589	0,941	0,720	0,292	0,158	0,080	0,002	0,000
Non SIDS/SIDS	Wilcoxon-z	-0,19	-2,73	-3,28	-2,51	-2,48	-2,01	-0,93	0,01	0,96
	pvalue	0,849	0,006	0,001	0,012	0,013	0,044	0,352	0,995	0,338
SIDS non LDCs/LDCs non SIDS	Wilcoxon-z	-1,26	-1,87	-2,33	-2,43	-1,78	-1,32	0,81	2,34	3,98
	pvalue	0,207	0,062	0,020	0,015	0,075	0,188	0,417	0,019	0,000
Non SSA/SSA	Wilcoxon-z	3,68	4,53	3,59	-0,17	-1,07	-1,05	-0,87	-1,65	-2,96
	pvalue	0,000	0,000	0,000	0,867	0,285	0,292	0,385	0,099	0,003

Table C.7 Ranking of LDCs according to the retrospective EVI, 2008.

Country	EVI 2008	Rank	Country	EVI 2008	Rank	Country	EVI 2008	Rank
Kiribati	69,31	1	Timor-Leste	50,02	25	(Papua New Guinea)	41,58	57
Gambia	64,13	4	Mauritania	49,72	26	Madagascar	40,92	60
Solomon Islands	60,13	5	Sudan	48,46	31	Somalia	40,38	64
(Zimbabwe)	59,76	6	Sao Tome and Principe	48,18	33	Niger	39,84	66
Samoa	57,71	7	Bhutan	48,11	34	Burkina Faso	39,65	67
Chad	57,31	9	Rwanda	46,63	39	Mali	39,42	70
Comoros	56,47	10	Angola	46,58	40	Togo	39,04	72
Burundi	56,13	12	Dem. Rep. of the Congo	44,51	44	Benin	37,61	76
Maldives	55,64	13	Lao PDR	44,40	45	Myanmar	37,18	79
Guinea-Bissau	55,24	14	Lesotho	44,13	47	Cambodia	37,04	82
Vanuatu, Republic of	55,08	15	Yemen	43,59	48	Uganda	35,86	83
Liberia	53,88	16	Haiti	43,31	49	Senegal	35,42	87
Equatorial Guinea	52,88	17	Sierra Leone	43,24	50	Nepal	30,08	96
Zambia	52,48	19	Central African Republic	42,91	51	Tanzania, United Rep. of	27,07	105
Malawi	52,11	21	Djibouti	42,75	53	Guinea	26,04	106
Eritrea	51,13	23	Mozambique	42,42	54	Ethiopia	24,79	109
Tuvalu	50,51	24	Afghanistan	42,25	56	Bangladesh	22,16	112

D. List of countries ordered by decreasing ranking differences between the retrospective EVI and the UNCDP 2009 review.

Country	EVI retro 2006	*ranking retro EVI, 2006*	EVI UNCDP 2009 review	*Ranking UNCDP 2009 review*	Absolute difference in scores	*Ranking difference*
Grenada	56,94	*14*	42,87	*66*	14,07	*52*
Uganda	37,28	*82*	51,91	*35*	14,63	*-47*
Somalia	46,33	*44*	62,63	*7*	16,30	*-37*
Lao PDR	45,51	*47*	59,89	*12*	14,38	*-35*
Ghana	32,69	*91*	44,45	*60*	11,76	*-31*
Gabon	45,14	*51*	38,60	*79*	6,53	*28*
Saint Vincent and...	52,09	*24*	46,81	*52*	5,27	*28*
Libyan Arab Jamahiriya	39,61	*71*	32,71	*95*	6,90	*24*
Dominican Republic	31,19	*97*	41,07	*74*	9,88	*-23*
Bhutan	45,20	*49*	52,93	*28*	7,74	*-21*
Madagascar	40,45	*65*	37,17	*86*	3,28	*21*
Equatorial Guinea	50,73	*29*	60,54	*9*	9,81	*-20*
Nicaragua	36,27	*84*	43,25	*64*	6,97	*-20*
Mauritania	49,46	*32*	47,13	*51*	2,33	*19*
Namibia	43,01	*57*	39,81	*75*	3,20	*18*
Eritrea	59,78	*7*	55,46	*24*	4,33	*17*
Gambia	65,45	*3*	56,27	*20*	9,19	*17*
Botswana	49,63	*31*	57,32	*15*	7,69	*-16*
Sierra Leone	43,78	*55*	50,67	*39*	6,88	*-16*
Oman	40,46	*64*	38,38	*80*	2,09	*16*
Saint Lucia	52,47	*23*	50,79	*38*	1,68	*15*
Singapore	39,61	*72*	36,55	*87*	3,06	*15*
Bolivia	37,90	*79*	42,90	*65*	5,00	*-14*
Jamaica	37,91	*78*	34,60	*92*	3,31	*14*
Qatar	44,61	*54*	42,56	*68*	2,06	*14*
Burkina Faso	38,58	*76*	43,81	*63*	5,23	*-13*
Cambodia	48,80	*36*	55,63	*23*	6,84	*-13*
Niger	40,36	*67*	45,84	*54*	5,47	*-13*
Cape Verde	48,71	*37*	48,06	*49*	0,65	*12*
Haiti	52,48	*22*	52,19	*34*	0,29	*12*
Lesotho	44,63	*53*	49,94	*41*	5,31	*-12*
Sudan	47,34	*42*	52,86	*30*	5,52	*-12*
Yemen	45,99	*45*	44,90	*57*	1,08	*12*
Honduras	31,72	*96*	37,39	*84*	5,67	*-12*
Saudi Arabia	32,09	*93*	30,08	*105*	2,01	*12*
Swaziland	42,45	*59*	48,47	*47*	6,02	*-12*
Fiji	48,21	*39*	48,05	*50*	0,16	*11*
Benin	37,78	*80*	42,50	*69*	4,73	*-11*
Chad	56,28	*16*	53,53	*27*	2,75	*11*
Chile	35,41	*86*	32,53	*96*	2,88	*10*
Guyana	48,92	*34*	49,39	*44*	0,47	*10*

Country	EVI retro 2006	*ranking retro EVI, 2006*	EVI UNCDP 2009 review	*Ranking UNCDP 2009 review*	Absolute difference in scores	*Ranking difference*
Tuvalu	57,56	*11*	79,69	*1*	22,14	*-10*
Iraq	44,94	*52*	43,88	*62*	1,06	*10*
Vanuatu, Republic of	54,94	*18*	62,30	*8*	7,36	*-10*
Lebanon	29,50	*100*	35,74	*90*	6,24	*-10*
Mauritius	40,91	*63*	45,96	*53*	5,05	*-10*
Nigeria	42,14	*60*	42,42	*70*	0,28	*10*
Suriname	71,46	*1*	59,90	*11*	11,55	*10*
Viet Nam	20,72	*118*	26,51	*108*	5,79	*-10*
Barbados	45,82	*46*	45,62	*55*	0,19	*9*
El Salvador	35,29	*88*	32,47	*97*	2,82	*9*
Liberia	57,01	*13*	65,46	*4*	8,44	*-9*
Saint Kitts and Nevis	57,59	*10*	56,48	*19*	1,11	*9*
Bahamas	47,54	*41*	52,44	*33*	4,90	*-8*
Belize	40,38	*66*	44,87	*58*	4,49	*-8*
Congo, Rep of	43,26	*56*	48,29	*48*	5,03	*-8*
Indonesia	19,09	*124*	23,00	*116*	3,91	*-8*
Afghanistan	39,98	*69*	39,52	*77*	0,46	*8*
Malaysia	19,91	*120*	25,53	*112*	5,62	*-8*
Ecuador	34,77	*90*	37,47	*83*	2,70	*-7*
Iran, Islamic Republic of	40,03	*68*	43,89	*61*	3,86	*-7*
Comoros	58,15	*9*	56,94	*16*	1,21	*7*
Senegal	34,80	*89*	37,58	*82*	2,77	*-7*
Mongolia	51,64	*25*	52,74	*32*	1,10	*7*
Brazil	21,39	*116*	20,96	*122*	0,43	*6*
Solomon Islands	59,52	*8*	57,98	*14*	1,53	*6*
Pakistan	22,77	*112*	22,25	*118*	0,52	*6*
Egypt	16,84	*126*	20,99	*121*	4,15	*-5*
Dem. Rep. of the Congo	45,19	*50*	49,27	*45*	4,07	*-5*
Tanzania, United Rep. of	30,39	*98*	31,02	*103*	0,63	*5*
Togo	41,25	*62*	42,79	*67*	1,54	*5*
Zambia	51,44	*26*	52,79	*31*	1,35	*5*
Sri Lanka	28,53	*103*	32,43	*98*	3,90	*-5*
Antigua and Barbuda	49,14	*33*	51,02	*37*	1,88	*4*
Bahrain	38,27	*77*	38,01	*81*	0,26	*4*
Colombia	20,13	*119*	20,87	*123*	0,74	*4*
Costa Rica	35,80	*85*	36,08	*89*	0,29	*4*
Guatemala	29,01	*102*	29,20	*106*	0,19	*4*
India	19,43	*123*	17,55	*127*	1,89	*4*
Angola	48,44	*38*	49,77	*42*	1,33	*4*
Maldives	56,05	*17*	58,18	*13*	2,13	*-4*
Syrian Arab Republic	27,01	*106*	25,76	*110*	1,25	*4*
Argentina	26,81	*107*	30,15	*104*	3,34	*-3*
Cameroon	27,61	*105*	31,29	*102*	3,68	*-3*
Côte d'Ivoire	28,10	*104*	31,48	*101*	3,38	*-3*
Mexico	19,51	*122*	18,96	*125*	0,55	*3*

Country	EVI retro 2006	*ranking retro EVI, 2006*	EVI UNCDP 2009 review	*Ranking UNCDP 2009 review*	Absolute difference in scores	*Ranking difference*
Rwanda	50,90	*28*	55,05	*25*	4,15	*-3*
Thailand	15,53	*127*	20,56	*124*	5,04	*-3*
United Arab Emirates	37,51	*81*	39,11	*78*	1,60	*-3*
China	21,82	*115*	22,91	*117*	1,09	*2*
Jordan	24,56	*109*	25,72	*111*	1,15	*2*
Morocco	21,25	*117*	22,12	*119*	0,87	*2*
Papua New Guinea	41,41	*61*	44,57	*59*	3,16	*-2*
Bangladesh	22,68	*113*	23,21	*115*	0,53	*2*
Burundi	56,71	*15*	56,81	*17*	0,10	*2*
Central African Republic	42,77	*58*	45,06	*56*	2,29	*-2*
Guinea-Bissau	57,15	*12*	60,53	*10*	3,38	*-2*
Kiribati	65,30	*4*	75,25	*2*	9,95	*-2*
Malawi	53,84	*20*	55,88	*22*	2,04	*2*
Mozambique	45,50	*48*	48,68	*46*	3,18	*-2*
Myanmar	36,42	*83*	37,39	*85*	0,97	*2*
Tunisia	23,34	*111*	24,92	*113*	1,58	*2*
Uruguay	38,99	*74*	42,25	*72*	3,26	*-2*
Algeria	31,72	*95*	33,25	*94*	1,53	*-1*
Kenya	18,57	*125*	18,39	*126*	0,18	*1*
Korea, Republic of	19,60	*121*	21,81	*120*	2,21	*-1*
Panama	32,53	*92*	35,17	*91*	2,64	*-1*
Philippines	23,44	*110*	26,37	*109*	2,93	*-1*
Seychelles	50,15	*30*	52,90	*29*	2,75	*-1*
Djibouti	48,83	*35*	51,20	*36*	2,37	*1*
Ethiopia	29,03	*101*	32,04	*100*	3,00	*-1*
Guinea	25,63	*108*	27,90	*107*	2,27	*-1*
Tonga	69,59	*2*	69,05	*3*	0,54	*1*
Trinidad and Tobago	38,86	*75*	39,76	*76*	0,90	*1*
Mali	39,78	*70*	42,32	*71*	2,54	*1*
Nepal	31,76	*94*	33,65	*93*	1,89	*-1*
Sao Tome and Principe	51,43	*27*	54,97	*26*	3,54	*-1*
Venezuela	35,33	*87*	36,29	*88*	0,96	*1*
Timor-Leste	54,85	*19*	56,70	*18*	1,86	*-1*
Cuba	39,01	*73*	41,97	*73*	2,96	*0*
Dem. Peo's Rep.Korea	48,12	*40*	50,19	*40*	2,07	*0*
Dominica	52,97	*21*	56,20	*21*	3,23	*0*
Paraguay	46,75	*43*	49,60	*43*	2,85	*0*
Peru	29,66	*99*	32,28	*99*	2,62	*0*
South Africa	22,19	*114*	23,73	*114*	1,53	*0*
Turkey	13,44	*128*	15,32	*128*	1,88	*0*
Samoa	60,04	*6*	64,29	*6*	4,24	*0*
Zimbabwe	62,61	*5*	64,32	*5*	1,71	*0*

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Contact
www.ferdi.fr
contact@ferdi.fr
+33 (0)4 73 17 75 30