Measuring vulnerability to climate change
to allocate adaptation resources

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Why measuring a country « exogenous » vulnerability

• Vulnerability is a handicap to sustainable development
• it is the opposite of sustainability
• at the heart of the post-2015 agenda
• to a large extent vulnerability is exogenous and structural
• with several dimensions, as sustainability,
• Legitimates support from the international community

Texte correspondant à la présentation:
Vulnerability on the international agenda

• For the identification of the Least Developed Countries (LDCs), as low income countries suffering from low human capital and high structural economic vulnerability (explicit since 2000)
• Small Island Developing States (SIDS) high concern about vulnerability, reflected at the Barbados (1994), Mauritius (2004), and Samoa (2014) UN Conferences...
• Increasing concern about fragile states
• Awareness of vulnerability with the «multiple crises» of the end of 2000s: oil prices, food prices, world demand downturn
• Growing concern about expected consequences of climate change
• All issues reflected in the post-2015 agenda on sustainable development
Vulnerability semantics

- Vulnerability, at the *macro* level (as at the *micro* level) is the risk to be hampered by exogenous shocks, either natural or external (...)
- It depends on the *size of the shocks*, the *exposure* to these shocks and the capacity to cope with them, also said capacity to adapt or *resilience*
- *Structural vulnerability* is the vulnerability that does not depend on the country present will, but is determined by exogenous and lasting factors (of the three components)
- *General vulnerability* also depends on the country present and future will, that is more rapidly changing, in particular through the resilience component
- Distinctions valid for various kinds of shocks and vulnerability
Two related issues to be discussed focussed on the vulnerability to climate change

1. How to design *structural* (versus general) vulnerability indicators, not depending on present policy:
   - recall: the economic vulnerability index (EVI)
   - focus: the *physical vulnerability to climate change index* (PVCCI)

2. Why and how to use such two indicators as criteria for the international *allocation* of (concessional) resources:
   - recall: economic vulnerability, for ODA
   - focus: PVCCI for the *allocation of the adaptation resources*
(I)
Designing indices structural vulnerability

- To be used for the identification of countries durably deserving a special attention (such as the LDCs) or for the allocation of resources, indicators should not depend on present policy.
- They should primarily reflect both the likely size of the shocks and the exposure to these shocks.
- They should capture either a medium-term economic vulnerability or a long term physical vulnerability to climate change.
- Focus on two indicators already calculated as indices
  - EVI: the economic vulnerability index (UN CPD)
  - PVCCI: a physical vulnerability to climate change index (Ferdi)
The structural economic vulnerability
as measured by the Economic Vulnerability Index (EVI)

• Designed by the UN CDP for featuring LDCs, EVI has been set up first in 2000, then revised, mainly in 2005, then slightly in 2011
• Captures only structural components of vulnerability, chosen with regard to their expected (or evidenced) effect on economic growth
• Transparent and parsimonious, EVI relies on
  - 4/5 main (structural) exposure components (ex ante vulnerability)
  - and 3 (exogenous) shock components, measuring past recurrent shocks, likely to re-occur in the future and to already hamper future economic growth
Changes recently brought in EVI ...and challenges

- Changes brought in 2011 for the 2012 review
- Same structure, but
- Among shocks components, homeless population due to natural disasters replaced by population affected (« victims »)
- And a new exposure component added, the % of population living in low coastal area, same weight now given to each of the new 4 sub-components
- Means a small move to make LDCs countries meeting structural obstacles for sustainable development, rather than only for growth
- But addition unbalanced with respect to dryland countries: alternative measure proposed by Ferdi as well as a program called « Build your own EVI »
Economic Vulnerability Index (EVI)

Exposure index (1/2)
- Size index 1/4
  - Population 1/4
- Location index 1/8
  - Remoteness 1/8
- Structural index 1/8
  - Share of agriculture, forestry and fisheries 1/16
  - Merchandise export concentration 1/16

Environment index 1/8
- Share of population in low elevated costal zones 1/8

Shock index (1/2)
- Natural shock index 1/4
  - Instability of agricultural production 1/8
  - Homeless due to natural disasters 1/8
- Trade shock index 1/4
  - Instability of exports of goods and services 1/4
Structural resilience kept aside... or included in a broader concept of structural vulnerability

• General vulnerability also depends on the capacity to react, indeed dependent on present policy (main part), but also (a minor part?) on structural factors, the «structural resilience»

• These structural factors of resilience are broad factors, to a large extent captured by separate indicators, in particular GNIpc and the Human Assets Index (HAI), that with EVI are used as complementary criteria for the identification of LDCs

• Possible to include them in a broader concept of vulnerability, such as the SHI or LLDI index

• But would blur the specificity of the vulnerability concept
Economic vulnerability and vulnerability to climate change

- *Vulnerability to climate* already taken into account through two components of EVI (population affected by natural disasters, instability of agricultural production), and now more specifically by the risk to be flooded due to the sea level rise (an exposure component of *vulnerability to climate change*).

- But vulnerability to climate change differs from the economic vulnerability by its nature (more physical) and time horizon (longer): it reflects a long term *risk of change in geo-physical conditions*, not a structural handicap to economic growth in medium term.

- And is a vulnerability to only one (major) environmental factor: other possible factors (e.g., earthquakes).

- And possible vulnerability of the environment itself (e.g., biodiversity) to various factors.
Which index of vulnerability to climate change is needed

• Depends on the goal pursued (many indices available), here is needed an index likely to be used (among others) to allocate resources for adaptation (to allocate more to the more vulnerable)
• Should be independent not only of the current policy (as EVI), but also of future policy: countries more vulnerable because of a poor present or expected policy/resilience should not rewarded for that
• Since vulnerability to CC is a quite long term one, it should preferably be captured through physical components
• This the main feature of the recent Ferdi Physical Vulnerability to Climate Change Index (PVCCI), as such differing from other attempts (CGD 2011, Barr et al. 2010)
A physical vulnerability to climate change index: main features

• Forward-looking and likely to capture long term risks
• Relies only on geo-physical components, without any debatable socio-economic component
• So does not include components reflecting the adaptive capacity
• Makes a distinction between two kinds of risks due to climate change
  - risks related to *progressive shocks* (such as sea level rise or desertification)
  - risks related to the *intensification of recurrent shocks* (such as rainfall or temperature shocks, or typhoons)
• Makes another distinction between the shocks and the exposure to the shocks, because the impact of the shocks depends on the initial exposure,
• And uses a quadratic averaging to capture interactions
• Still tentative (and change in the data basis)
Physical Vulnerability to Climate Change Index PVCCI

Risks related to progressive shocks

- Flooding due to sea level rise (1/4)
  - Share of flood areas (1/8)
  - Size of likely rise in sea level (1/8)

- Increasing aridity (1/4)
  - Share of dry lands (1/8)

Risks related to the intensification of recurrent shocks

- Rainfall (1/4)
  - Rainfall Instability (1/8)
  - Trend in rainfall instability (1/8)

- Temperature (1/4)
  - Temperature Instability (1/8)
  - Trend in temperature instability (1/8)

Trend in rainfall (1/16)
Trend in temperature (1/16)

NB. The boxes corresponding to the two last rows of the graph respectively refer to exposure components (in italics) and to size of the shocks components.
Adaptive capacity and resilience, again kept aside

- (Weak) adaptive capacity often considered as a part of climate vulnerability indicators
- As economic resilience, it depends on various structural factors, and is not determined only by present policy factors
- But again these structural factors are very broad: including them would lower the specificity of the vulnerability concept
- Better to take them into account separately through indicators such as income pc or human assets index
- Indeed the same as for economic resilience with EVI
• There is a rationale for keeping two separate indices:
  - difference of time horizon
  - difference of scope (economic vs geo-physical impacts)
• But *fusion* in an extended structural vulnerability index, combining the two indices is conceivable (only one redundant component in EVI, where it could 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 environment stability.
• The relevance of integrating depends on the use of the indices for international policies
Using vulnerability indicators for policy: 
the issue of international allocation of resources

- The previous two indicators, can be used for guiding policy, in particular the international allocation of resources, either for development assistance or for adaptation
- Such a use meets the difficult issue of the principles and criteria of international resources allocation
Geographical allocation of development assistance: the present debate

• Traditional wisdom dominated by the «PBA», the «performance based allocation»: aid should mainly be allocated to countries according to their «performance»
• PBA is first a formula used by the MDBs (and some bilateral donors) for the allocation of their concessional resources, with performance measured by the «CPIA» (Country Policy and Institutional Assessment),
• PBA is also a kind of general principle on which the international community is supposed to agree...
• But is strongly debated...and far to be fully applied
Taking into account structural vulnerability would improve the PBA for five reasons

• Restauring the real meaning of performance
• Enhancing equity by compensating structural handicaps and avoiding double punishment
• Drawing lessons of aid effectiveness literature
• Increasing transparency by limiting exceptions
• Looking for stability, predictability and countercyclicality
Why a debate?

• PBA gives an overwhelming weight to the assessment of policy and governance of recipient countries (through the « CPIA » and mainly its governance component)
• It does not take into account their vulnerability, neither their distance to the MDGs (in particular in health and education)
• In spite of criticisms, reluctance of several main donors to change
• However move of ideas and better appreciation of the need to take vulnerability into account,
• illustrated by various UN SG reports to the Development Cooperation Forum (since 2008 and 2010)
Towards an improvement

- Following, robust rationale for taking into account structural vulnerability, as well as a low level of human capital in aid allocation, besides an appropriate indicator of «performance» with a lower weight than presently: would meet principles of equity, effectiveness, transparency

- Can be done by using available and commonly agreed indicators, such as EVI (for structural vulnerability) and HAI (for human capital), used at UN for LDCs identification along with GNIpc,

- Donors explicitly invited to do so in Dec.2012 by UNGA resolution on the smooth transition of graduating LDCs (A/C.2/67/L.51)

- and EC having done it...

- Always possible to *improve or adapt the index* of structural economic vulnerability, if needed
Performance vs vulnerability, also an issue with regard to climate change funding

• More and more resources will be devoted to the adaptation to climate change.
• The allocation of these resources meets the same issue as ODA
• Presently also ruled by performance/policy (eg GEF), with specific reference to environment policy, but without a clear rationale
• Since low-income countries are not responsible for climate change, it is equitable that the concessional funds for adaptation be allocated mainly according to the vulnerability to climate change
• So, need to consider physical vulnerability to climate change, through an indicator such as PVCCI, not dependent on policy
• Weak capacity to adapt for structural reasons should also be considered separately, and captured by GNIpc and HAI
• Capacity to implement, an effectiveness criterion, may be added
Criteria for the allocation of adaptation resources:
common features with ODA

• A weak *capacity to adapt* for reasons not depending on present policy (ie a low structural resilience), legitimating a higher allocation in both cases, should also be considered separately, and can be captured through the low level of GNIpc and HAI

• But a low *performance rating* (policy and governance), or capacity to implement (as named in the climate change literature), as an effectiveness criterion, may lead to a lower allocation (with a smaller weight than presently)

• It may also lead to *specific modalities* of support (projects vs budget)
Comparison of vulnerability as an allocation criterion for adaptation resources and for ODA

• Physical vulnerability criterion, more clearly exogenous and easily accepted than the structural economic vulnerability one: can the ODA allocation be influenced by climate adaptation?
• Reference to effectiveness (« performance ») may in both cases be also needed, but not clear what kind of performance is relevant in each case, in particular for the adaptation to climate change:
  - environmental performance? a moral, but debatable argument
  - general performance: the same factors have an impact on development and on adaptation
• Differentiation more logical if performance assessment includes an assessment of project implementation, as far as projects differ.
Mixing the two allocation processes?

- Economic development and adaptation in poor countries are very close goals.
- Although additionality is officially supposed, resources for the two goals are likely to be partial substitute.
- If the two kinds of resources were merged, their geographical allocation would need to be treated simultaneously and the two kinds of vulnerability be measured through a synthetic index (while the allocation for mitigation would be treated differently).
- Anyway, a trade-off between development and adaptation goals, is unescapable, that will be reflected in the time horizon and the component weights of the index,
- Allocation of international resources is a policy choice, and the choice of indices as well.
Thanks