Measuring Structural Vulnerability
Why and How

By

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A « fusion lecture » on vulnerability, in brief

- Vulnerability (a multifold concept) matters : by several ways it makes devevelopment unsustained (able)
- It calls for international measures,
  focused on most vulnerable developing countries
- This requires a measurement of vulnerability,
  according to indicators /indices comparable among countries, reliable and likely to be used for policy purposes, firstly for the international allocation of resources
- Depending on the kind of vulnerability to be addressed,
  here economic or climatic, and the resources to be allocated, indices should be differentiated… or fusioned

On the semantics of vulnerability

- 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*, recurrent or progressive (…) 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

Vulnerability matters for growth and development

- For *economic growth*, due to many reasons, corresponding either to risk or to asymmetry effects of economic instability
- Even more for *poverty reduction*, because instability makes economic growth, already affected by vulnerability, less pro-poor
- For *policy,* because the quality of policy and institutions is affected by structural vulnerability (paper with Mark Mc Gillivray)
- For *sustainability*: not only economic vulnerability matters (vulnerability is the opposite of sustainability), but also because economic shocks have environmental consequences, and environmental shocks economic consequences

Vulnerability going up on the international agenda

- Identification of the *Least Developed Countries* (LDCs) as low income countries suffering from low human capital and high vulnerability (explicit since 2000)
- *Small Islands Developing States* (SIDS) concern about vulnerability, from the Barbados (1994) and Mauritius (2004) Conferences… and recent tsunamis
- Concern about civil conflict, post-conflict, *fragile states*
- Increased awareness of vulnerability with the *"multiple crises"* of the end of 2000s: oil prices, food prices, world demand downturn
- And more and more *climate change* and its expected consequences

Various ways to tackle structural vulnerability(ies)

- Policy responses first depend on the kind of vulnerability to be addressed, economic or environmental (eg commodity price instability or climate change)
- In particular for the actions aiming at reducing vulnerability (eg economic diversification or adaptation to climate change)
- Another and important way to tackle vulnerability is to allocate international resources (either ODA or adaptation resources) according to the needs generated by structural vulnerability(ies) (either economic or climatic)
- Measurable relevant indicators are then needed

Outline of what follows

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

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

(I)

Designing indicators of structural vulnerability

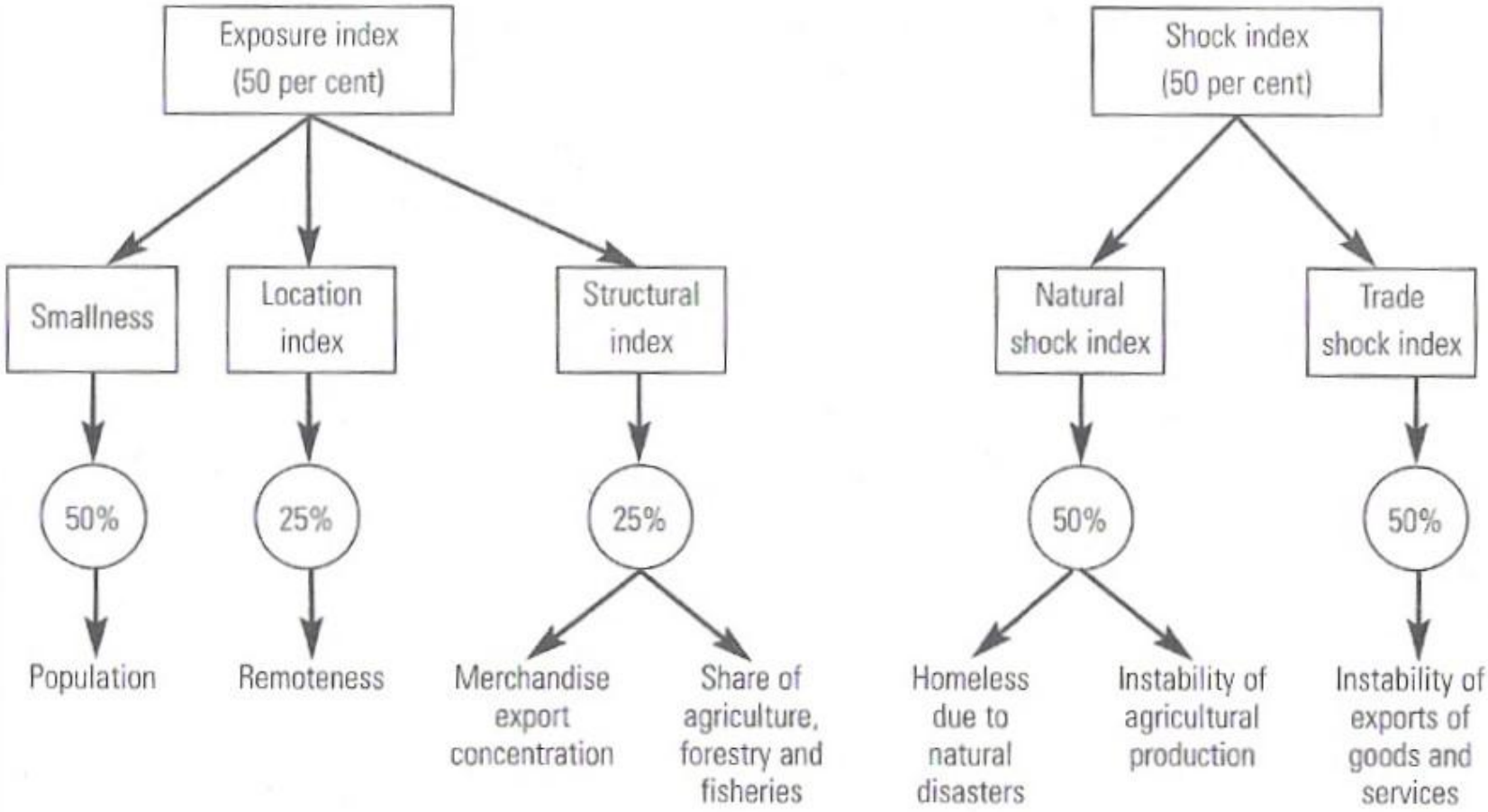
- Indicators should not depend on present policy
- They should primarily reflect both the likely size of the shocks and the exposure to these shocks
- They should capture either an economic medium-term vulnerability or a long term physical vulnerability to climate change
- Focus on two indicators already calculated as indices
- EVI: the economic vulnerability index (UN CPD)
- PVCCI: a physical vulnerability to climate change index (Ferdi)

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 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

Economic Vulnerability Index (EVI)

CDP



Why structural resilience is kept aside

- 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, rather well captured by GNIpc and the Human Assets Index (HAI), that with EVI are used as complementary criteria for the identification of LDCs
- Including them in the vulnerability index woud blur the specificity of the vulnerability concept

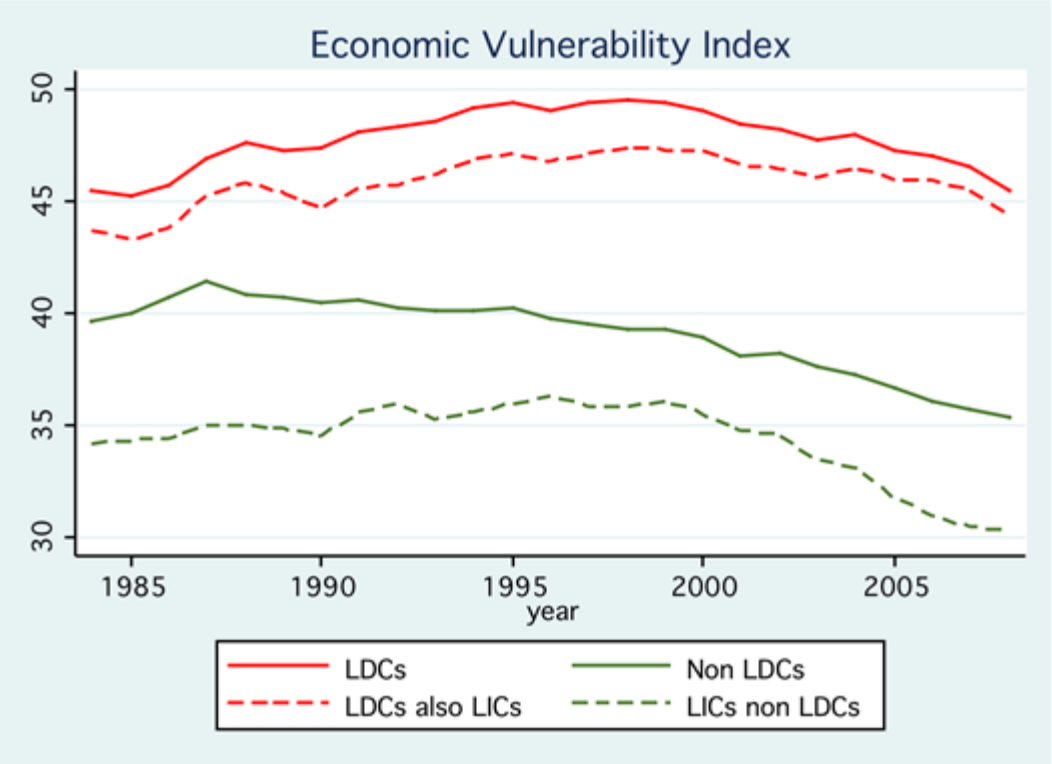
EVI, by group of countries, from 2006 LDCs review

group of countries	number of countries	Mean
All Developing countries (DCs)	120	45.0
Low-Income Countries	58	47.4
Non-low-income Countries	62	42.8
Least Developed Countries (LDCs)	50	53.4
All Developing countries non LDCs	70	39.1
Low-Income LDCs	43	51.1
Low-Income non-LDCs	15	37.0
LDCs, Low Income non LDCs and transition economies	73	47.79
Small Islands Developing States (SIDS)	29	56.9
SIDS non LDCs	17	51.2
Non-SIDS LDCs	38	49.7
SIDS-LDCs	12	65.0

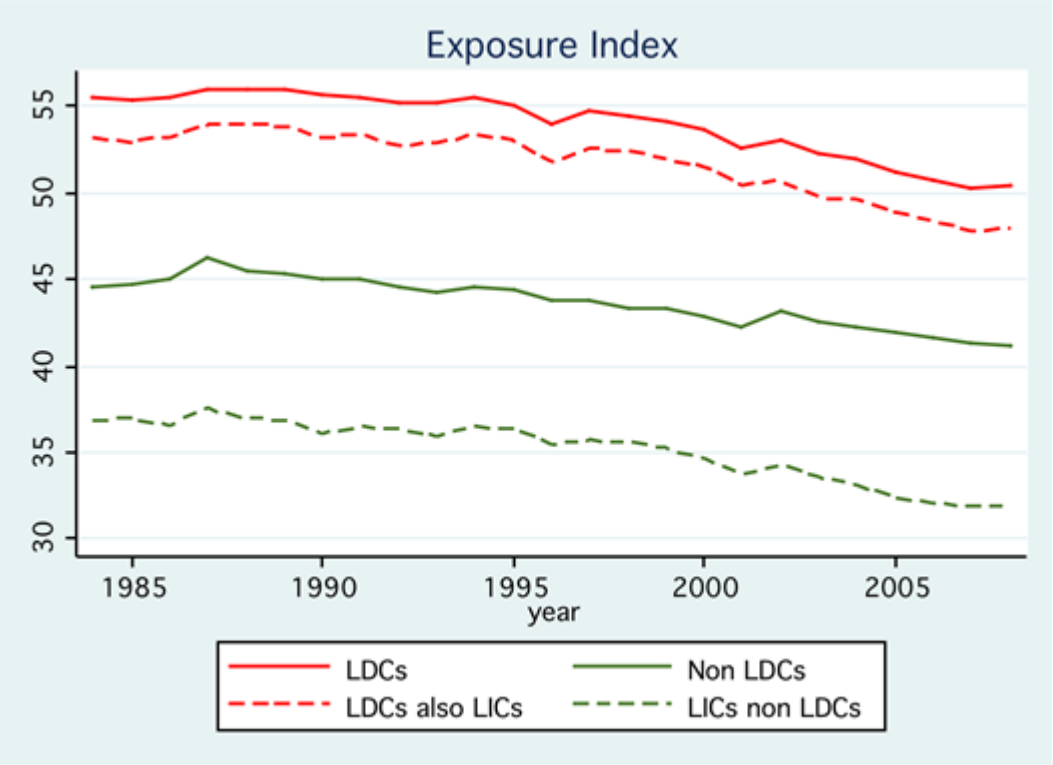
Lessons from a « retrospective EVI »: LDCs and other developing countries compared

- Retrospective EVI built at Ferdi in cooperation with UN DESA over 1970-2008, for 128 countries, using the same structure and components that for the 2006 and 2009 reviews of the list of LDCs
- The overall index : roughly stagnant in LDCs, decreasing elsewhere
- The exposure index: slightly decreasing , as elsewhere
- The shock index: increasing, decreasing elsewhere …

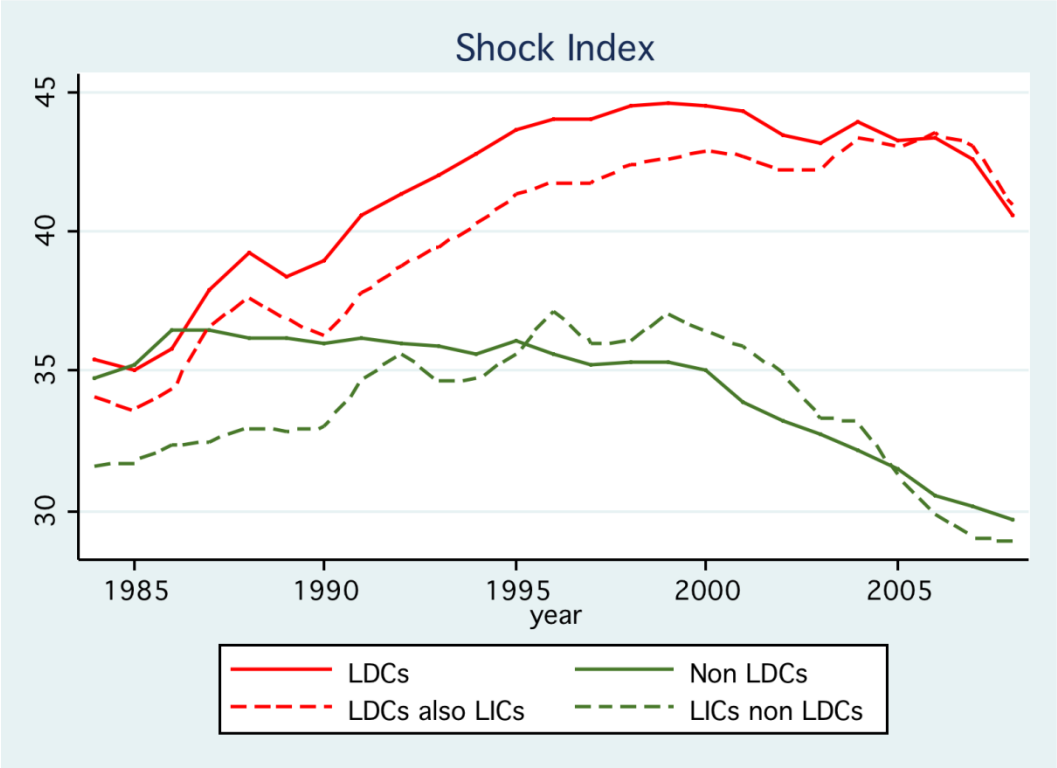
Evolution of EVI, by group of countries



Evolution of the exposure index, by group of countries



Evolution of the shock index, by group of countries



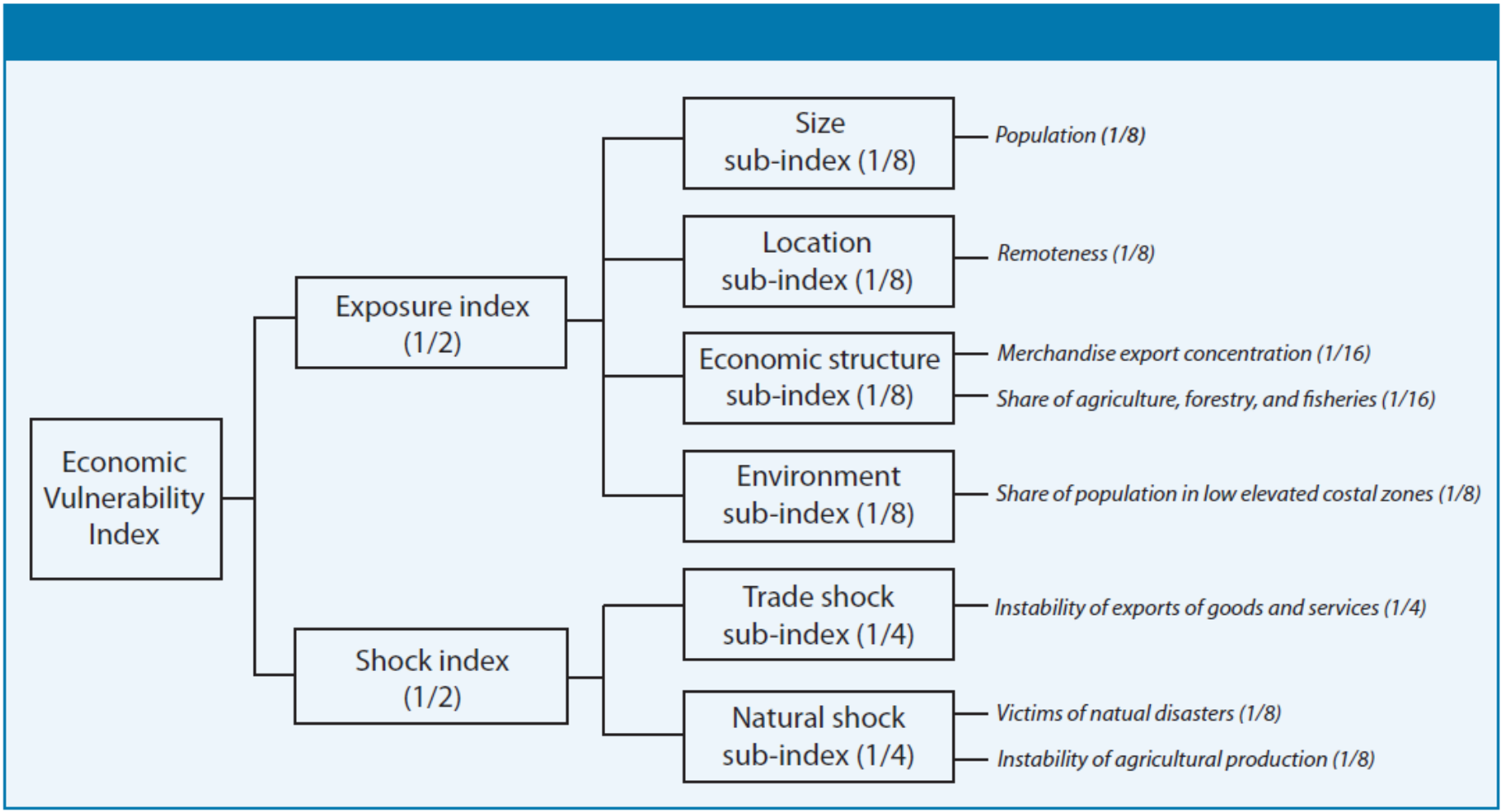
Changes recently brought in EVI… and challenges

- Changes brought in 2011 for the 2012 review
- Same structure, but
- Among shocks components, homeless population due to natural disasters replaced by population affected…
- And a new exposure component added ,
  the % of population living in low coastal area,
  same weight being 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
- Raises a debate about the distinction between economic and climatic vulnerability, besides another one about economic vulnerability and state fragility

FERDI

Composition of the Economic Vulnerability Index (EVI)

Numbers in parenthesis indicate the weight in the overall EVI.



Structural economic vulnerability and state fragility

- Structural economic vulnerability, distinct from *state fragility,*
- Leads to clearly separate LDCs and fragile states (FS)
- State fragility designed and identified only from present policy and institutional factors: lack of state capacity, political will and legitimacy (many changing definitions)
- Structural economic vulnerability designed from factors (exogenous shocks and exposure) independent of policy
- But structural vulnerability influences state fragility,
- And many LDCs are also FS (most are or have been so)

Economic vulnerability and vulnerability to climate change

- Vulnerability to climate already taken into account through several components of EVI (population affected by natural disasters, instability of agricultural production), and now more specifically by the risk 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 it is vulnerability to only one (major) environmental factor

Which vulnerability to climate change index is needed

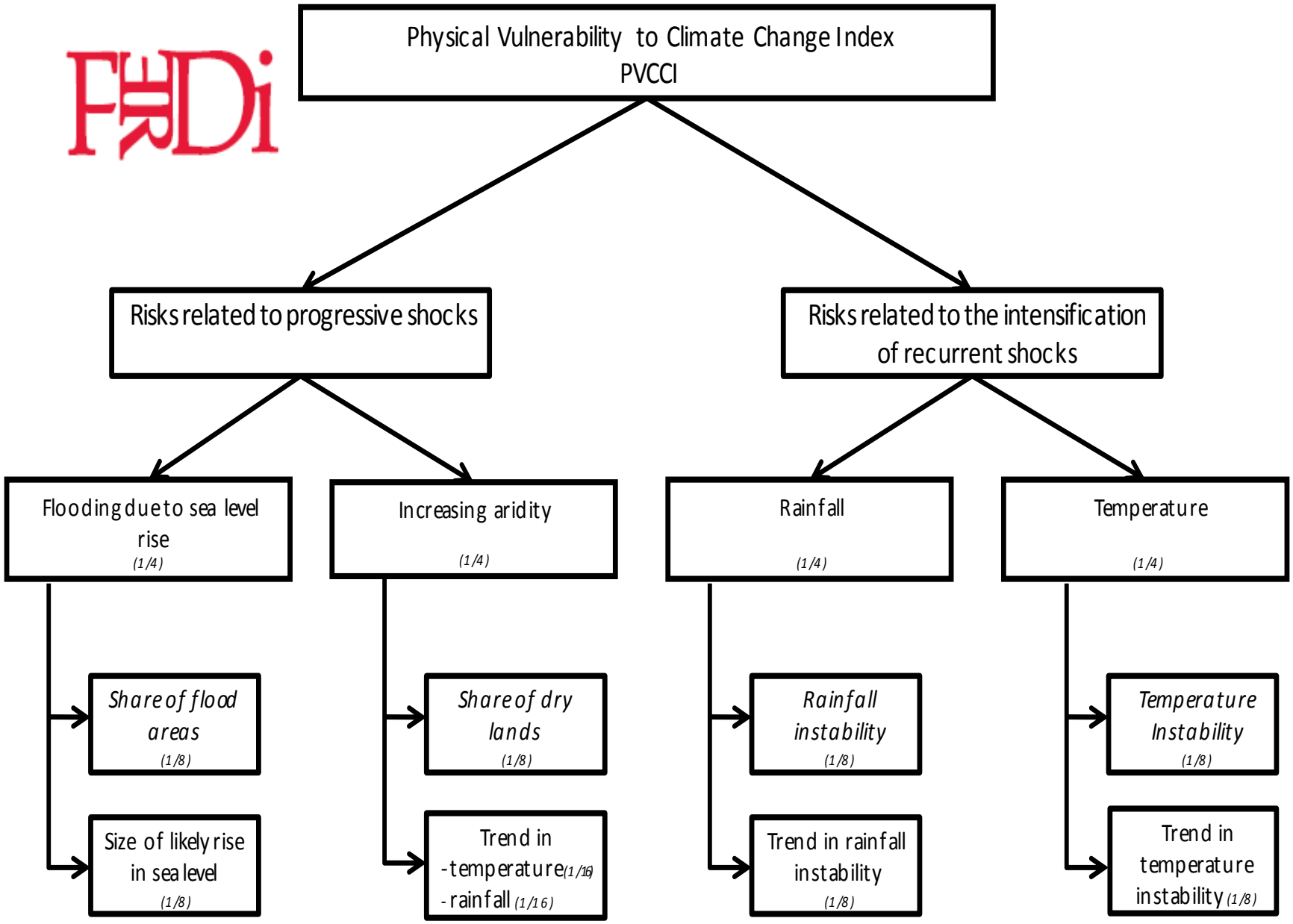
- Depends on the goal pursued (many indices available)
- Here an index likely to be used (among others) to allocate resources for adaptation, with the idea to give more to the most vulnerable
- Should be independent not only of the current policy (as EVI), but also of future policy: countries more vulnerable 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)

The index of physical vulnerability to climate change: main features

- Forward-looking and likely to cature 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) and
  - risks related to the intensification of recurrent shocks (in rainfall or temperature)
- Makes another distinction between the shocks and the exposure to the shocks, and, because the impact of the shocks depends on the initial exposure, uses a geometric averaging
- … but still tentative

Why adaptive capacity is kept aside

- Adaptive capacity or resilience 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

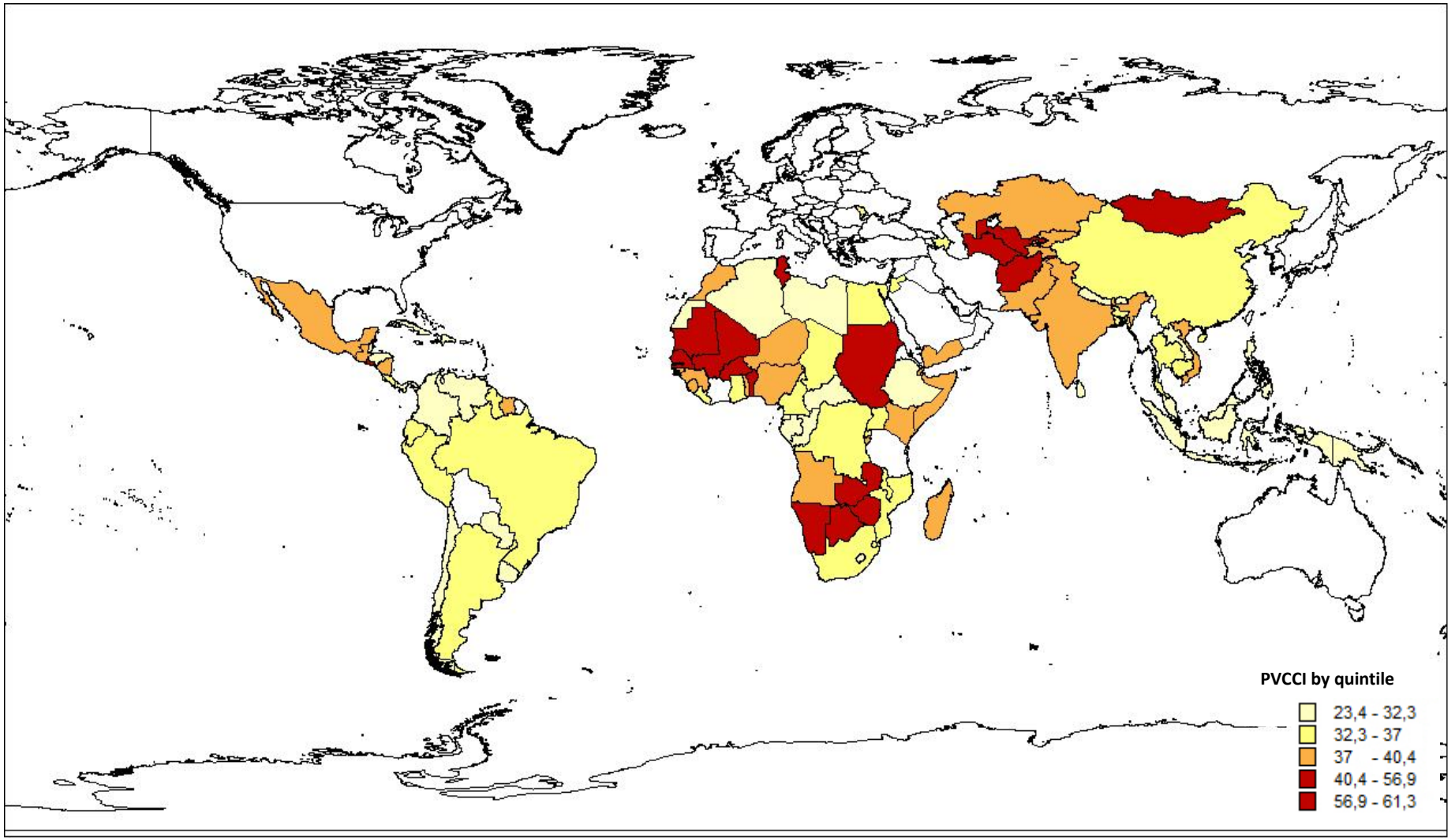


NB. The boxes corresponding to the two last rows of the graph respectively refer to exposure components *(in italics)* and to size of the shocks components

PVCCI in several groups of developing countries

group of countries	number of countries	Mean	Median	Standard Deviation
All Developing countries (DCs)	116	36.43	35.89	6.77
Least Developed Countries (LDCs)	46	38.28	38.38	8.04
All Developing countries non LDCs	72	35.48	34.77	6.30
Low and Lower Middle Income countries	84	37.64	37.21	7.13
Low and LMI countries non LDCs	39	36.66	36.72	5.92
Small Islands Developing States (SIDS)	29	38.00	34.60	9.42
SIDS non LDCs	18	35.98	34.29	7.51
SIDS-LDCs	11	40.19	38.67	11.85
Landlocked Developing Countries (LLDCs)	27	37.14	36.87	6.24
LLDCs non LDCs	11	39.43	40.09	4.96
LLDCs-LDCs	16	35.56	33.52	6.67

Physical Vulnerablity to Climate Change Index (PVCCI) in developing countries



Marshall, Tuvalu, Maldives, Namibie, Gambie, Sénégal, Kiribati, Botswana, Benin, Burkina Faso

- A high average level of vulnerability to climate change in Africa

group of countries	PVCCI				PROGRESSIVE SHOCKS				RECURRENT SHOCKS			
	number of countries	Mean	Median	Standard Deviation	number of countries	Mean	Median	Standard Deviation	number of countries	Mean	Median	Standard Deviation
All Developing Countries (DCs)	116	35,96	35,81	6,74	116	24,33	21,53	11,60	142	46.72	45.75	7.48
African Developing Countries	43	37,97	37,63	5,87	43	24,64	23, 37	9,32	47	51,07	50,92	7,18
Least Developed Countries (LDCs)	46	37,93	37,38	7,83	46	24,92	18,80	14,22	49	51.03	51.02	7.58
African LDCs	30	38,11	38,14	5,72	30	23,63	20,09	9,29	32	52,44	52,01	7,14
Low and LMI Countries non LDCs	84	37,25	36,84	7,16	84	25,53	22,37	13,00	95	48.54	48.92	7.50
African Low and LMI Countries	37	37,61	37,65	5,49	37	23,84	21,77	8,86	40	51,25	50,97	7,27

  - Sub-Sahara African countries evidence a higher average PVCCI than other DCs
    - level of the risk associated to progressive shocks index is a result of two opposed effects
      - a low impact of the sea level rise in Africa
      - component “increasing aridity” more important for African DCs and the trend in temperature is more increasing in Africa
    - difference between DCs and African DCs is important and non ambiguous for the impact of the increasing recurrent shocks

Mixing the two indices?

- 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 need of a fusion would depend on the use of the indices for international policies

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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
- But 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…
- …and which is used to assess the allocation quality of the various donors (“ selectivity ”)
- But is strongly debated

PBA formula (IDA)

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

PBA formula (AfDF)

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

PBA formula (AsDB): the country allocation share depends on the « Composite country performance rating », (CCPR) which itsef depends on…

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

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 (although a matter of concern for a long time), neither their distance to the MDGs (in particular in health and education)
- In spite of criticisms, reluctance of some donors to change
- However move of ideas and better appreciation of the need to take vulnerability into account, illustrated by UN SG report to the ECOSOC Development Cooperation Forum in 2008 and 2010, by the Joint Ministerial Declaration on Debt Sustainability, from Commonwealth and OIF, 2009, by new initiatives of the AfDB…

Five reasons to improve the PBA…
all related to vulnerability

- 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 countercyclicity

Restauring the real meaning of performance

- Everybody favours performance
- Genuine performance refers to outcomes with respect to given initial and external conditions
- CPIA is an assessment of policy rather than a real measure of performance
- Moreover a subjective assessment, according uniform norms, what does not fit the alignment and ownership principles
- And it does not take into account the initial and external conditions, such as the vulnerability to shocks

Enhancing equity by compensating structural handicaps and avoiding double punishment

- Aid allocation should look for equity: among countries or individuals, promoting equity means equalizing opportunities, and capabilities
- *Opportunity equalization involves compensating structural handicaps*
- Main structural handicaps of the LICs are vulnerability to exogenous shocks and low level of human capital, two obstacles reinforcing each other, and not taken into account in the PBA
- To be noted, these two handicaps, along with a low level of income pc, are the main features and identification criteria of LDCs
- Moreover, if aid is allocated mainly according governance, populations suffering from bad governance are at the same time penalized by aid allocation: they are punished twice… Bad governance should indeed be taken into account when designing *aid modalities*, more than through aid allocation

Drawing lessons of aid effectiveness literature

- A double main lesson of literature: aid effectiveness is conditional on the features of recipient countries, but
- Although present policy is a significant *positive* factor of growth, its impact on aid effectiveness is *uncertain*
- Although vulnerability is a significant *negative* factor of growth, its impact on aid effectiveness is *positive* (Chauvet & Guillaumont 2001, 2004, 2010; Collier and Goderik, 2010)
- Then legitimate to take vulnerability into account in aid allocation to make it effective…

Increasing transparency and consistency by making the rule general and effective and treating fragile states in an integrated framework

- Present PBAs are implemented with multiple exceptions: country or per capita caps, floors, and above all special treatment for fragile states or post conflict countries
- These exceptions weaken the relationship between “performance” and allocation , making the allocation rules little transparent
- Treatment of FS/ PCC in aid allocation should be not only transitional and curative, as it is, but also permanent and preventive, through the consideration of structural vulnerability

Making the allocation more stable, more predictable and less procyclical

- Amplified effects of small changes of policy rating (CPIA, CPR, CPA, CCPR…) on allocation, due the structure of the formula (high rating elasticity of allocation)
- Instability of the rating itsef
- Procyclicality of CPIA with regard to exogenous shocks
- Taking into account structural handicaps should make allocation less sensitive to policy and governance rating, more stable and less procyclical

Possible approaches to an improvement

- Followingly, robust rationale for taking into account structural vulnerability, as well as a low level of human capital in aid allocation
- 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, also a relevant aid allocation criterion
- To be still possibly included , with a lower weight than presently, an appropriate indicator of "performance/policy"
- Should meet the three principles of equity , effectiveness and transparency (and simplicity)
- Two main ways of addressing previous issues :
  - EVI (and HAI) included within an " augmented PBA "
  - EVI (and HAI) included as a component of a simple allocation formula balancing effectiveness and equity goals

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
- For equity and effectiveness, need to consider *physical vulnerability to climate change*, through an indicator such as PVCCI, not dependent on policy
- Weak capacity to adapt for reasons not depending on present policy (named above structural resilience) 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 by the low level of GNIpc and HAI
- But a low *performance rating* (policy and governance), also named capacity to implement (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)

Criteria for the allocation of adaptation resources: may debate differ from that on ODA?

- Reference to structural vulnerability, because it is more clearly exogenous (physical) more easily accepted (shocks and exposure): can the ODA allocation debate be influenced by the climate one?
- Reference to effectiveness (« performance ») may in both cases be also needed , but not clear what kind of performance is relevant for the adaptation to climate change :
  - environmental performance? a moral, but debatable argument
  - general performance: the same factors have an impact on the effectiveness of development and of adaptation
- Differentiation more logical if performance assessment includes a judgement on projects 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 mergered, their geographical allocation should be treated simultaneously and the two kinds of vulnerability could then be measured through a synthetic index
- While the allocation for mitigation would be treated differently
- Anyway trade-off between goals, their time horizon and the component weights of the index, is unescapable
- Allocation of international resources, a policy choice

Thanks