The measurement of innovation: a developmental approach

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The symposium aims at:

- contributing to the innovation and development community.
- connecting the innovation studies agenda to development debates.
- designing follow-on research and teaching programmes in innovation and development.

The symposium approach asserts that:

- innovation can be a tool for the effective provision of essential public goods, such as education, housing and health.
- learning processes are key for innovation strategies
- **innovation strategies matter for development.**

Outline of the presentation

(I)Initial considerations

(II) What implies measuring innovation for development purposes?

(III) What kind of innovation-related measurements are needed in developing countries?

(IV) A key feature: the demand factor

(V) Adding meaningfulness and legitimacy to innovation measurement

(I) Initial considerations

(a) Theory matters

"**It is the theory that decides what we can observe**".
(This is what Einstein told Heisenberg when they were discussing the "nature of reality" in 1926)

(b) Context matters

A one-size-fits-all theory can lead us to fail in the understanding of important factors and processes that are context-specific; perhaps even worse, it can turn some important context specific factors and processes invisible for empirical and analytical work.

Which theories, approaches and insights should we use to observe the innovative reality of developing countries?

- Development theories
- Economic history insights
- Emphasis on the dynamics of learning processes and capability building
- Attention to the diffusion of innovations processes
- The National System of Innovation approach, adapted to developing contexts

Such theories highlight points like the following:

- "Development depends not so much on finding optimal combination of productive factors and resources as on using resources that are hidden, scattered or badly utilized." (A. Hirschman)

- "Development is best seen as an expansion of people's capabilities"; "People shoud be seen as agents and not a patients". (A. Sen)

- Nations should not "kick away the ladders" that helped other nations advance their development (F. List, H. J. Chang)

- "If knowledge is the most important resource, then learning is the most important social process" (B. Johnson& B.A Lundvall),… but what implies learning?

- The process of diffusion is key to understand the impacts of innovations on development, particularly those related to inequality (E. Rogers).

- The NIS approach stresses interactions, highlights the role of different actors, including usually neglected ones, pays attention to political and cultural factors related to innovation processes.

Questions that follow from these insights (and call for measurement)

- What resources do we have in developing countries that are hidden or badly utilized? Which are our “invisible” strenghts?
- Are our innovation policies concerned with the expansion of people’s capabilities? Or are we kicking away the ladders?
- How can we define the “learning situation” of a developing country?
- How good is the production and diffusion of innovations that provide essencial goods to the population?
- What should we look at when analyzing the NIS of a developing country?

(II) What implies measuring innovation for development purposes?

(a) Going beyond the already well-known

Countries	HE gross enrolment ratio	Researchers (FTE) per million inhabitants	R&D/ GDP	% total expenses in R&D by firms	% total R&D execution by firms	Researchers working in business firms (% of total researchers)	Researchers (per 1000 total employed)
Denmark	80	5.277	2,43	59,5	64,7	64,8	10,2
Finland	93	7.681	3,45	68,2	72,3	56,6	16,6
France	56	3.491	2,11	52,4	63,2	55,7	8,2
Japan	57	8.840	3,39	77,1	77,2	66,2	11,1
UK	59	3.695	1,78	45,2	61,7	44,7	5,8
Germany	….	3.386	2,53	68,1	70,0	63,5	7,2
Sweden	79	6.139	3,73	65,7	72,7	73,2	12,6
USA	82	4.671	2,62	66,4	71,9	79,2	9,6
Canada	…	3.922	1,94	47,8	54,4	63,6	7,7
S. Korea	93	2.044	3,23	75,4	77,3	72,2	8,7
Brazil	25	461	1.02	….	…..	23,8	1,0
Argentina	66	895	0.49	29,3	30,3	15,9	…..

This implies that measuring innovation mainly to compare with the rest of the world is not particularly useful for development

In the case of innovation surveys,

- The questions to be asked and the alternatives we allow for the answers should not be completely defined by the "iron law" of international comparisons.
- Given the huge differences in contexts, care is needed not to assume that the questions and the answers will mean the same everywhere.
- Room should be made for "incomparable" issues if they are meaningful for the country. (innovation through repairs, for instance)

(b) Organising key information to better understand innovation processes (including problem-solving activities)

Learning processes are key

But learning implies a double movement:

(i) To enhance capabilities through studying at high level and
(ii) To open opportunities to apply creatively the acquired capabilities

Measurable proxies for these dimensions?

Enrolement in HE; R&D/GDP

With these two variables it is possible to fix a point in a map: where are the different countries located in such a map today?

Mexico?

Finland?

South Korea?

USA?

Brazil?

Spain?

Argentina?

India?

Denmark?

France?

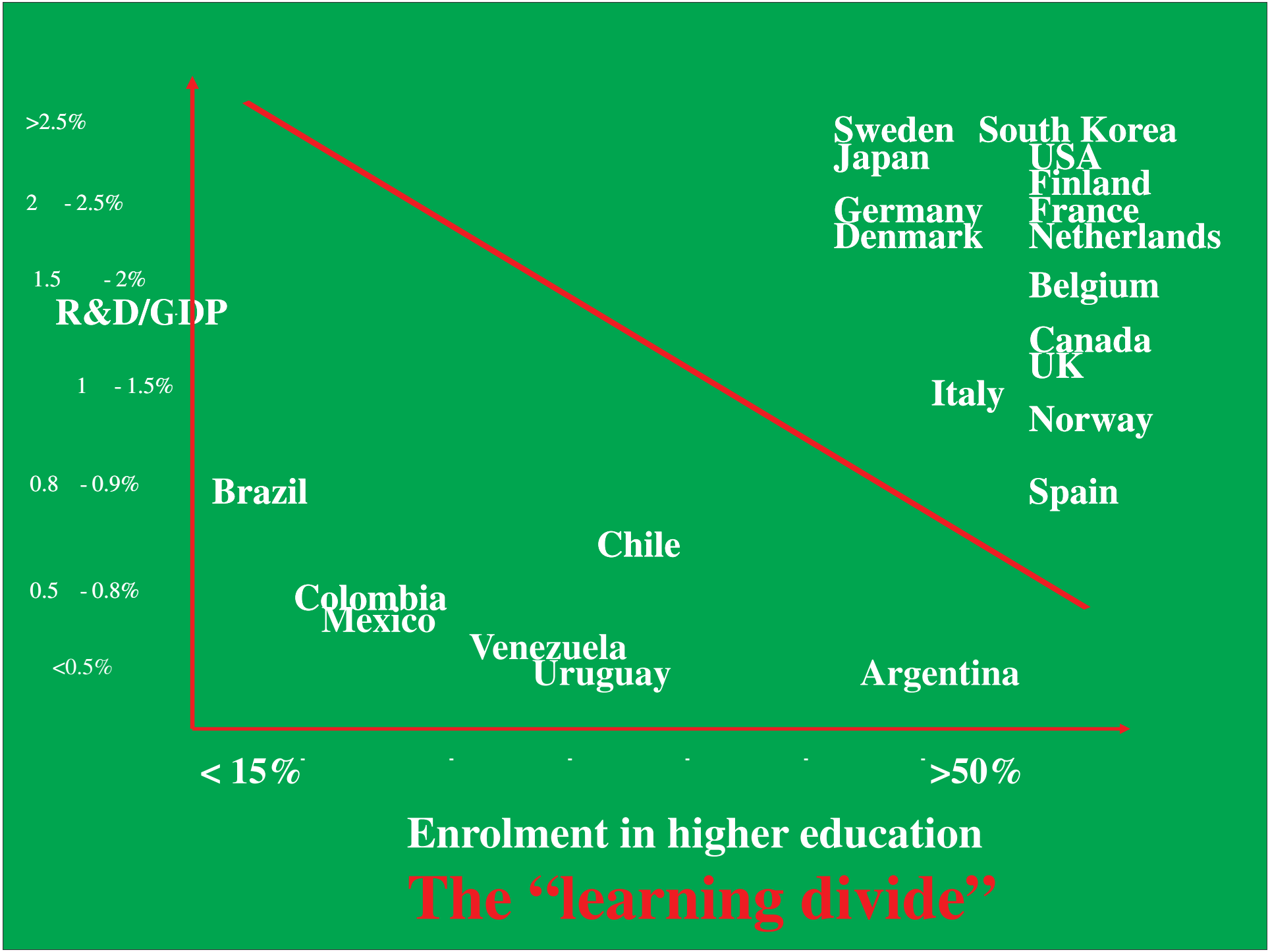
Venezuela?

Uruguay?

Chile?

UK?

South Africa?



The "learning divide"

(c) Designing measurements to inform innovation policies

- Innovation surveys should be discussed with policy makers and not only within the closed community of innovation surveys experts

- Monitoring the state of the "learning divide" is key for innovation policies, and should be better done

- What else should innovation policy makers need to know? For instance, who are the weak innovation actors. How can this be measured?

(III) What kind of innovation-related measurements are needed in developing countries?

For instance: To what extent firms in developing countries are able to learn, and to profit from the knowledge produced everywhere?

This relates to the role of universities in innovation: one of their main roles is to provide well trained and creative people, able to face the challenge of finding solutions to difficult problems in difficult conditions

Let's assume that universities fulfill this role: is that enough? Do firms employ these people?

Some evidence from Uruguayan innovation surveys: proportion of "learning weak" firms according to size

"Learning weak" firms: those firms that do not have a single employee with a higher education S&T background

Size	% of firms without any "S&T" employee		
	1985 -1987	2001 -2003	2004 -2006
Small	73,8	87,4	88,0
Medium	50,3	63,2	57,0
Big	22,5	21,9	12,0

Other important and usually ignored questions

(1)What do knowledgeable people know in productive firms?

How many geologists are working in the minning firms?

How many biochemists are working in the food industry?

What people know is directly related to how much they can profit from the global accumulation of knowledge

(2) Why do firms attempt to innovate in a developing country?

Will the reasons be identical across the world?

These informations feed directly into policy design

To what extent can we believe the information about innovative behaviour we gather from innovation surveys?

- Is innovation a value-free concept?
- In Uruguay, 54% of all firms that declared performing R&D activities did not have a single employee with higher education inS&T: can we assume that all firms declaring R&D are talking about the same thing?

We need to ask about innovation in different ways, introduce control questions, include open questions (now we have software to analyze them!); if we fail in doing this our results can be misleading.

(IV) A key feature: the demand factor

"Innovation in the developing world is constrained not on the supply side but in the demand side. That is, it is not the lack of trained scientists and engineers, absence of R&D labs, or inadequate protection of intellectual propriety that restricts the innovations that are needed to restructure low-income economies. Innovation is undercut instead by **lack of demand from its potential users in the real economy** –the entrepreneurs. And the demand for innovation is low in turn because entrepreneurs perceive new activities to be of low profitability." Rodrik (2007: 101)

Is that true for South Africa?

Why is the demand side of innovation policies so important?

"Imagine trying to cut a piece of paper with just one blade of a pair of scissors. It's near impossible. Yet that is what we try to do with innovation policy. (...) Innovations are the product of the creative interaction of supply and demand. However, in focusing on how to increase the supply of innovative businesses, policymakers have lost sight of the importance of demand." (Georghiou, 2007:1, 2)

How can we increase innovation demand in countries marked by heavy scarcities?

Can this matrix be of some help?

	Problems for which solutions have been found in AICs	Problems for which solutions have not been searched or found in AICs
Problems for which solutions suitable for DCs conditions exist	**The vast majority of solutions acquired through technology transfer**	Solutions to problems mainly posed in DCs and developed locally
Problems for which solutions suitable for DCs conditions do not exist	"Canonical" solutions exist, but for different scarcity reasons they are not suitable for DCs conditions	No solutions (yet) Typically health issues like vaccines against cholera or AIDS

Srinivas and Sutz, 2008

(V) Adding meaningfulness and legitimacy to innovation measurement

For this aim, innovation itself needs to be seen as more meaningful for development

- The sequence: innovation, economic growth, positive trickle-down effect on poverty and inequality, does not work well.
- To fight inequality and to advance the right to "no to be less or to live less" for a majority, innovation needs to play an additional role besides economic growth: to directly help social policies to fulfill their goals, in education, housing, health.

If we agree that a way to do this is to embbed innovation policies into social policies and the other way around;

If what we need is to build more socially inclusive National Systems of Innovation

What should we research and measure ?

- The innovation demand of social policies
- Where this demand is directed to
- What part of this demand reach local firms
- What part of this demand is picked-up by academic research
- Which policies are devoted to connect research and innovation capabilities to social demands
- A set of success indicators for such policies

The need to link innovation to development in new ways is gaining wide recognition

We need to conceive and to measure innovation in new ways

The task ahead is difficult,

particularly because if it is theory that decides what we can observe, it is not only a matter of measuring innovation differently but of

thinking anew how to make innovation strategies matter for development

I hope we will able to work together in this endeavor