

Industrial Policy for Structural Transformation

A new policy tool

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Why industrial policy is important?

- Structural transformation is key for economic and human development
- Market failures of different nature (**information**, **coordination** and **economies of scale**) can lead to inefficient equilibria and slow down transformation (especially in developing economies)
- Adopting **targeted government action aimed at altering the sectoral structure of production** towards sectors that are expected to offer better prospects for economic growth
- **Key question no longer is whether to engage in industrial policy, but how to do it right**

Overview

1. Strategies of industrial policies
2. Open Economy IP- Strategic Trade Integration
3. UNCTAD's *Picking Possibles*
4. An application to Ethiopia

Strategies of industrial policies

- Adopting wide-ranging protection and subsidization, inward-oriented industrialization strategies - Latin America 60s and 70s
- Attracting FDI and supporting export activities
- Maintaining an undervalued exchange rate - China 2000s
- Pursuing outward-oriented industrialization using **strategic trade integration** - East Asian Tigers

Industrial policy in an open economy

- Strategic trade integration, which
 - Involves change in product categories that receive public policy support, with their skill, technology and value-added content gradually increasing
 - To accompany (or guide) the evolution of an economy towards the introduction of goods with progressively higher value added content

Strategic Trade Integration

Need to:

- Choose the **"right" products** at each moment in time
- Select an effective policy support mix
 - Targeted import liberalization to ensure easy and cheap access to capital goods and intermediate products
 - Export promotion through temporary support policies (e.g. EPZs)
 - Encourage entrepreneurship and investment in new activities (**discovery**)
 - Wise exchange rate policies
 - Choosing **"right" trade partners**

TODAY: Policy tool to identify right products/sectors - Fortunato, Razo and Vrolijk, *UNCTAD DP 219* (forthcoming)

What are the right products?

"Right" products are those **more sophisticated** (i.e. requiring more productivity and therefore generating higher value added)

Hausmann, Hwang and Rodrik (2007) propose a measure of the **sophistication** of a country's export package to **capture the implied productivity of exported goods**

Idea: when exporting a good, countries reveal their productivity levels (cfr RCA) therefore the **characteristics of the exporters** reveal important information about the product

In particular **HHR** look at the **income of the exporters as a way to capture the implicit productivity** (i.e. the sophistication) of exported goods

What are the right products?

The Sophistication Index: Intuition

If a product accounts for a large percentage of poor-country exports but a small percentage of rich-country exports, then it will have a low level of sophistication

Conversely, if a product accounts for a large percentage of rich countries export packages but is not significant among poor-countries, it will have a higher level of sophistication

The more the export structure is similar to the one of the richest countries, the more it is sophisticated

[Link to technicalities](#)

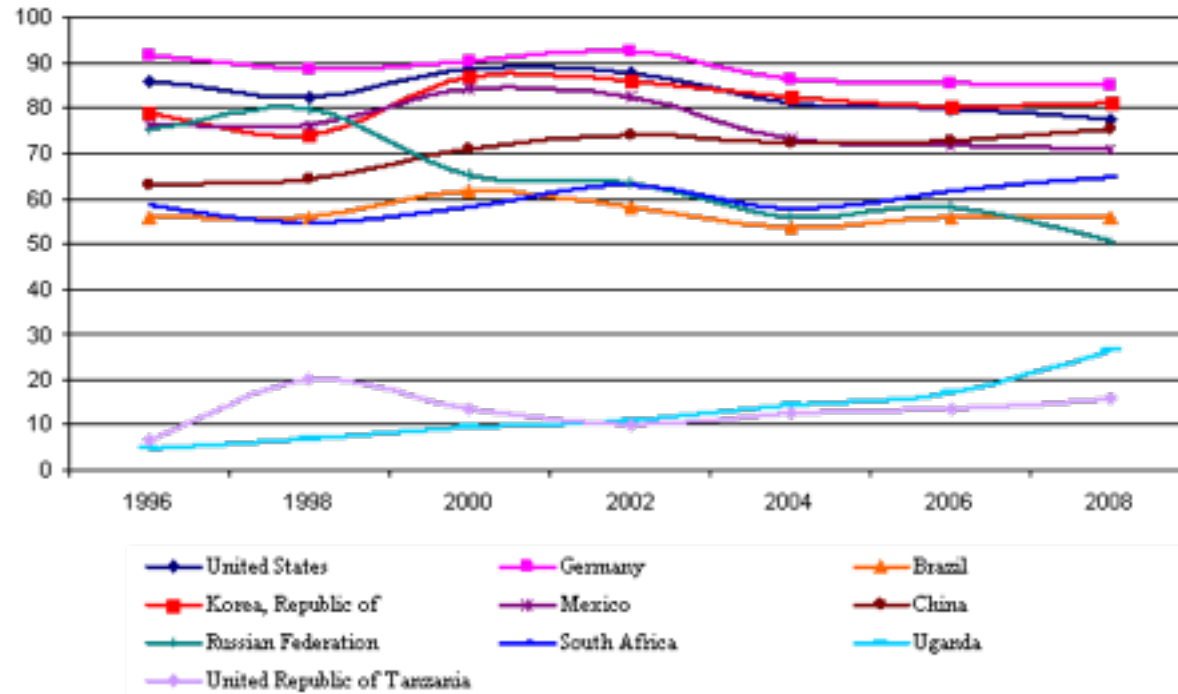
Sophistication matters: if a country has a sophisticated export basket relative to its level of income, subsequent growth tends to be much higher - Fortunato and Razo (2013)

	(1)	(2)	(3)	(4)	(5)
	Growth	Growth	Growth	Growth	Growth
Variables					
Expy	0.0147*** (0.004)	0.0153*** (0.004)	0.01** (0.003)	0.01** (0.004)	0.01* (0.004)
HHI	0.00002 (0.00003)	-0.00001 (0.00003)	-0.00002 (0.00002)	-0.00002 (0.00002)	-0.00002 (0.00003)
Tech/Exports	0.004 (0.006)	-0.0065 (0.006)	-0.002 (0.005)	-0.0015 (0.006)	-0.0015 (0.006)
GDP per capita	-0.00003*** (0.000001)	-0.00003*** (0.000001)	-0.00003*** (0.000001)	-0.00003*** (0.000001)	-0.00003*** (0.000001)
FDI/GDP		0.022*** (0.005)	0.014*** (0.004)	0.014*** (0.005)	0.0135** (0.005)
Capital formation			0.03*** (0.005)	0.03*** (0.005)	0.03*** (0.005)
Trade/GDP				0.0003 (0.001)	0.0003 (0.001)
Schooling					-0.0007 (0.001)
Constant	0.434** (0.154)	0.46*** (0.145)	-0.065 (0.15)	0.052 (0.16)	0.067 (0.16)
Observations	168	168	168	168	168
R-squared	0.08	0.19	0.35	0.35	0.35

SI Ranking - average 1995-2008

Country	Highest SI	Country	Lowest SI
Ireland	95.69	Burundi	7.42
Switzerland	95.69	Rwanda	4.70
Japan	94.82	Ethiopia	4.60
Finland	91.84	Mali	4.18
Singapore	90.53	Malawi	2.70

Evolution of the sophistication index for selected countries: 1996-2008



Picking the right products

Now we have a measure that can help us to identify the "right" products

But: sophistication alone is not enough!

Sophistication is only one dimension (info on the quality), the other is **feasibility**

We need to look at what products a country can readily start producing given its capacities, and pick among these products the most sophisticated (pick possibilities!)

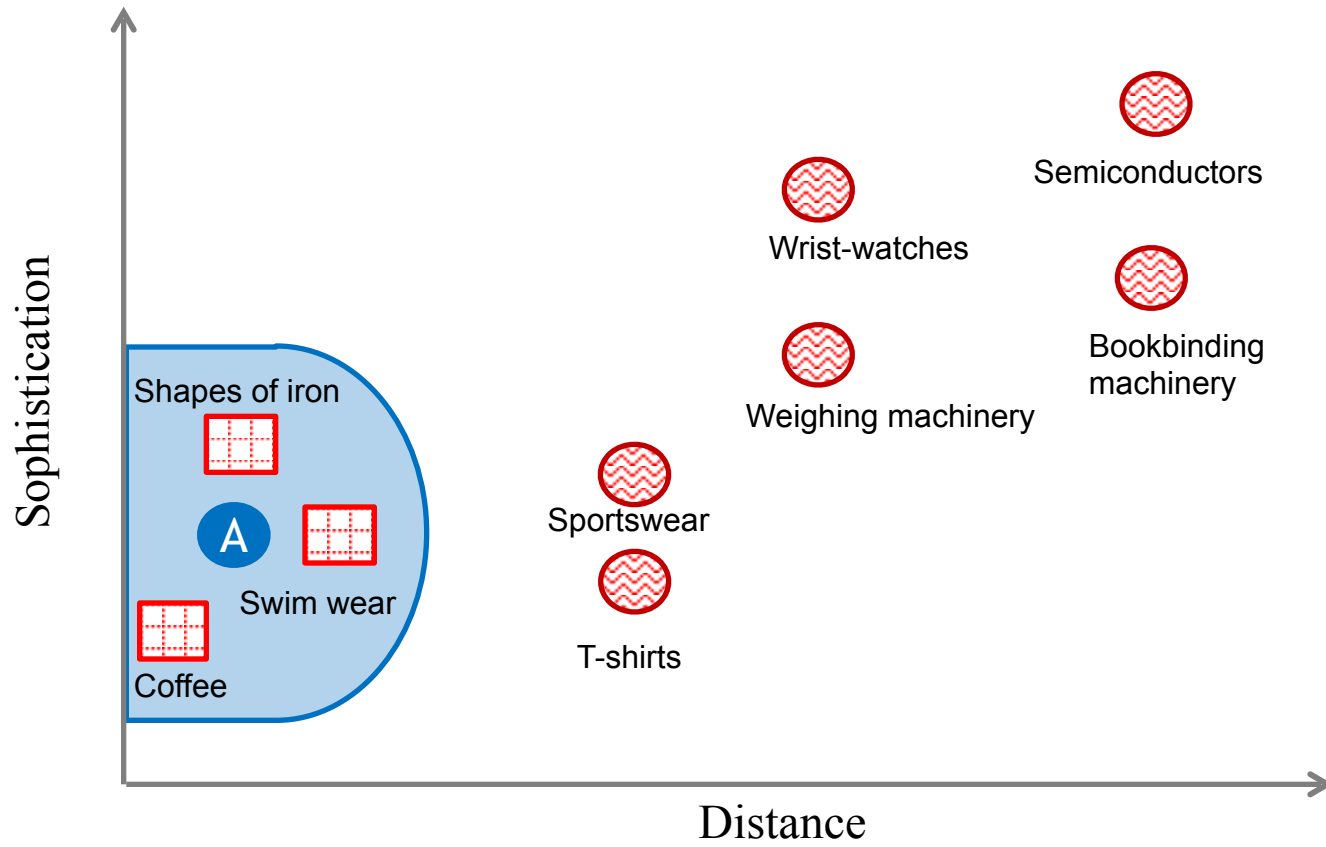
Picking Possibles

- I. **Locate** new export possibilities in the **Product Space**
 - **Quality:** level of sophistication
 - **Distance:** Distance from current export basket
 - Measure of the probability of a country to produce a *new* product given the existing capacities (i.e probability having a comparative advantage in one product given it has a comparative advantage in the other product) - **Difficulty of undertaking a new production and cost of needed policy support package**
- II. **Identify** most sophisticated products at various levels of distance

Sophistication



Distance



Distance & Products (Leamer - factor intensity): Ethiopia

leamer_name	distance_group									Total
	1	2	3	4	5	6	7	9		
Animal Products	0	4	9	5	1	0	0	0	19	
Capital Intensive	4	11	13	7	3	2	0	0	40	
Cereals, etc.	0	5	13	4	5	0	0	0	27	
Chemical	0	7	22	34	8	3	0	0	74	
Forest Products	0	2	8	2	3	2	0	0	17	
Labor Intensive	1	2	3	0	0	1	0	0	7	
Machinery	1	8	16	7	3	0	0	0	35	
Petroleum	0	0	1	3	2	1	1	0	9	
Raw Materials	0	5	8	7	5	2	2	1	31	
Tropical Agriculture	0	1	5	2	1	0	0	0	9	
Total	6	45	98	71	31	11	3	1	268	

An application to Ethiopia

Identifying the right products - Ethiopia

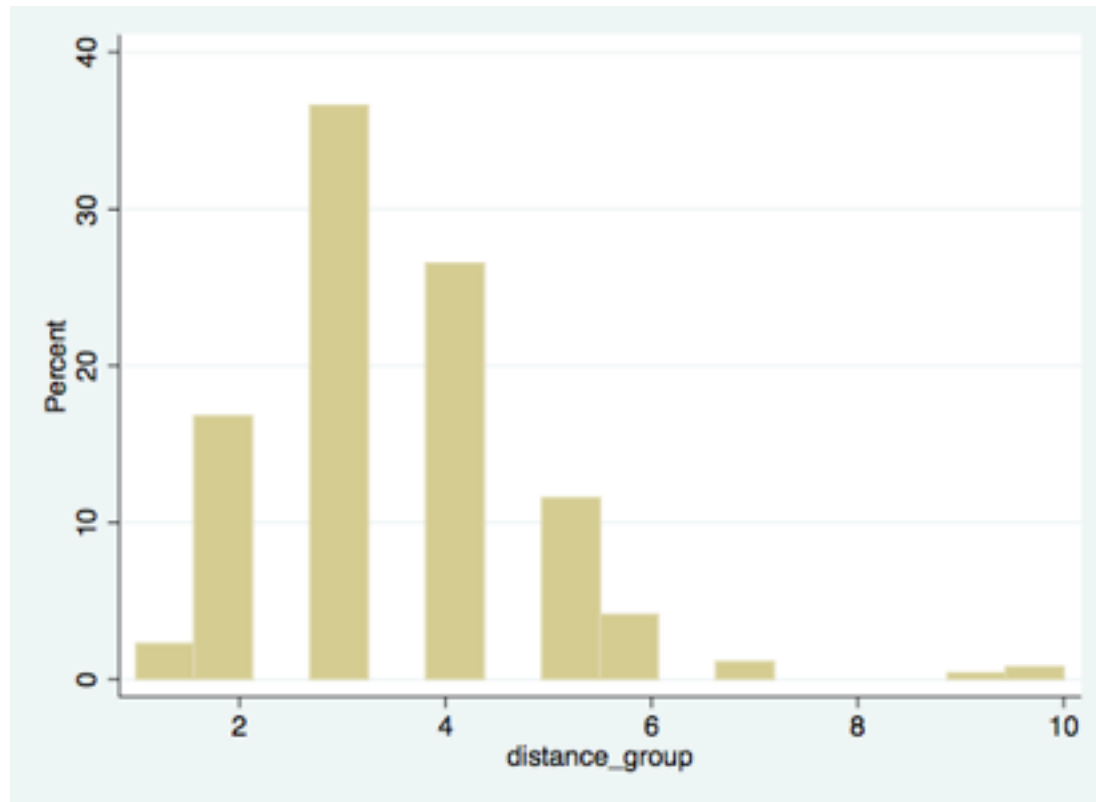
Low/Medium Sophistication gain

1	Swimwear Of Textile Fabrics	Labor Intensive
1	Fabrics, woven, 85% plus of discontinuous synthetic fibres	Capital Intensive Machinery
1	Electric shavers and hair clippers, parts thereof	
2	Other fermented beverages, nes (cider, perry, mead, etc)	Tropical Agriculture
2	Cork, natural, raw and waste	Forest Products
2	Sesame (sesamum) Oil And Its Fractions	Cereals, etc.

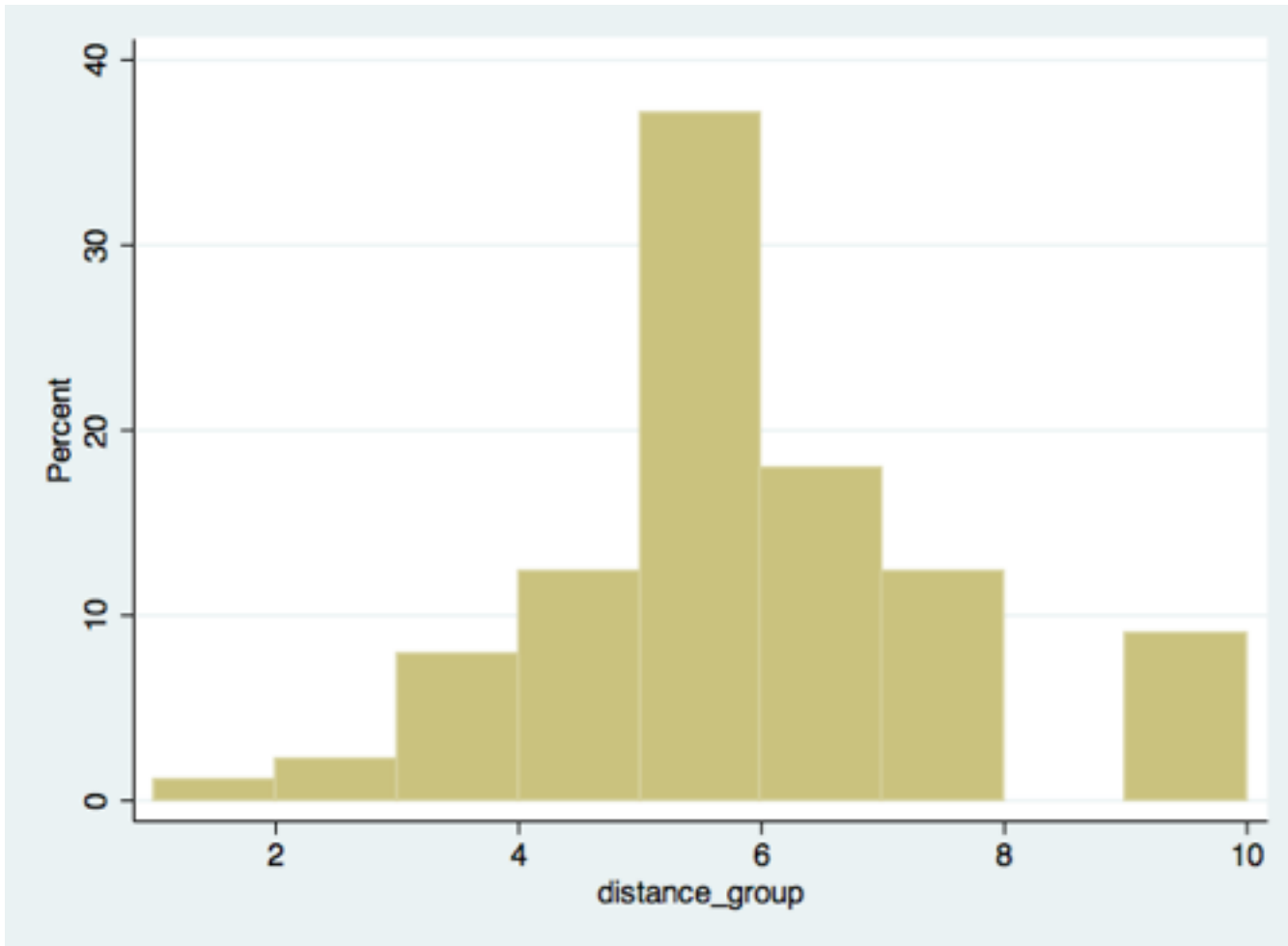
High Sophistication gain

2	Mineral or chemical fertilizers, phosphatic	Chemical
2	Steam and other vapour-generated boilers	Machinery
2	Printed circuits, and parts thereof, nes	Machinery
2	Fabrics, woven, of flax or of ramie	Capital Intensive
3	Processed animal and vegetable oils	Animal Products
3	Amine-function compounds	Chemical
3	Vegetable alkaloids and derivatives, not put up as medicaments	Chemical

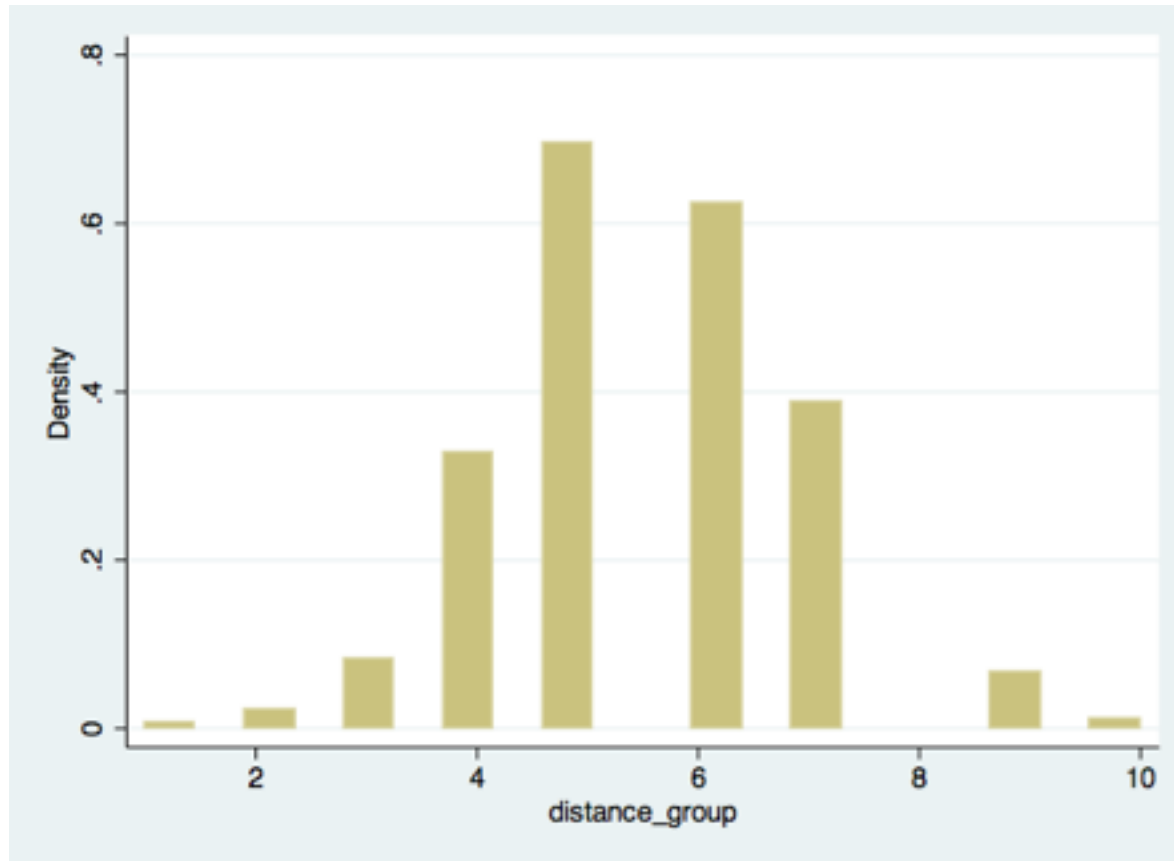
Distribution of new products: Ethiopia



Distribution of new products: Uganda



Distribution of new products: Mozambique



Picking Possibles

Sectors, clusters and backward linkages

- **Target sectors:** Food-Processing, (non-food) agro-processing and manufacturing
- **Clusters:**
 - **Food-processing:** Beverages (1), Dairy (4), Edible Foods (10), Edible oils (5), Fish (3), Meat (2)
 - **Agro-processing:** Furniture (2), Leather (5), Paper (3), Rubber (6), Textile (15)
 - **Manufacturing:** Chemical (20), Construction material (15), Electronics (2), Heavy Manufacturing (11), Light Manufacturing (17), Specialized Manufacturing (2)
- **Identify backward linkages to existing agriculture exports**

Sector	Cluster	# new products	# linkages
Food-Processing	Beverages	1	10
Food-Processing	Dairy	4	5
Food-Processing	Edible Foods	10	47
Food-Processing	Edible Oils	5	10
Food-Processing	Fish	3	3
Food-Processing	Meat	2	13
Agro-Processing	Furniture	2	1
Agro-Processing	Leather	5	3
Agro-Processing	Paper	3	8
Agro-Processing	Rubber	6	-
Agro-Processing	Textile	15	5
Manufacturing	Chemical	20	2
Manufacturing	Construction	15	9
Manufacturing	Electronics	2	-
Manufacturing	Heavy Manuf.	11	-
Manufacturing	Light Manuf.	17	4
Manufacturing	Specialized Manuf.	2	5

Conclusions

- Industrial policy is an important tool to solve market failures and foster structural transformation
- Industrial policy must be embedded in a wider trade and development strategy - strategic trade integration IP
- Product space based methodology useful to pre-screen products/ activities but need to be complemented (marketability, impact of job creation, distributional effect, etc.)

The Sophistication Index: Methodology

- **Step I (product level)**: measuring the GDP per capita (i.e. the implicit productivity level) associated with each exported product to get a measure of the **level of sophistication of each product (PRODY)**

$$PRODY_k = \sum_j \frac{\frac{X_{kj}}{X_j}}{\sum_j \left(\frac{X_{kj}}{X_j} \right)} Y_j$$

- The revealed comparative advantage (RCA)-weighted average of the GNI per capita of the countries exporting that product (i.e. the implicit productivity level)

•**Step II (country level):** measuring the overall level of income associated with a country's export basket, to get a measure of the **level of sophistication of the country (EXPY)**

$$EXPY_{jt} = \sum_k \frac{X_{kjt}}{X_{jt}} PRODY_k$$

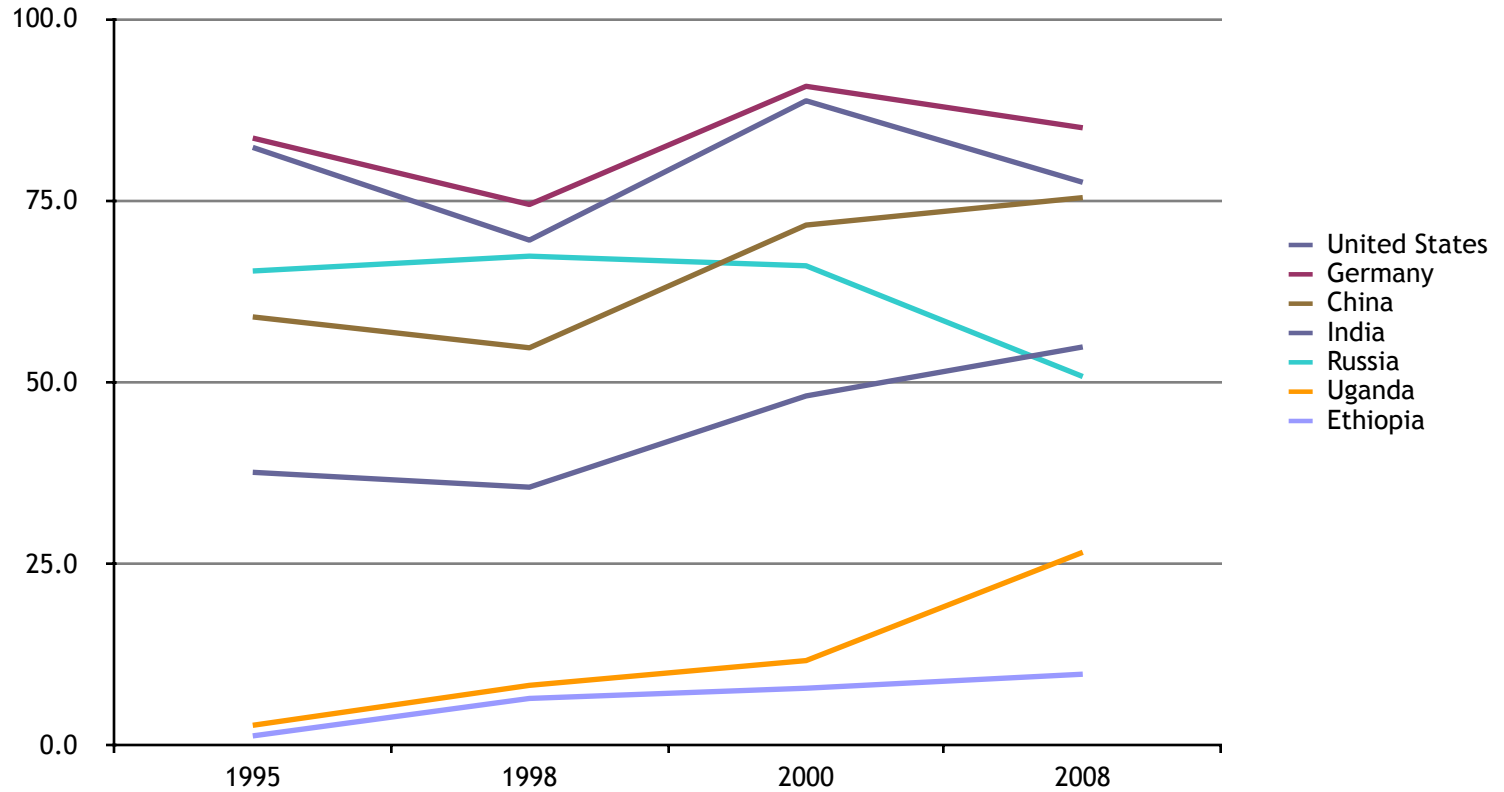
- The average of the PRODY of each good that a country exports, weighted by that product's share of total exports
- Since PRODY is measured using the GNI per capita of the typical exporter, rich countries have a high EXPY and poor countries have a low EXPY

•**Step III (normalizing the index):** we construct the export sophistication index, by normalizing the export sophistication level, EXPY, to a scale from 0 to 100 for every year. The country with the highest EXPY is set to 100 and the country with the lowest at zero.

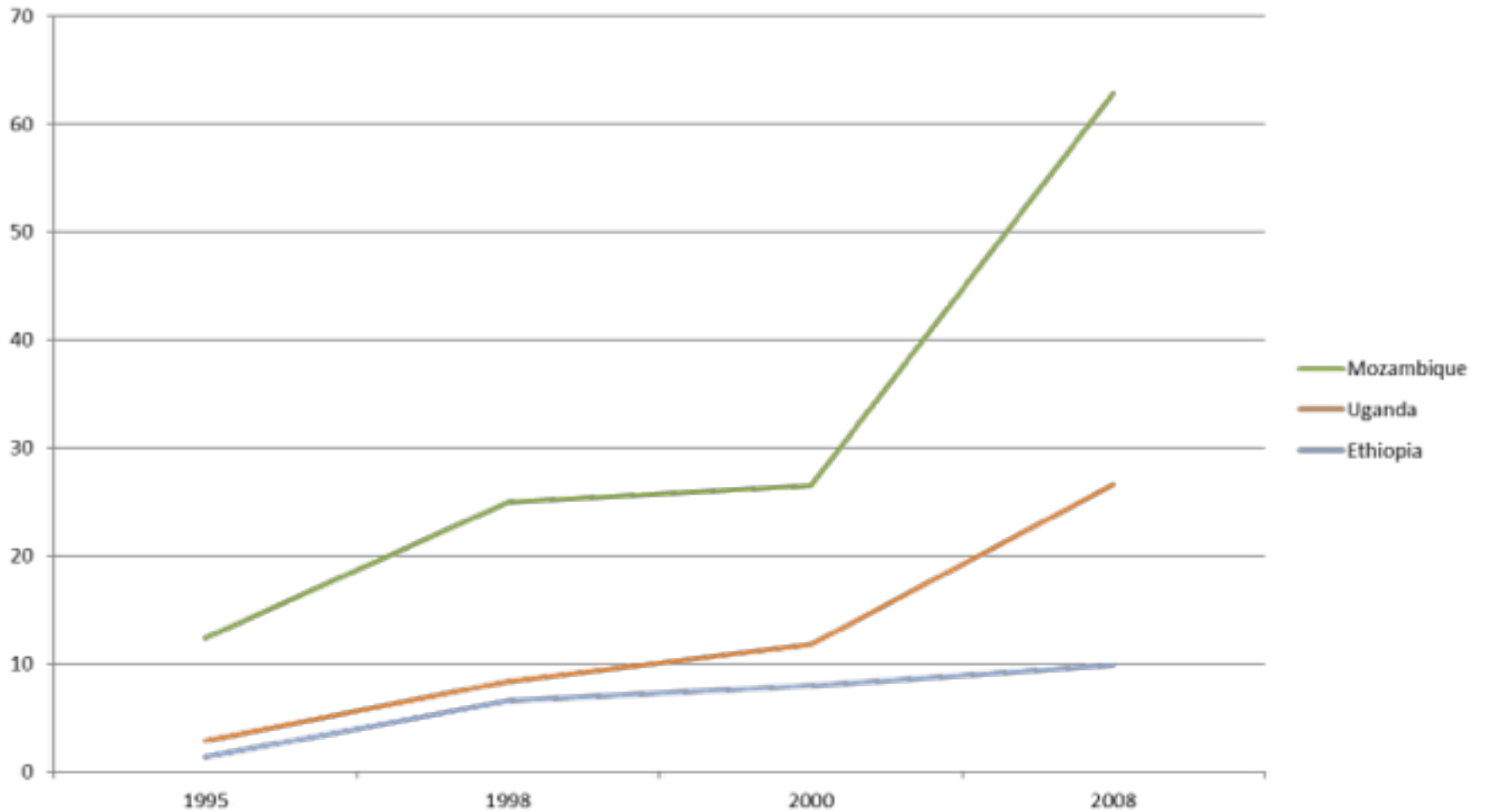
$$SI_{jt} = \frac{EXPY_{jt} - EXPY_t(Min)}{EXPY_t(Max) - EXPY_t(Min)} * 100$$

[Back to presentation](#)

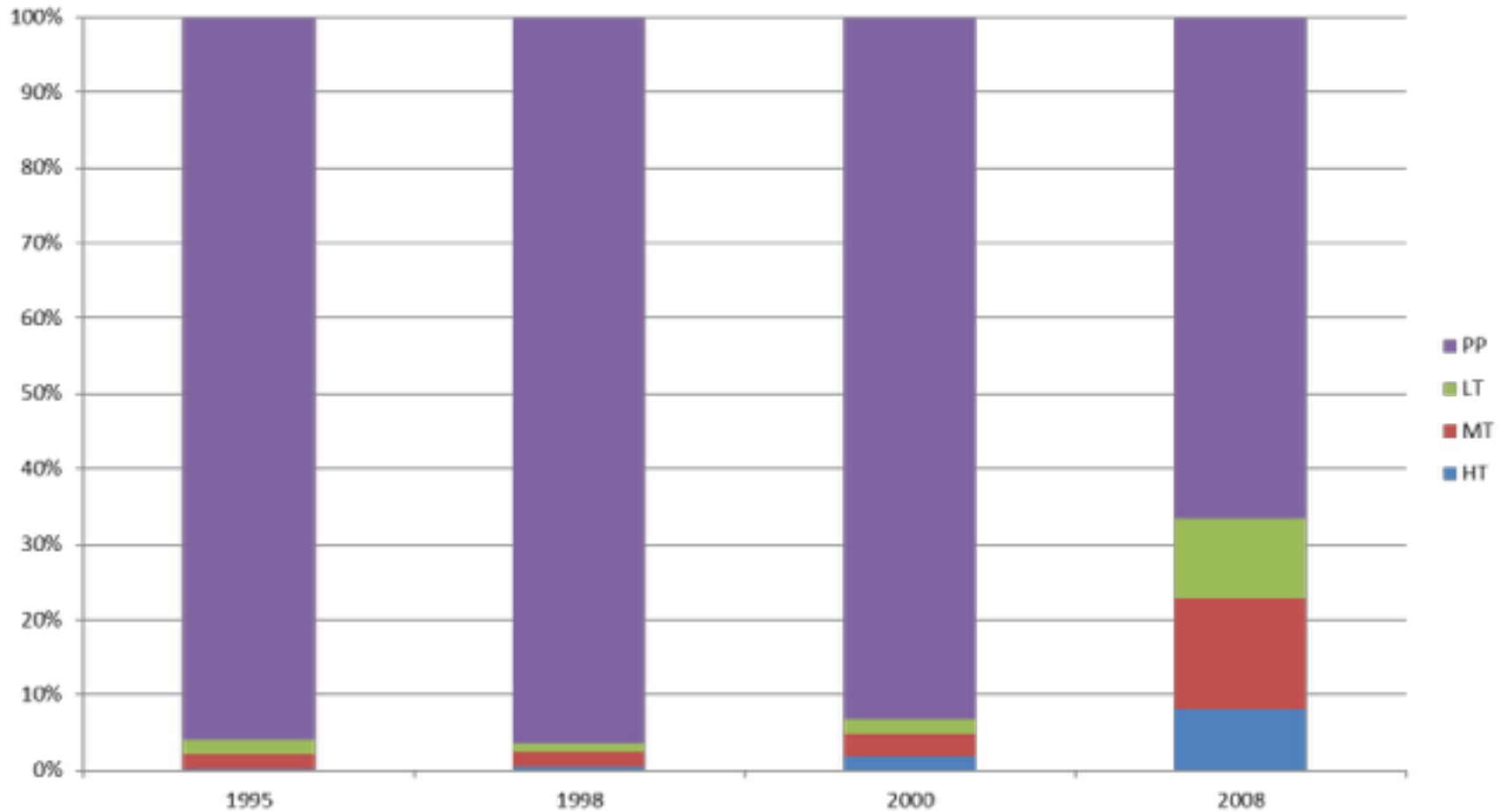
Sophistication Dynamics



Benchmarking Ethiopia

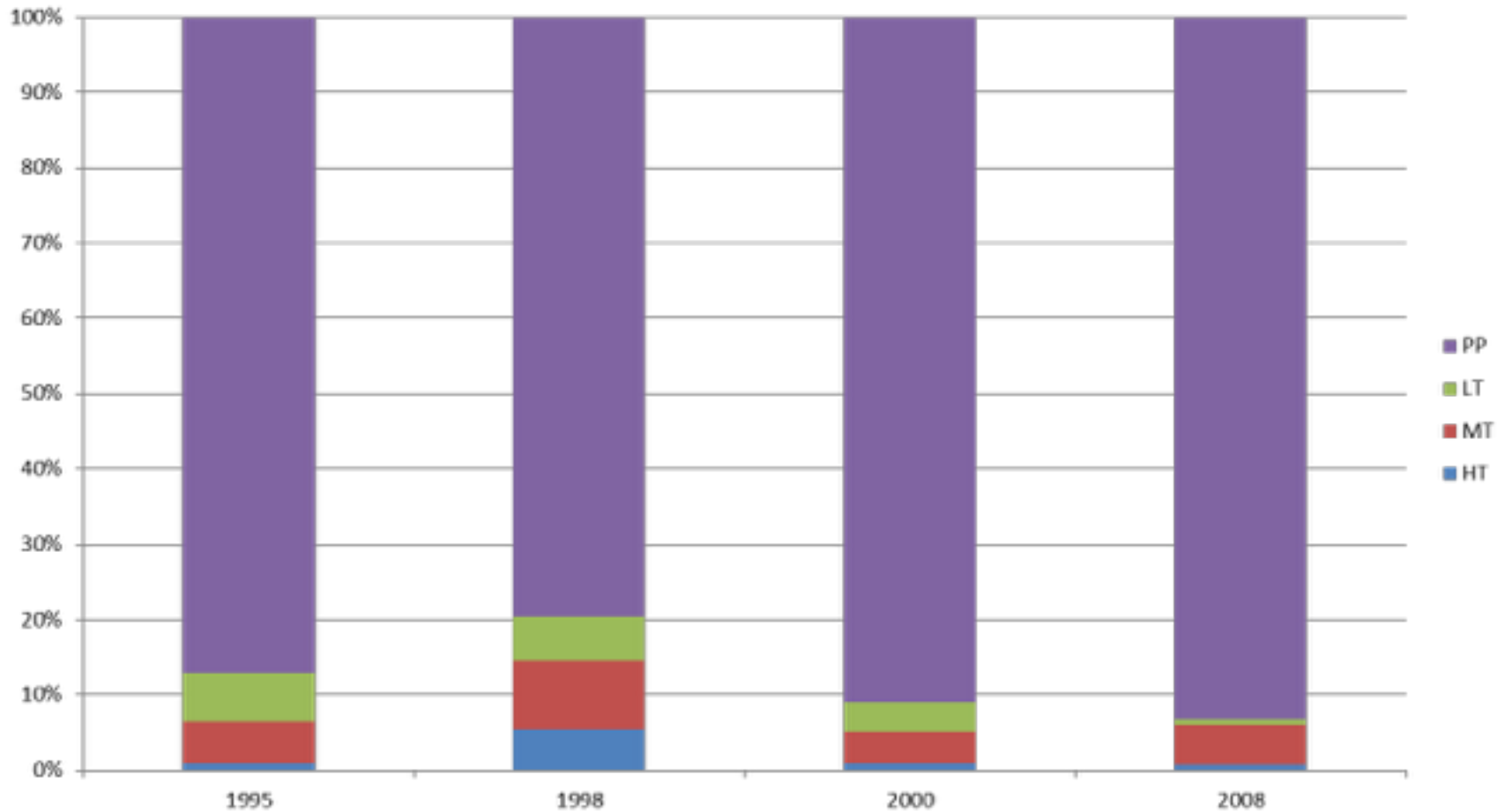


Exports Decomposition Uganda: the role of Manufacturing



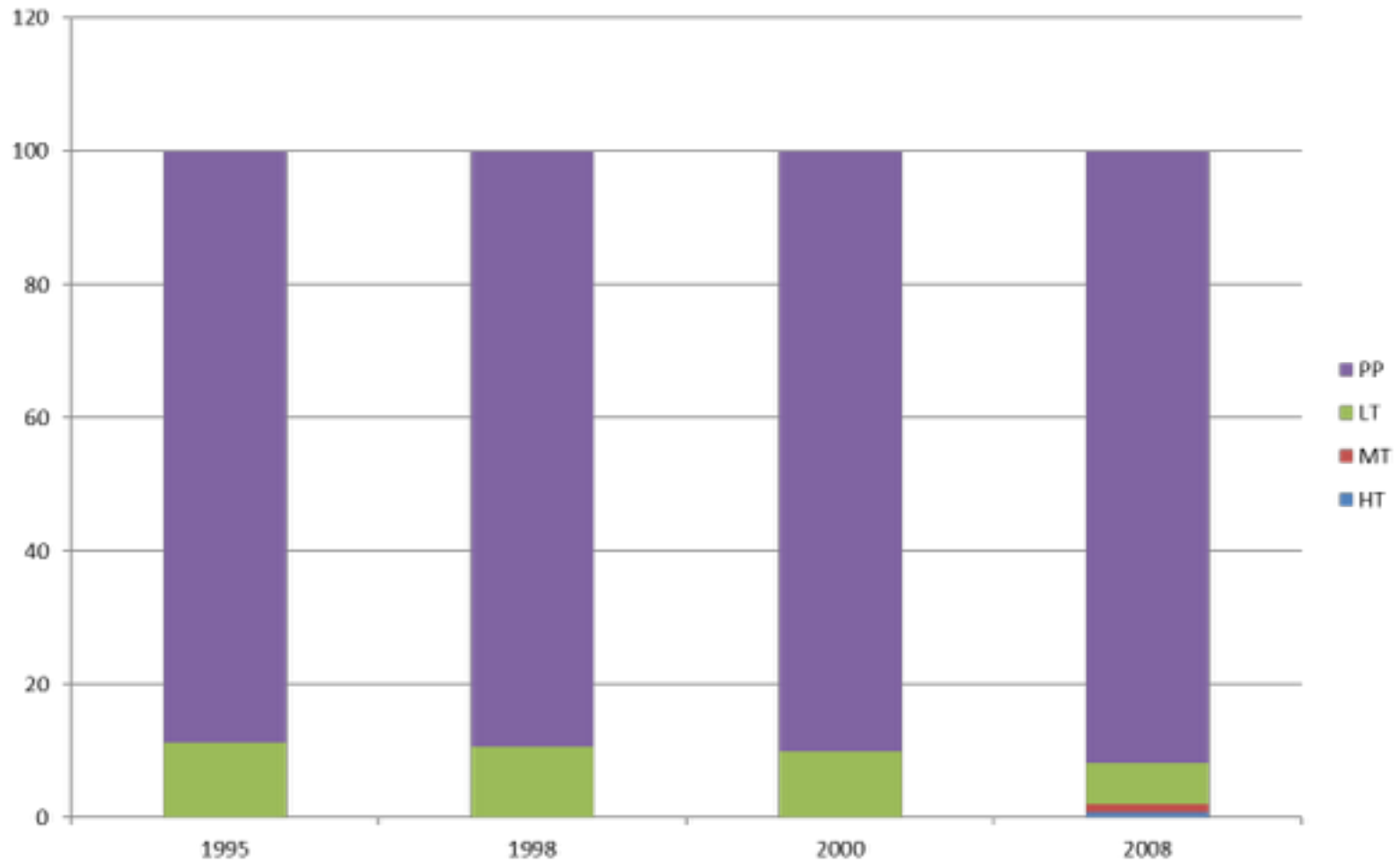
Lall Classification. PP = Primary Products. LT = low-technology manufactures. MT = Medium-technology manufactures. HT = High-technology manufactures.

Exports Decomposition Mozambique: increasing sophistication in Primary sector



Lall Classification. PP = Primary Products. LT = low-technology manufactures. MT = Medium-technology manufactures. HT = High-technology manufactures.

Exports Decomposition: Ethiopia



Lall Classification. PP = Primary Products. LT = low-technology manufactures. MT = Medium-technology manufactures. HT = High-technology manufactures.

Strategic Trade Integration

The Right Policy Mix

Encourage entrepreneurship and **investment in new activities (discovery)**

- Increase the private returns to innovation (ex ante) but also push out unproductive firms to avoid moral hazard (ex post)
- Public sector credit or guarantees that operate by transferring part of the risk of failure to the government better than trade protection

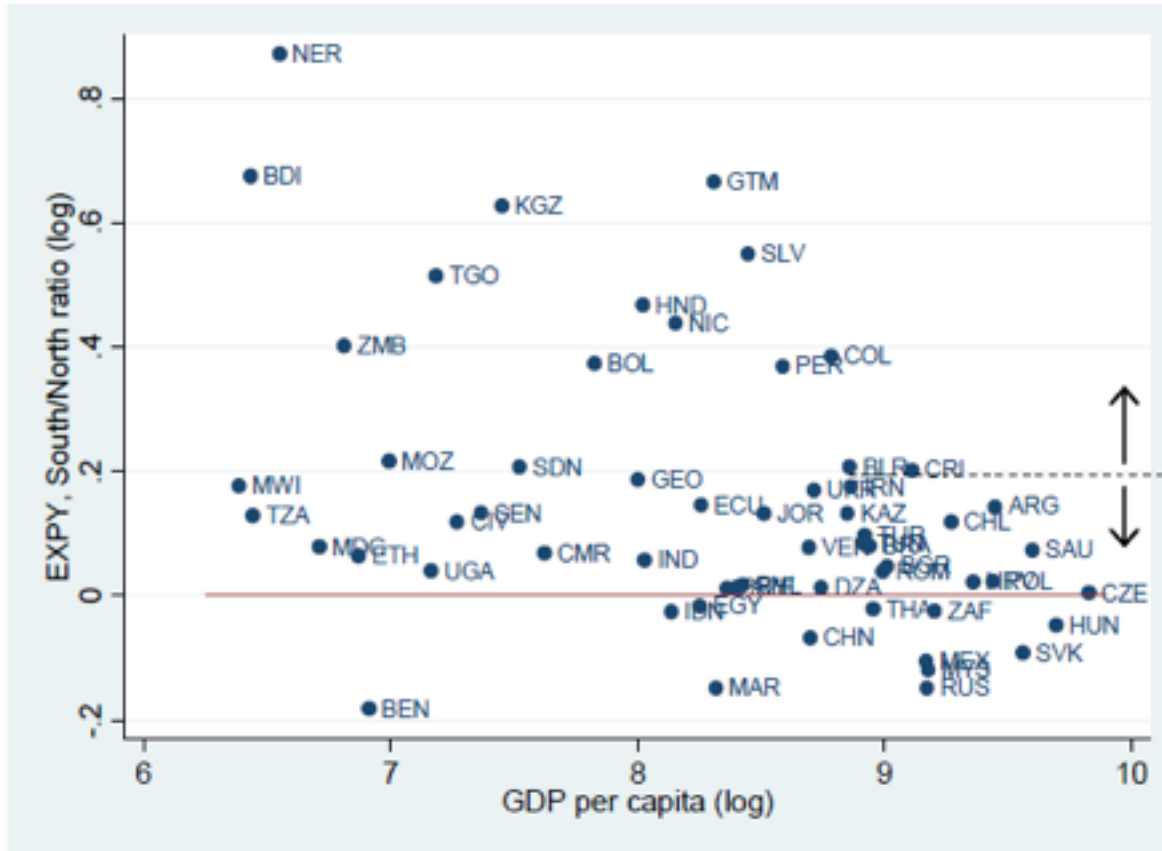
Exchange rate policies (it *depends*...):

- For many poor countries an over-evaluated exchange rate reduces exports and hinder development (especially if NR-abundant)
- But for more advanced DEEs the maintenance of a chronically undervalued exchange rate slows the movement of resources into more technologically sophisticated activities and weakens the incentive to move up the technological ladder

Choosing the "right" trade partners (more on this later)

One step back...

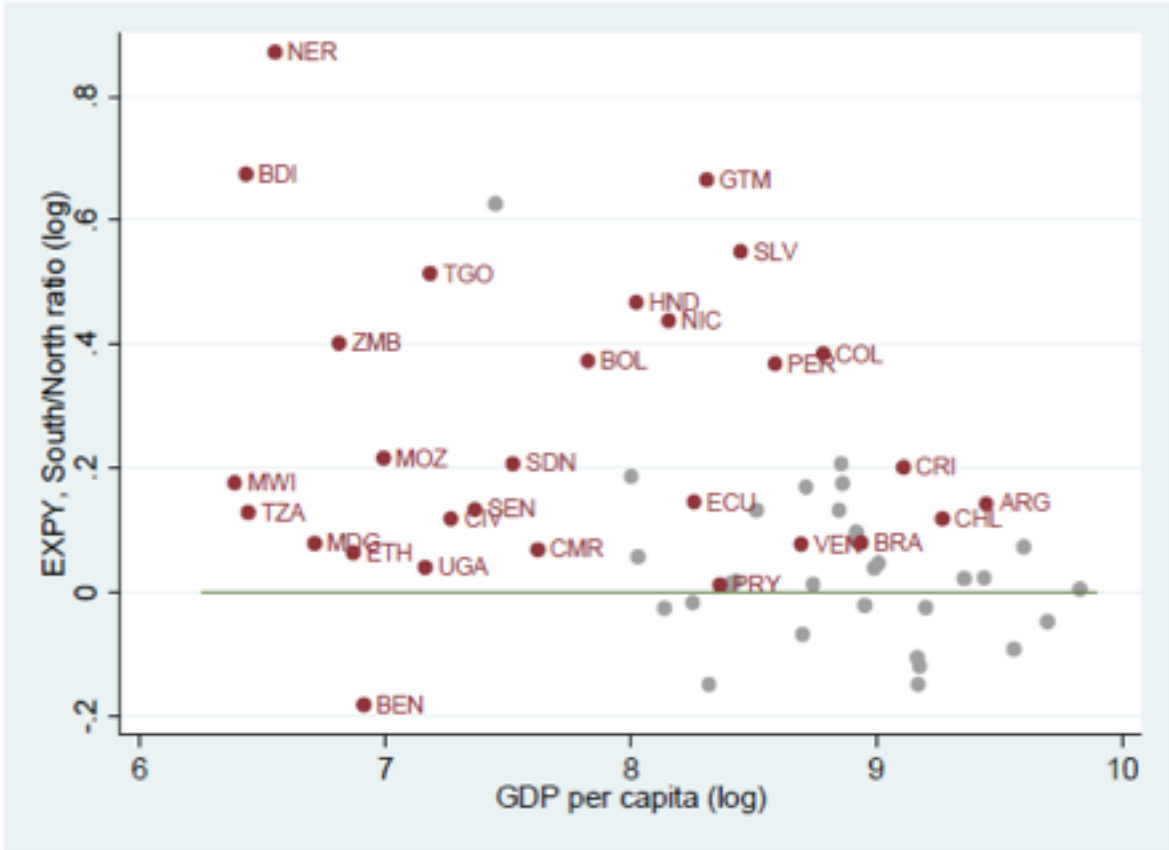
The sophistication gap is higher the poorer you are!



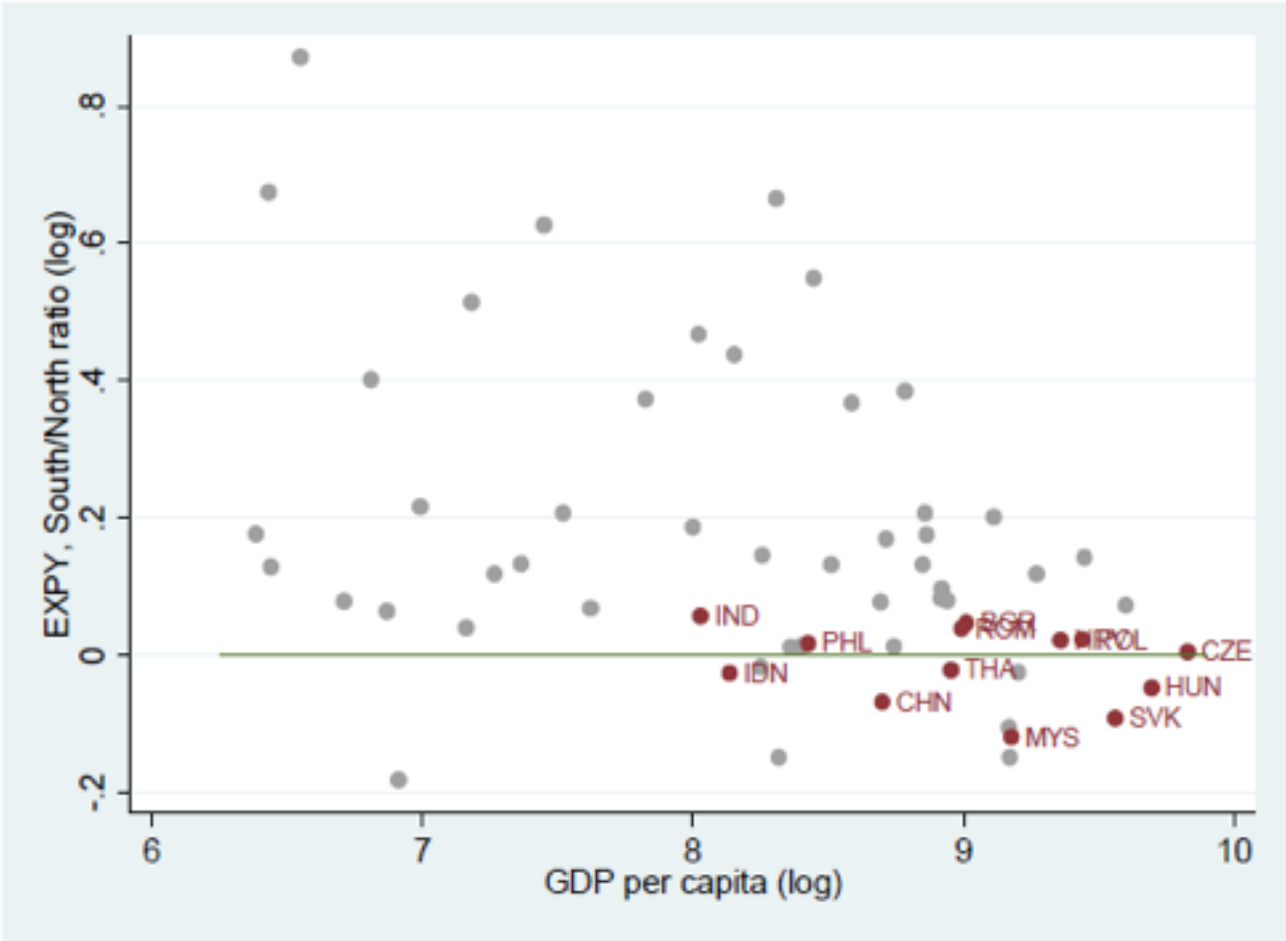
Exports to the South are more sophisticated than exports to the North

Exports to the North are more sophisticated than exports to the South

Africa and Latin America

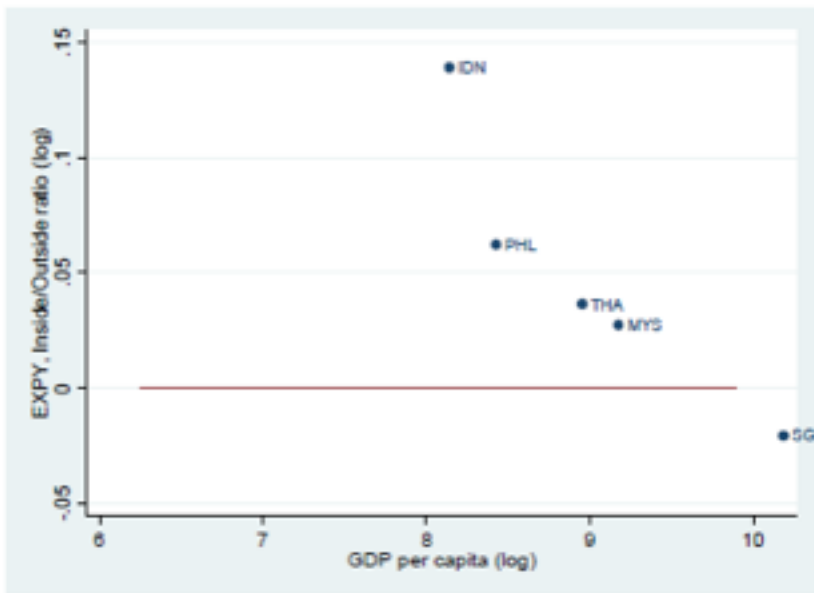


Asia and Europe

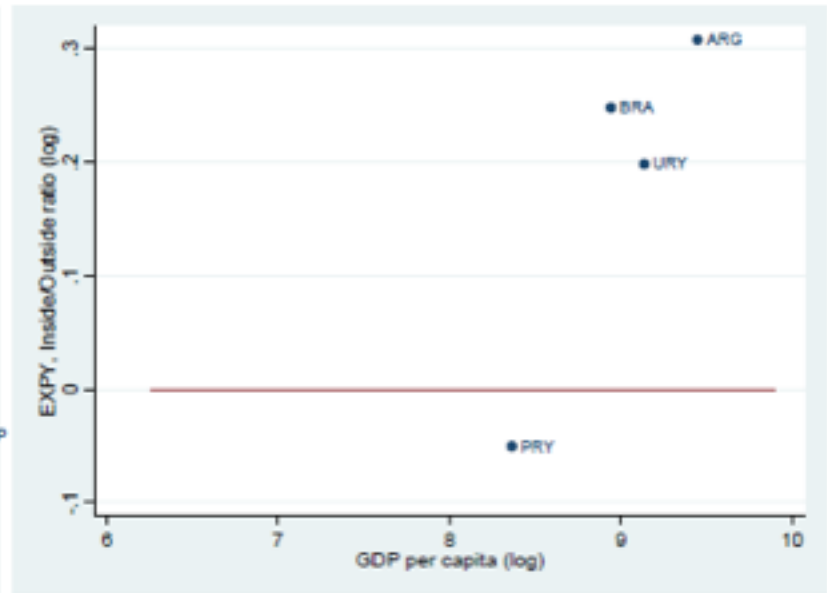


Trade blocs seem to work...

ASEAN

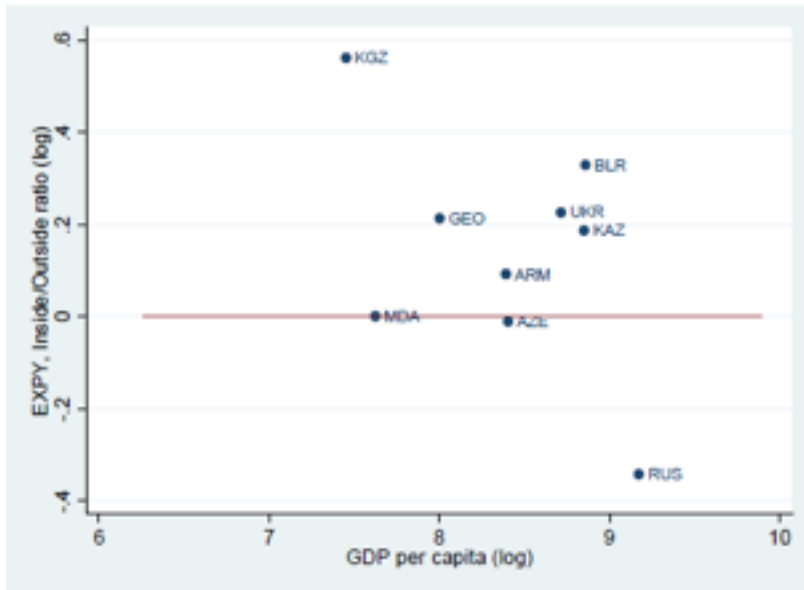


MERCOSUR



Trade blocs seem to work...[continued]

CIS



CARICOM

