



# **CREATING OPTIONS AND COMPETENCES FOR PRODUCTIVE TRANSFORMATION: A LEARNING STRATEGY**

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Boosting economic dynamics and job growth:  
the potential of industrial policies



# PRODUCTIVE TRANSFORMATION, SOCIAL CAPABILITIES AND PRODUCTIVE JOBS

- Productive jobs are the foundation for productive employment
- Jobs are created in the real economy through investment in productive capacities and productive transformation
- The dynamics of productive transformation and patterns of structural change determine
  - productivity growth
  - the job-content of growth and
  - the nature and developmental value of jobs created in the economy
  - employment patterns
- Social capabilities define the space and boundaries for productive transformation and job growth

# A DYNAMIC FRAMEWORK OF ECONOMIC DEVELOPMENT (CATCHING UP)



**Global product and technology space**

## **Capabilities**

Determine the feasible set of new products and services for diversification; technologies it may adopt

## **Productive Capacities**

What a country can produce given its existing production factors, infrastructure, technology



# A DYNAMIC FRAMEWORK OF ECONOMIC DEVELOPMENT - CAPABILITIES

Capabilities drive economic dynamics and catching up paths in two ways:

1. Determine feasible options for productive transformation and diversification
  - Products and economic activities that may be developed
  - Technologies that may be imitated
2. Define a country's competences to take advantage of options and to translate them into investment and productive capacities

# A KNOWLEDGE-BASED CONCEPT OF CAPABILITIES



WHAT ARE CAPABILITIES AND WHERE DO THEY RESIDE?

- Capabilities for productive transformation are a collective phenomena, they exist at the level of enterprises, value chains, labour force and society, not at the level of individuals
- Capabilities exist in the knowledge sphere and in distinct collective forms of knowledge, not in the production (material) sphere

# A KNOWLEDGE-BASED CONCEPT OF CAPABILITIES



- Knowledge structures shape the option space – the specific knowledge mix, variety and complexity of knowledge existing in teams of enterprises, in the labour force, in society.
  - Knowledge structures are shaped by (explicit knowledge):
    - Cultural knowledge acquired in social networks (families, communities etc.)
    - **Formal knowledge taught in formal education and training**
    - Technical and commercial knowledge accumulated in the world of work, industries.
- Procedures or «knowing how to do» shape competences - reflected in formal and informal institutions and in the technological, managerial, organisational, knowledge creating and coordinating routines of enterprises. High performance is based on «smart» procedures.
  - Competences are acquired in a process of experience, observation, imitation, practice and learning by doing (tacit knowledge).

# EDUCATION STRUCTURE AS A DETERMINANT OF THE PRODUCTIVE STRUCTURE

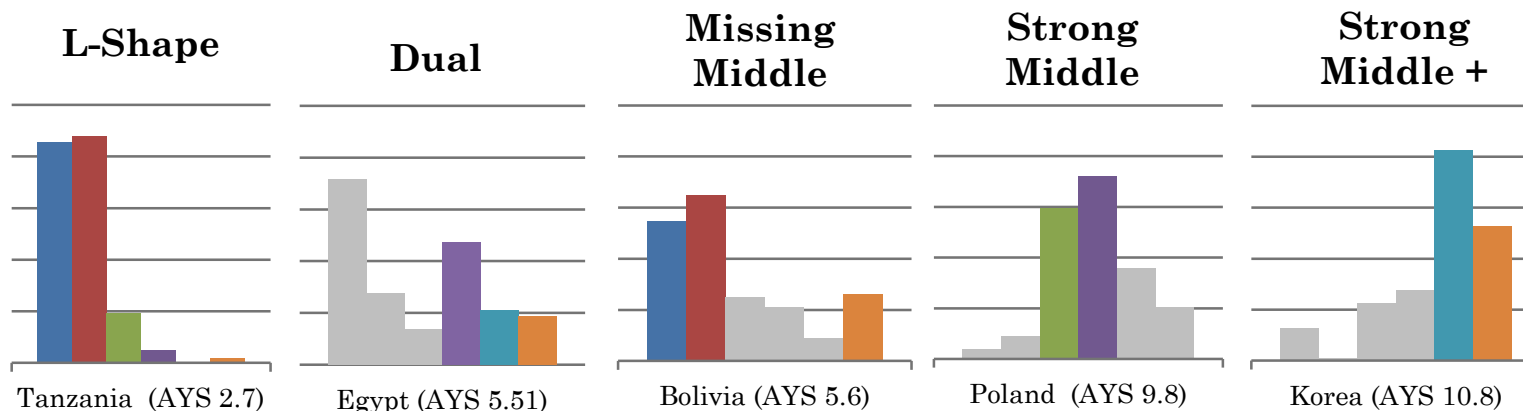


- Methodologies are needed to
  - assess social capabilities in a country context
  - inform policy makers of the options space and competences embodied in country-specific knowledge structures, institutions and routines
  - analyze how these options and competences can be improved by policies
- Formal education and schooling are an important determinant of a society's knowledge base
- Education structure shapes options and boundaries for productive transformation and job growth



# A TYPOLOGY OF EDUCATION STRUCTURES

- Described by the share of labour force (15+) with «no schooling», incomplete primary, complete primary, lower, upper and post-secondary education as highest education level achieved (Barro-Lee data base 2000)
- Sorting the six categories in increasing order identifies four basic education structures: *L-Shape*, *Dual*, *Missing Middle* and *Strong Middle*





# COUNTRIES BY EDUCATION STRUCTURE

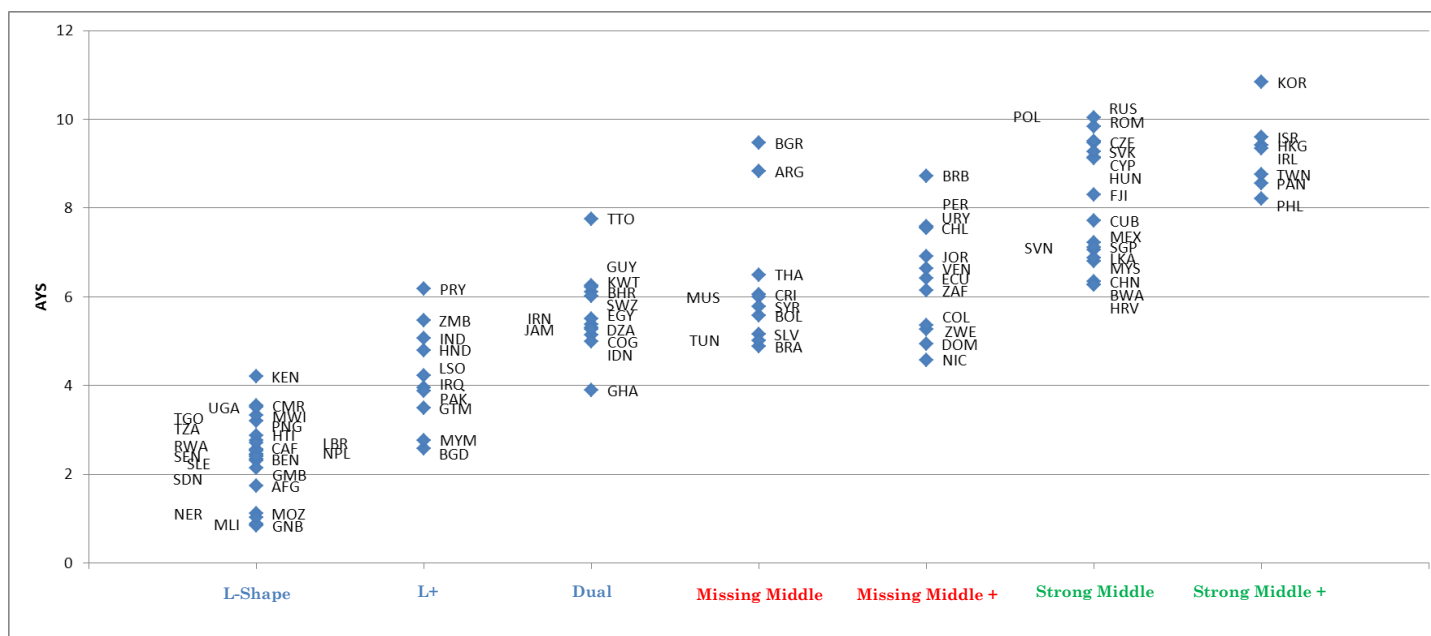


		Missing Half	Missing Middle		Strong Middle	
L	L+	Dual	MM	MM+	SM	SM+
Afghanistan	Bangladesh	Algeria	Argentina	Barbados	Botswana	Hong Kong
Benin	Guatemala	Bahrain	Bolivia	Chile	China	Ireland
Cameroon	Honduras	Congo	Brazil	Colombia	Croatia	Israel
Central African Rep.	India	Egypt	Bulgaria	Dominican Rep.	Cuba	Korea
Congo, Dem. Rep.	Iraq	Ghana	Costa Rica	Ecuador	Cyprus	Panama
Gambia	Lesotho	Guyana	El Salvador	Jordan	Czech Rep.	Philippines
Guinea-Bissau	Myanmar	Indonesia	Mauritius	Nicaragua	Fiji	Taiwan
Haiti	Pakistan	Iran	Syria	Peru	Hungary	
Kenya	Paraguay	Jamaica	Thailand	South Africa	Malaysia	
Liberia	Zambia	Kuwait		Uruguay	Mexico	
Malawi		Swaziland		Venezuela	Poland	
Mali		Trinidad and Tobago		Zimbabwe	Romania	
Mozambique		Tunisia			Singapore	
Nepal					Slovakia	
Niger					Slovenia	
Papua New Guinea					Sri Lanka	
Rwanda						
Senegal						
Sierra Leone						
Sudan						
Tanzania						
Togo						
Uganda						

# EDUCATION STRUCTURES AND EDUCATION LEVELS



- Different education structures demonstrate different aggregate levels of education (measured by Average Years of Schooling, AYS)
- Sorting education structures by AYS shows:
  - Lowest AYS in L-Shape (2.43 AYS), L+ (4.42 AYS), Dual (5.65 AYS) and Missing Middle (MM and MM+ combined 6.40 AYS)
  - Highest AYS in Strong Middle (SM and SM+ combined 8.38 AYS)
- Large variety of AYS within each educational category





# EDUCATION STRUCTURE AND PRODUCTIVE TRANSFORMATION

- We measure productive transformation by two indicators:
  - Share of manufacturing in total merchandise exports (SMME) (World Bank, 2012)
  - Industrial-cum-Technological Advance index (ITA) (UNIDO, 2005)
- SMME data is used for the year 2002\*
- The ITA index provides data for 2002
- The education data is used for the year 2000.

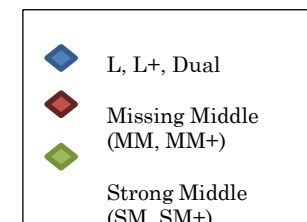
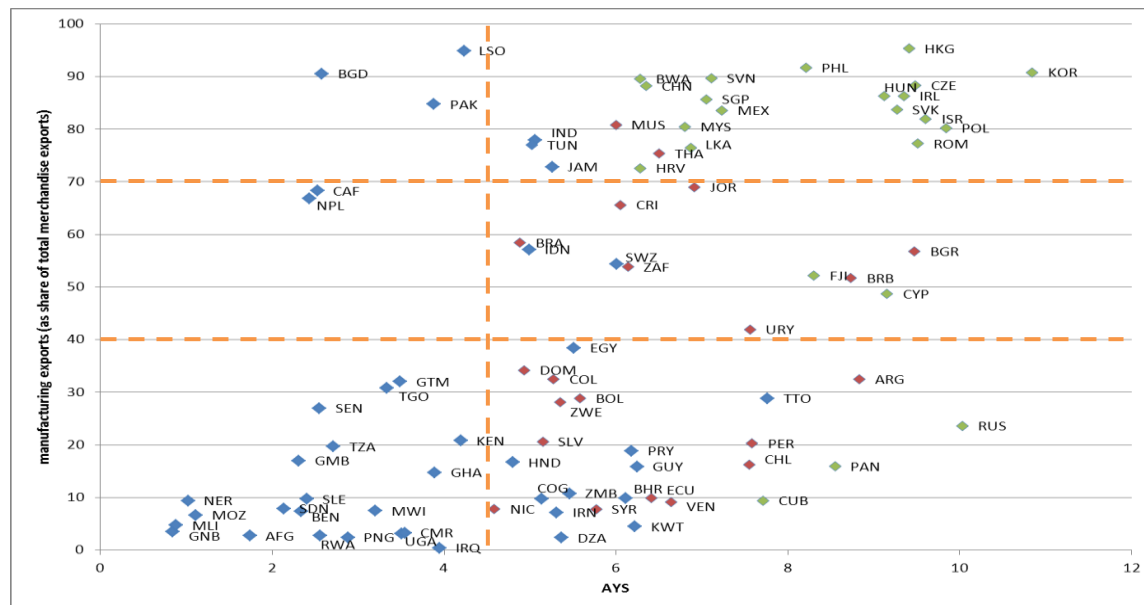
\* +/- 5 years for those countries where no 2002 data was available

# EDUCATION AND MANUFACTURING EXPORTS PERFORMANCE (INDICATOR 1)



Education levels cannot explain export performance in manufacturing:

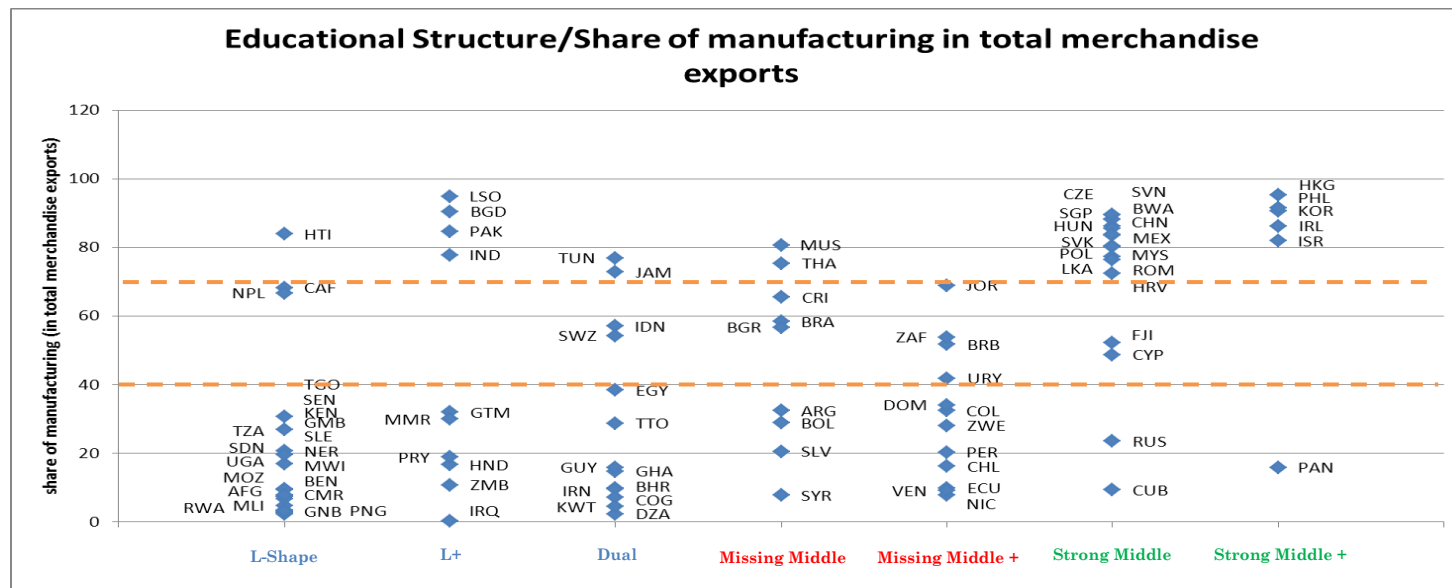
- Similar levels of education result in very different shares of manufacturing
- Two thresholds for SMME:
  - < 40 – low performers, largest cluster, low density -widely ;
  - > 70: high performers, dense cluster;
  - 40-70: only few countries fall into this middle range.
- AYS = 4.5 distinguishes mainly the LDCs from non-LDCs
- Question: What translates education into higher shares of manufacturing exports?



# EDUCATION STRUCTURE AND MANUFACTURING EXPORTS PERFORMANCE



- Strong middle education structures (SM, SM+) show highest performance in manufacturing exports (SMME>70) for most countries. 4 exceptions are small countries.
- Only few countries with non-SM educational structures achieve such high levels, mainly in L+ structure (countries export mainly textile and garment)
- All non-SM structures show most countries below 40 percent SMME.
- Dual and MM structures dominate the middle range between 40 and 70 percent.
- Export performance independent of AYS also within each of the educational groups (see coloured data points on slide 12 –green for SM, red for MM).





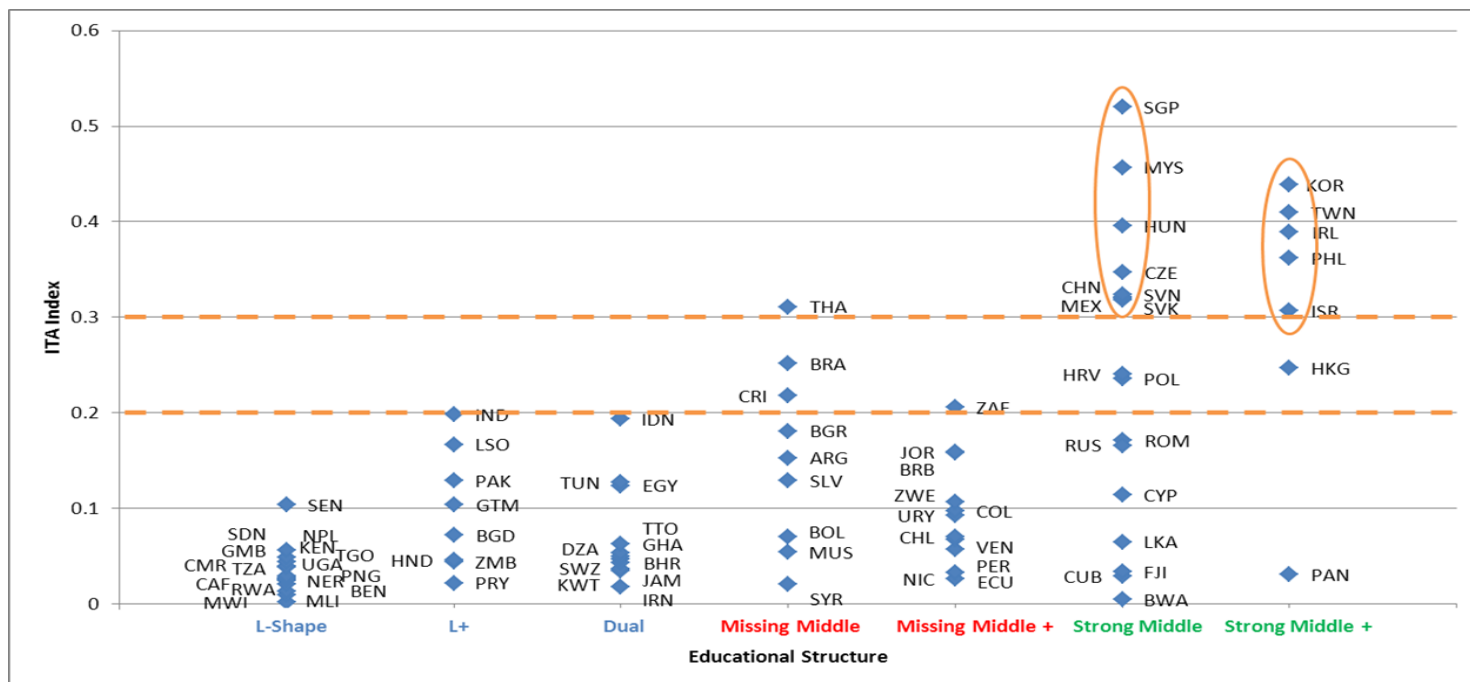
# EDUCATION STRUCTURE AND PRODUCTIVE TRANSFORMATION: INDICATOR 2

- Productive transformation is reflected in the size of industries and manufacturing as well as by the technological level achieved in an economy.
- The Industrial-cum-Technological Advance index (ITA) integrates level of industrial and technological development
- The index is composed of
  - Level of industrial activity: industrial output per capita and manufactured exports per capita
  - Industrial Advancement Index (IAI): shares of manufacturing in total production and in total exports (value 0-1)
  - Technological Advancement Index (TAI): shares of medium and high technology goods in manufacturing production and in manufacturing exports (value 0-1)
- ITA ranges between 0 (lowest) and 1 (highest)

# EDUCATION STRUCTURES AND OPTIONS FOR PRODUCTIVE TRANSFORMATION



- ITA index confirms previous findings
- SM countries achieve highest ITA index: ITA values >0.3
- SM <0.3 are mainly small and transition countries
- Such high ITA index cannot be achieved by MM countries (exc. Thailand)
- L, L+ and Dual education structures cannot translate into ITA >0.2. Very narrow boundaries and options for productive transformation



# THE PATTERN OF PRODUCTIVE TRANSFORMATION



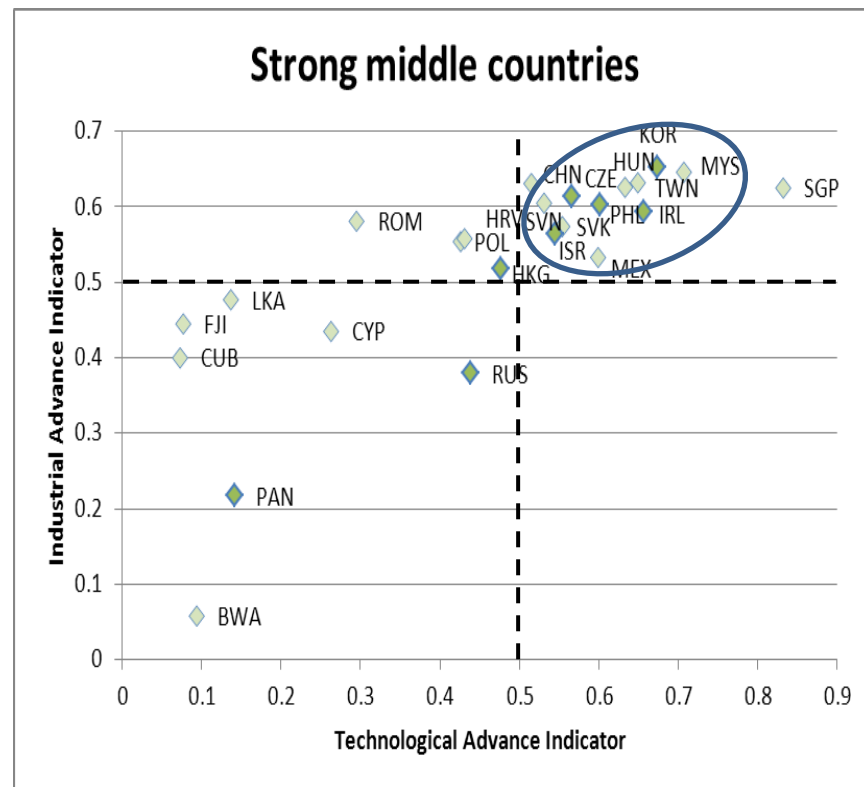
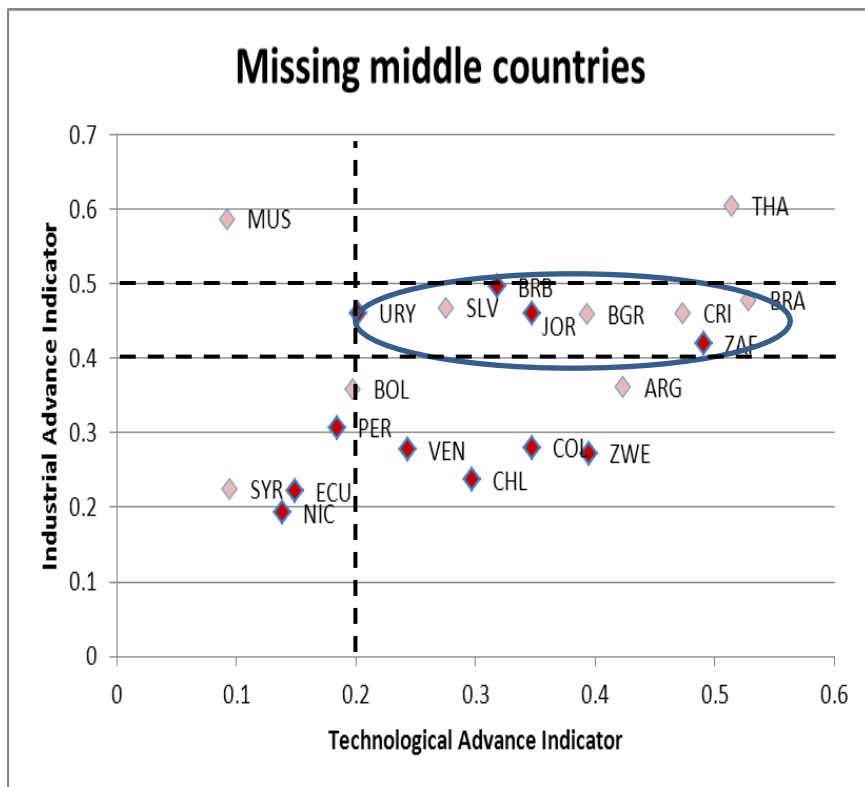
- Countries differ in the patterns of productive transformation
- Transformation patterns measured by two dimensions of ITA index:
  - Industrial advancement index (IAI): shares of manufacturing in production and export
  - Technological advancement index (TAI): shares of medium and high technology goods within manufacturing sector (in production and exports)

Findings (see graphs on next slide with circles illustrating the pattern of transformation):

- Missing Middle education countries transform mainly by upgrading technological sophistication within manufacturing and increasing the share of medium and higher technology goods (value of TAI)
- Strong Middle education countries transform by simultaneously
  - expanding share of manufacturing in production and export (IAI value)
    - sectoral transformation
  - increasing the technological level within manufacturing (TAI value)
    - technological upgrading and diversification into increasingly complex products



# DISTINCT PATTERNS OF PRODUCTIVE TRANSFORMATION





## PRODUCTIVE TRANSFORMATION AND JOBS CREATION – THE MISSING MIDDLE (MM, MM+) COUNTRIES

**Highest performers** in ITA (0.2-0.3): both high level of TAI and IAI (Brasil, Costa Rica, South Africa, Thailand ) (IAI and TAI 0.4-0.6)

**Medium performers** in ITA (ITA 0.1-0.2): low range of IAI (0.38-0.5) but higher for TAI (0.28-0.43) (Bulgaria, Barbados, Jordan, Argentina, Slovenia). Catching up is led by technological advancement, very limited expansion of industrial sector.

**Low performers** in ITA (<0.1): similar low levels of IAI (0.2-0.3), but wide range of TAI (0.1-0.4): mainly Latin American countries. Low levels of industry, but enhance technologies to catch up.

Option space to increase technological levels within exiting industries higher than for expanding the share of manufacturing.

MM countries are suggested to have in particular options to create productive jobs by enhancing productivity in existing activities but less options to create new productive jobs by broadening the manufacturing base.

# PRODUCTIVE TRANSFORMATION AND JOBS CREATION – THE STRONG MIDDLE (SM, SM+) COUNTRIES



**Highest performers** in ITA (0.3-0.46): same range for both the IAI and the TAI (0.5 - 0.7) – for 12 countries, except for Singapore.

But: the levels of TAI and IAI much in SM than in MM countries.

This suggests that only SM structures allow countries to achieve highest dynamics in productive transformation.

**Medium performers** (ITA 0.18-0.25): IAI (0.5-0.6) > TAI (0.3-0.5) for all countries (Romania, Poland, Croatia, Hongkong).

This suggests that catching up is lead by expanding manufacturing activities which is followed by increasing technological level.

**Low performers:** ITA (0-1.1): IAI significantly > TAI (exc. Botswana).

Initial phase of transformation is driven by expansion of manufacturing at lowest technological levels.

Options space for increasing both the share of manufacturing and technological sophistication within manufacturing.

High options to combine productivity with jobs growth through technological progress and diversification.

# CONCLUSIONS AND POLICY IMPLICATIONS -1



- Countries even with similar levels of education may have very different education structures.
- Different education structures provide different options and boundaries for productive transformation and patterns of industrial and technological advancement.
- Strong middle education structures provide highest options for productive transformation and sustained economic dynamics.
- Missing middle education structures may contribute to countries falling into the middle income trap. But further research is needed.

## CONCLUSIONS AND POLICY IMPLICATIONS -2



- The challenge in a catching up context is to transform the social knowledge base in a way that rapidly enlarges the options for productive transformation and creation of productive jobs with high developmental value. (higher wages, steep learning curves, decent work).
- Education policies support productive transformation dynamics by shaping Strong Middle education structures in the labour force.
- Industrial policies support the economy in translating options into productive capacities and productive jobs. Different forms of industrial policies - investment, trade, technology, finance - to shape and accelerate economic dynamism in private sector.



## CONCLUSIONS AND POLICY IMPLICATIONS -3

- High performing transformation and catching up processes require a comprehensive learning strategy that creates
  - human capital (productive capacity) at the individual level for efficient use of technologies and to meet skills demand with supply
  - collective capabilities at the level of enterprises, industries, value chains, societies for wide option spaces and high performing competences to diversify into new products, economic activities and adopt advanced technologies.
- This challenges education, training and learning-by-doing policies to follow a two-pronged strategy – enhance collective capabilities (precedes productive transformation) and promote human capital (follows productive transformation – demand led).