



# Technology Classification for Tanzania Manufacturing: Opportunities and Challenges

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# Overview

## **1. Structural Change**

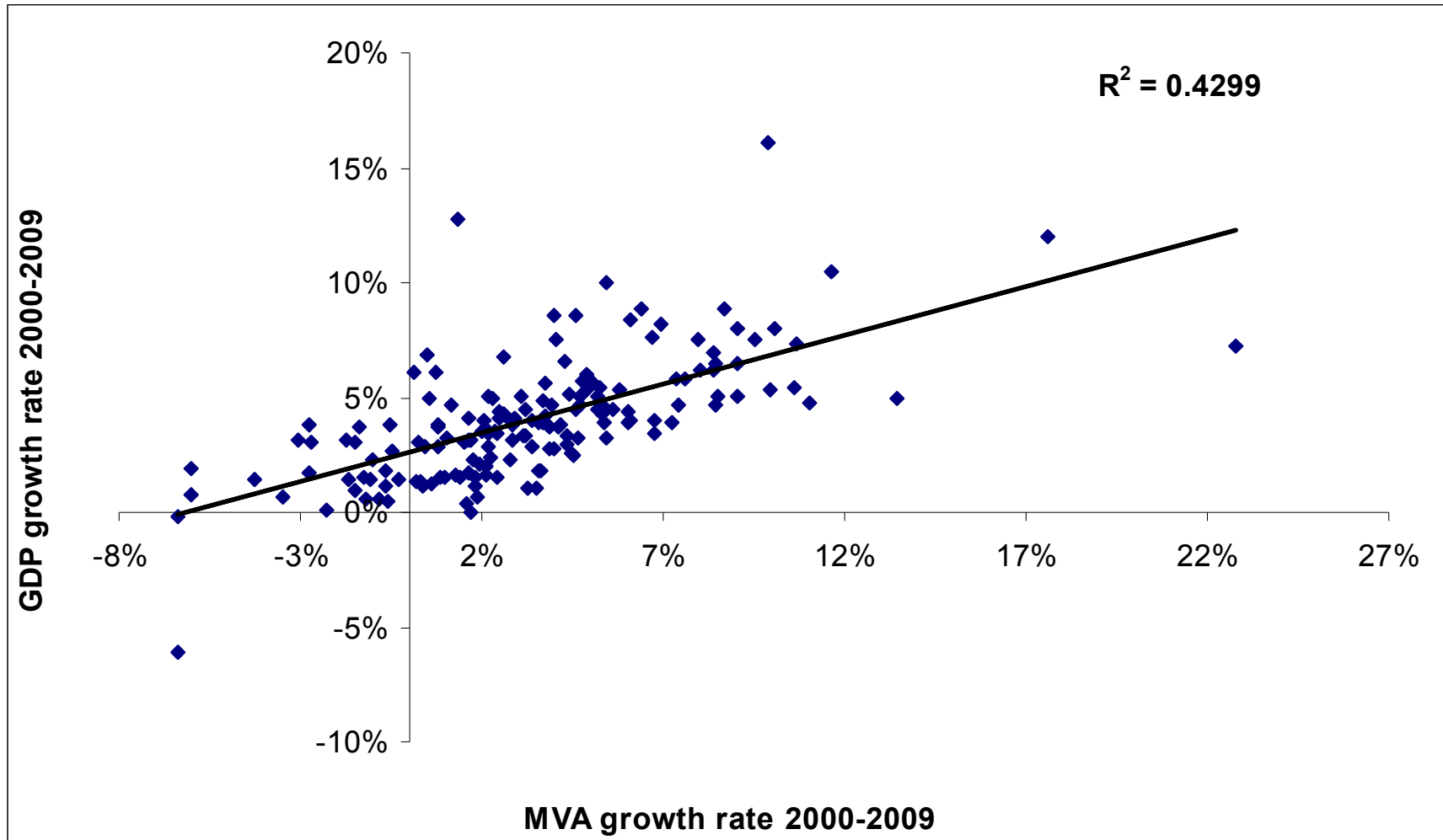
- 1. Why industrialization is important, and why technology is vital for industrial development**

## **2. Classification and Measurement**

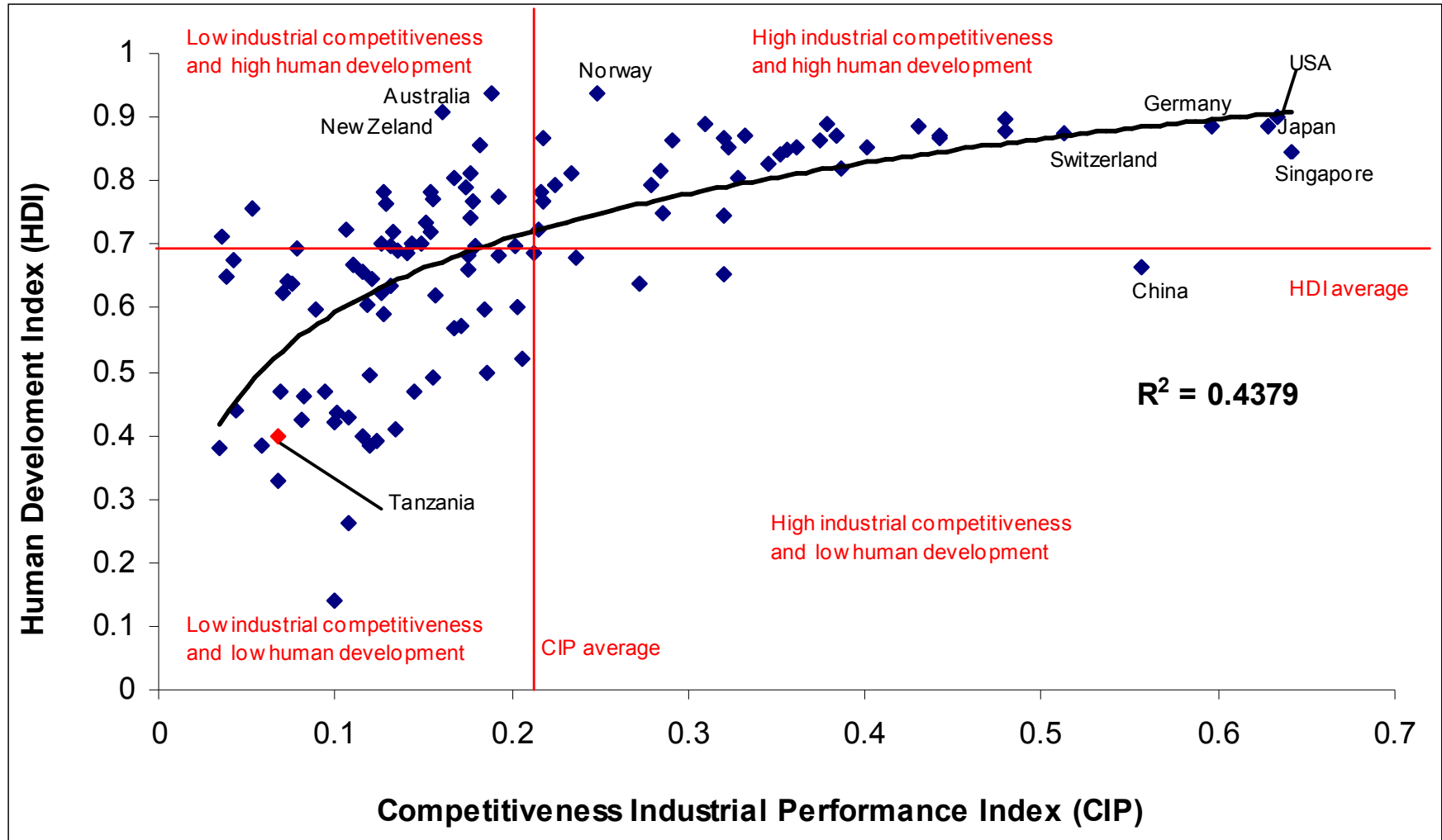
## **3. Measuring Technology in Tanzania**

## **4. Challenges and opportunities**

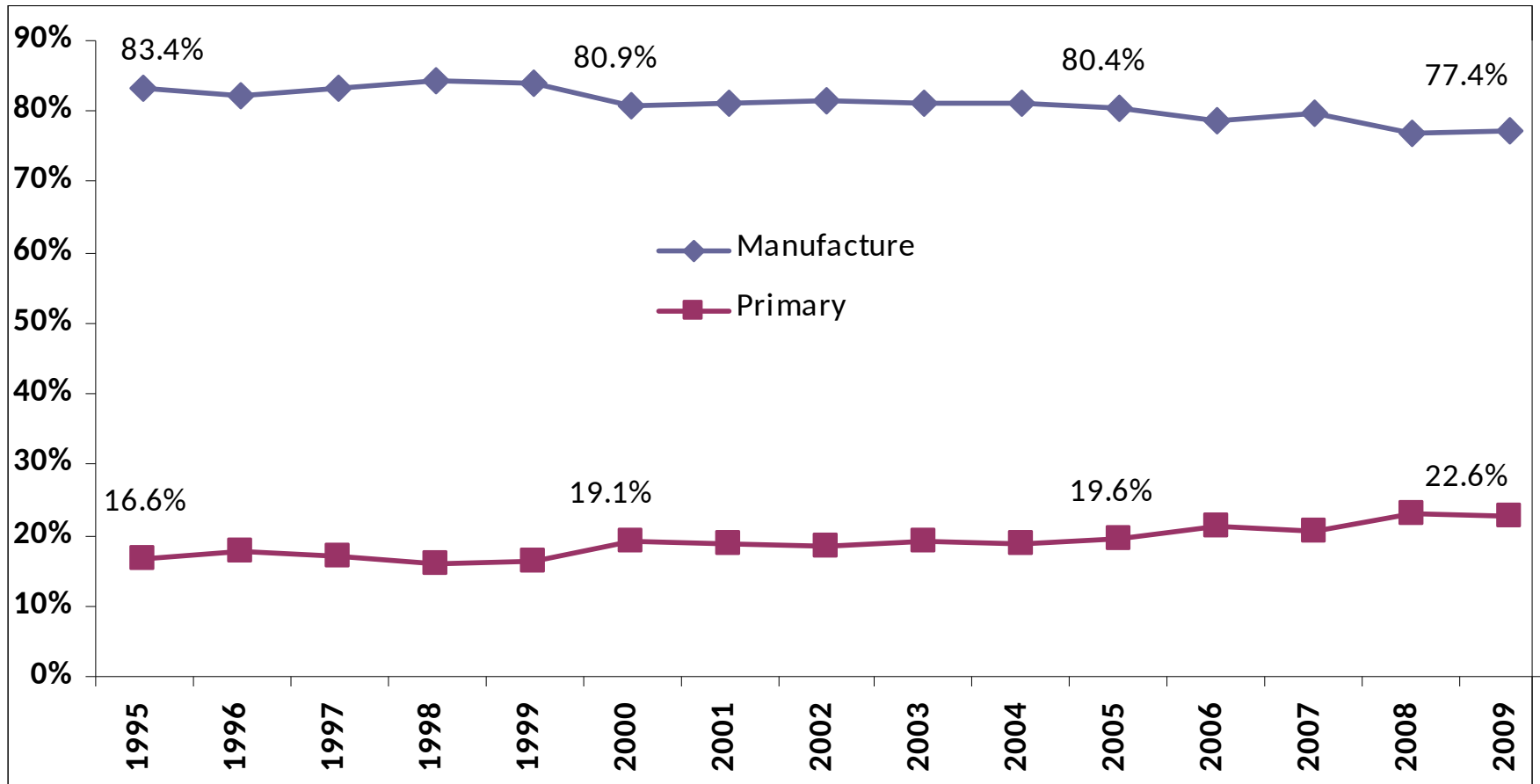
# Industrialization matters for economic growth



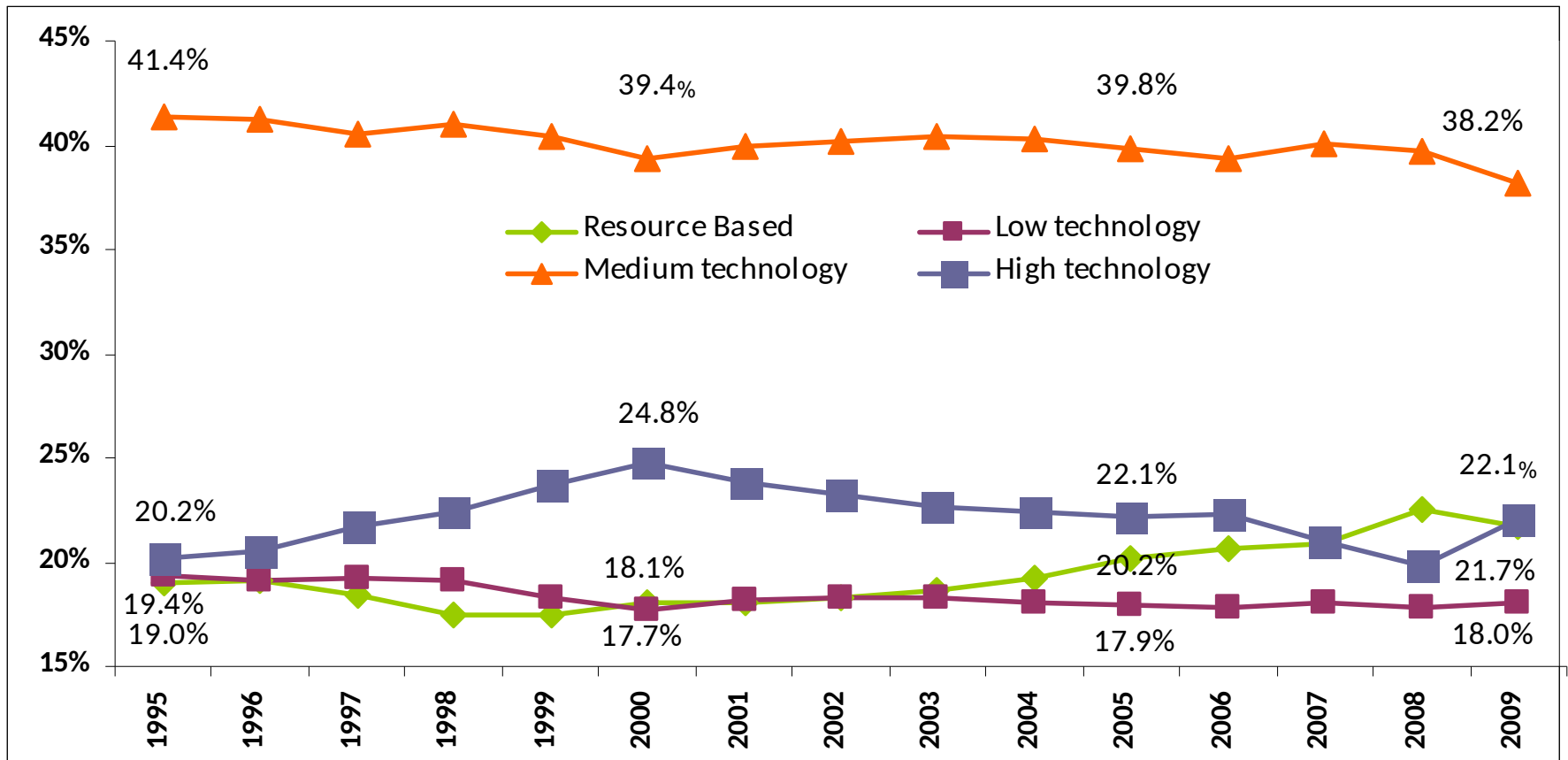
# Industrial Competitiveness matters for development



## Manufactures dominate world trade ...



# ...within manufactures, technology-intensive sectors





## **Technology matters for competitiveness**

- Export growth is correlated with technological intensity
- Technology sectors are not so much affected by declining prices of manufactured goods (mainly caused by China's increased presence in global manufacturing)
- Technology sectors have greater entry barriers, hence reducing the competitive pressures posed by emerging trading nations
- Technology sectors offer greater opportunities for innovation and learning

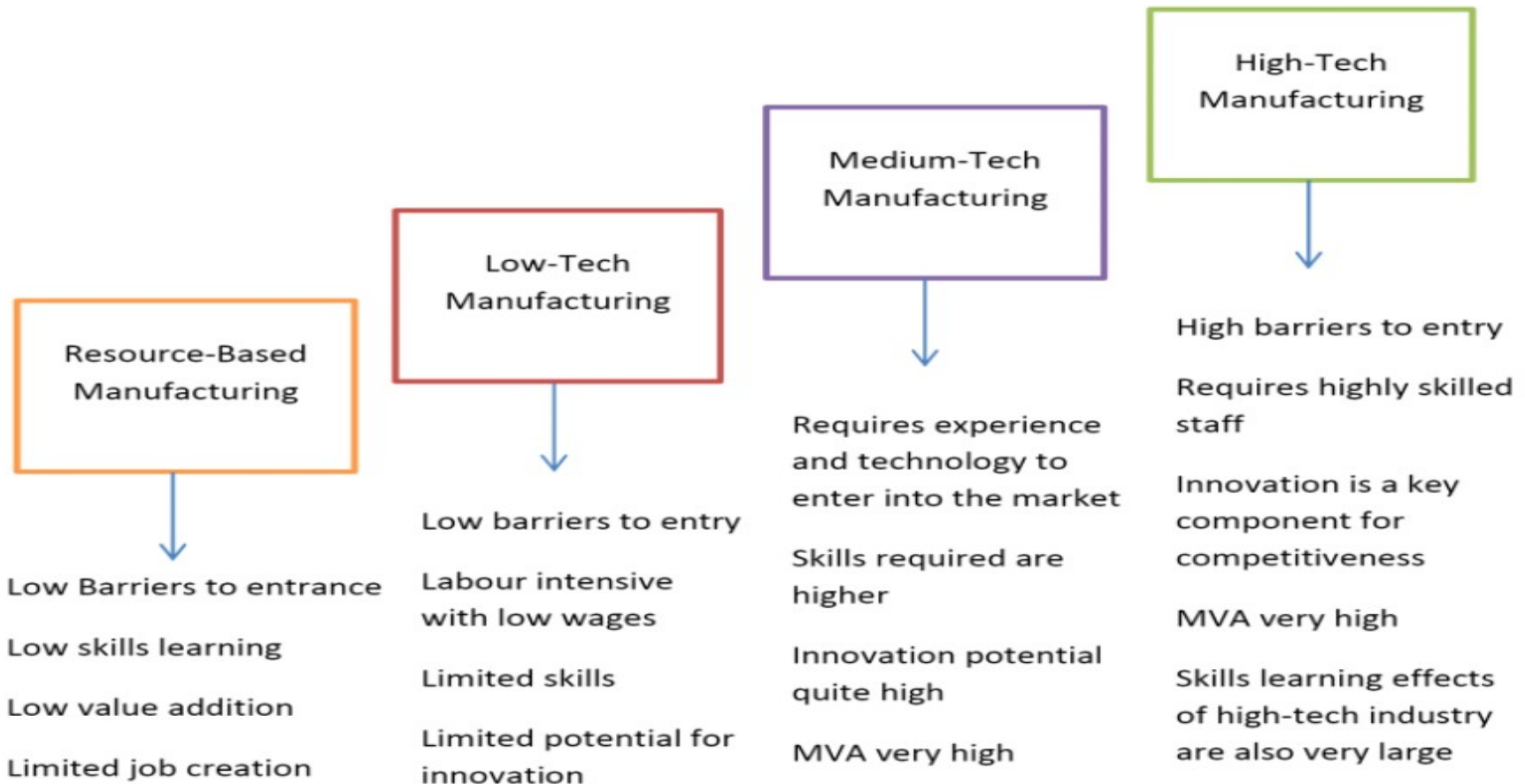
## So: industrialization needs **STRUCTURAL CHANGE**:

- First tier: from primary to manufacturing
- Second tier: within manufacturing towards:
  - ❖ High value-added and technologically sophisticated sectors;
  - ❖ High demand sectors;
  - ❖ Sectors less exposed to international competition;
  - ❖ etc.

**What a country exports matters!!**



# Levels of Structural Change



# Overview

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**2. Classification and Measurement**

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# How UNIDO Classifies Technology

- 1. We classify into 5 technology groups; Primary, Resource-based, Low-tech, Medium-tech and High-tech
- 2. These Classifications are made for both Trade and Manufacturing
- 3. This classification is based on internationally comparable data and the codification of publically available databases



# Why a measure of sophistication?

- Provides a broad picture of technology-intensity in world trade
- Show countries' trade upgrading efforts towards technology-intensive sectors
- It rightly emphasises that 'complex' sectors have significant spill-over effects, and greater prospects for learning and innovation

# It has been criticised because...

- It wrongly assumes that all products within each category have the same technological complexity
- It overlooks that trade sophistication can be achieved through intra-industry upgrading
- It therefore sends the wrong message to policy makers: competitiveness can only be achieved through industrial shift rather than sectoral improvements

# The Core Assumptions

- countries specialise in core competences
- Rich countries keep high value added products (proxy of sophistication) and processes while decentralising the others
- With increased costs, rich countries are likely to decentralise products with declining industrial margins
- Therefore, trade sophistication can be proxied through an income-related measure



## Two approaches to measure trade sophistication

- Haussman, Hwang and Rodrik (2005) => calculates the RCA-weighted GDP per capita of each product (PRODY), to then obtain the level of sophistication of a country's export basket (EXPY)
- Lall, Weiss and Zhang (2005) => calculates a WMS-weighted GDP per capita score as a measure of sophistication. The objective was to complement the technology classification to identify:
  - sophisticated activities in resource-based and low-tech manufactures,
  - unsophisticated activities in medium- and high-tech manufactures

## Methodology of Lall's approach

- All countries classified in 10 groups according to their income level
- For each product WMS are calculated for the 10 groups
- The group's average income is used as 'multiplier'
- Each products gets a 'unique score', which is obtained through adding up all groups' individual scores
- The higher the WMS by rich income group the higher the product sophistication

## 542. Radioactive and associated material

Reporter Name	WMS	Average group income	Score
Income group 1	57.07%	32,751	18,690.63
Income group 2	34.89%	24,832	8,664.65
Income group 3	0.63%	15,284	95.95
Income group 4	2.38%	9,902	235.32
Income group 5	0.04%	7,152	2.58
Income group 6	4.93%	5,204	256.82
Income group 7	0.06%	3,296	2.01
Income group 8	0.00%	2,026	0.01
Income group 9	0.00%	1,353	0.01
Income group 10	0.00%	788	0.01

**Final sophistication score**



**27,948.0**



Low

Medium

High

831. Trunks, cases, etc

785. Motorcycles & cycles

764. Telecomm equipment, etc

Sophistication

-

+

0,960

8312. Trunks & Suitcases

14,812

7852. Cycles not motorized

20,887

7642. Micro & speakers

22,705

8311. Handbags

22,834

7853. Invalid Carriages

22,008

7643. Radio/TV apparatus

24,573

8312. Special purpose cases

25,869

7851. Motor cycles

27,032

7648. Telecom equipment nes

# Classification of Trade Product Groups

- Agreed Classifications of technology levels exist for different databases
- Normally use the SITC rev 3.
- All 259 product groupings at the three digit level are classified
- Data is reported by national customs authorities and is collected by UN Comtrade

# Classification of Trade Product Groups

Product	Tech class\	Product	Product Name		
001	A	001	Live animals except fish	Primary	PRIMARY
016	B	016	Meat/offal preserved	Resource based 1: Agro based	RESOURCE BASED
287	C	287	Base metal ore/conc nes	RB 2: other RB	
612	D	612	Leather manufactures	Low technology 1: Fashion cluster	LOW TECH
642	E	642	Cut paper/board/articles	LT 2: other LT	
784	F	784	Motor veh parts/access	Medium Technology: MT 1 automotive	MEDIUM TECH
266	G	266	Synthetic spinning fibre	MT 2: Process	
884	H	884	Optical fibres	MT3 Engineering	HI-TECH
752	I	752	Computer equipment	HT 1: electrical and electronics	
542	J	542	Medicaments include vet	HT 2: other HT	OTHER
896	K	896	Art/collections/antiques	Other transactions	



# Classification of Industrial Activity

- Agreed classifications exist for technology in ISIC.
- Data is collected by survey, and is available through UNIDO's Instat database, or data for Tanzania can be found in the ASIP reports.

# Classification of Industrial Activity

ISIC Code	Technology classification	Activity
241	MHT	241 Basic chemicals
151	RB	151 Processed meat, fish, fruit, vegetables, fats
1520	RB	1520 Dairy products
191	LT	191 Tanning, dressing and processing of leather
1920	LT	1920 Footwear
2010	RB	2010 Sawmilling and planing of wood
2230	OTHER	2230 Reproduction of recorded media
2310	LT	2310 Coke oven products
2320	RB	2320 Refined petroleum products
2710	MHT	2710 Basic iron and steel
2720	RB	2720 Basic precious and non-ferrous metals
273	RB	273 Casting of metals
331	MHT	331 Medical, measuring, testing appliances, etc.
3320	MHT	3320 Optical instruments & photographic equipment
3330	MHT	3330 Watches and clocks
3410	MHT	3410 Motor vehicles
3610	LT	3610 Furniture

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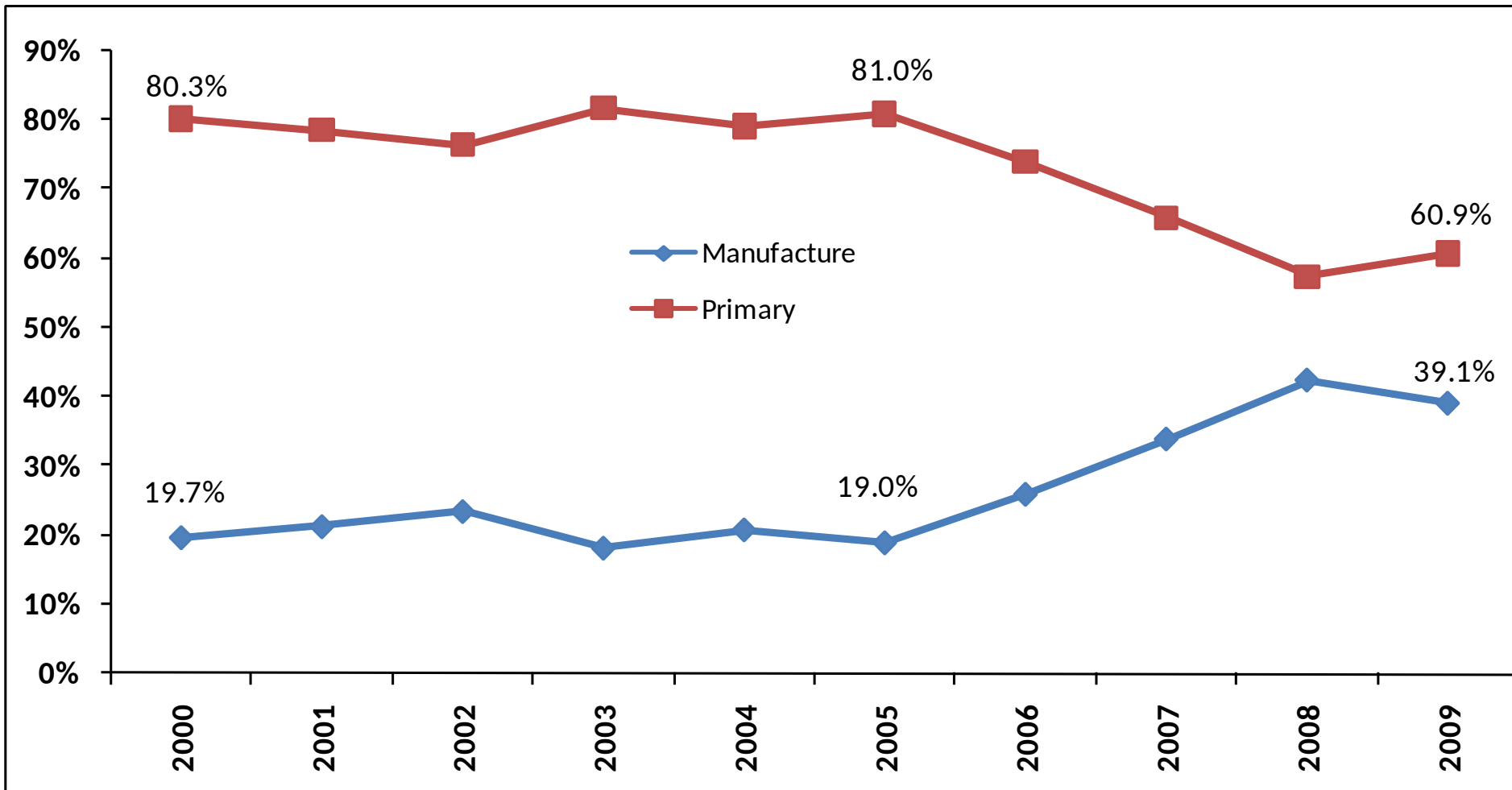
## **2. Classification and Measurement**

## **3. Measuring Technology in Tanzania**

Classifications in practice: Tanzania and Technology

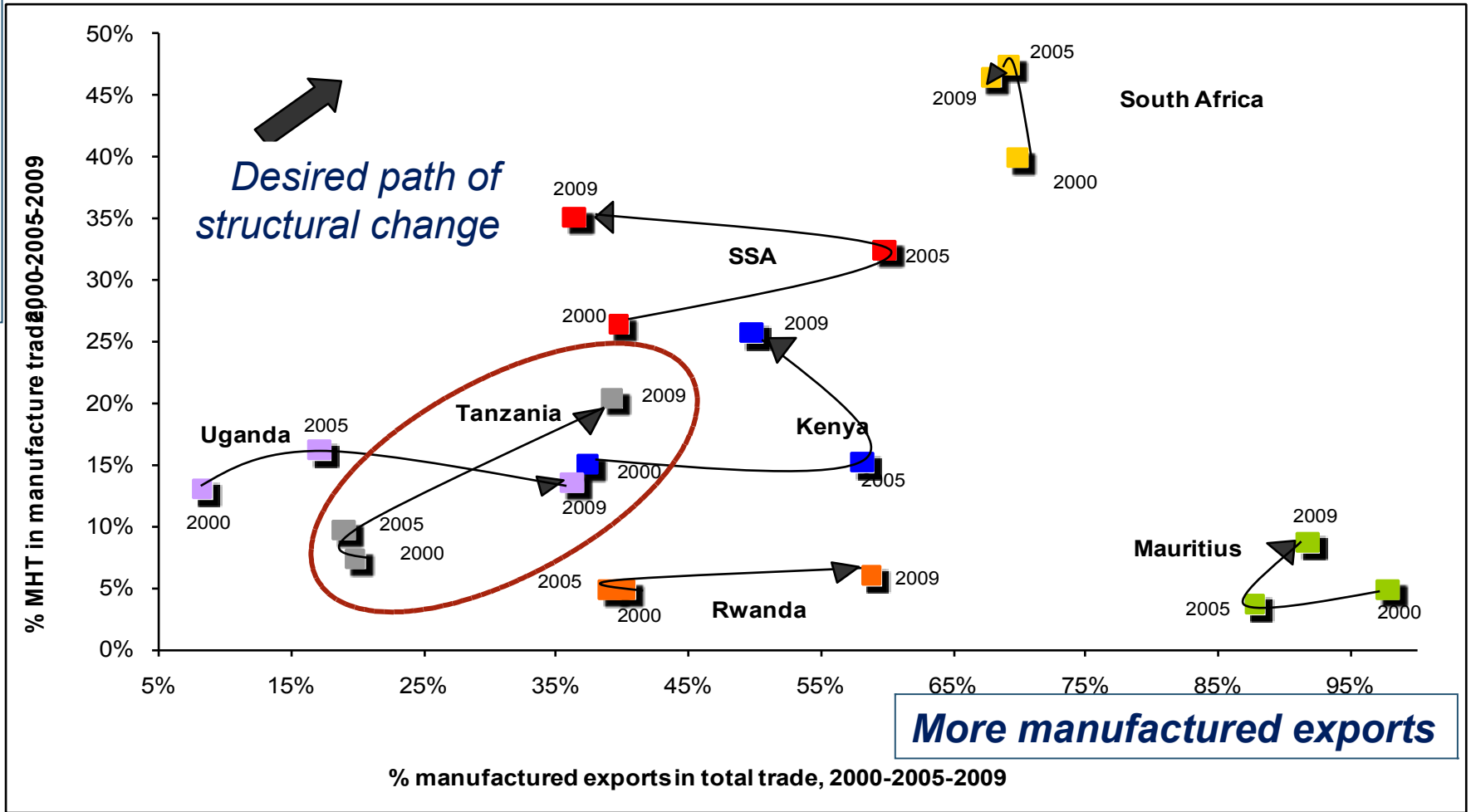
## **4. Challenges and opportunities**

# Primary products still dominate Tanzania's trade

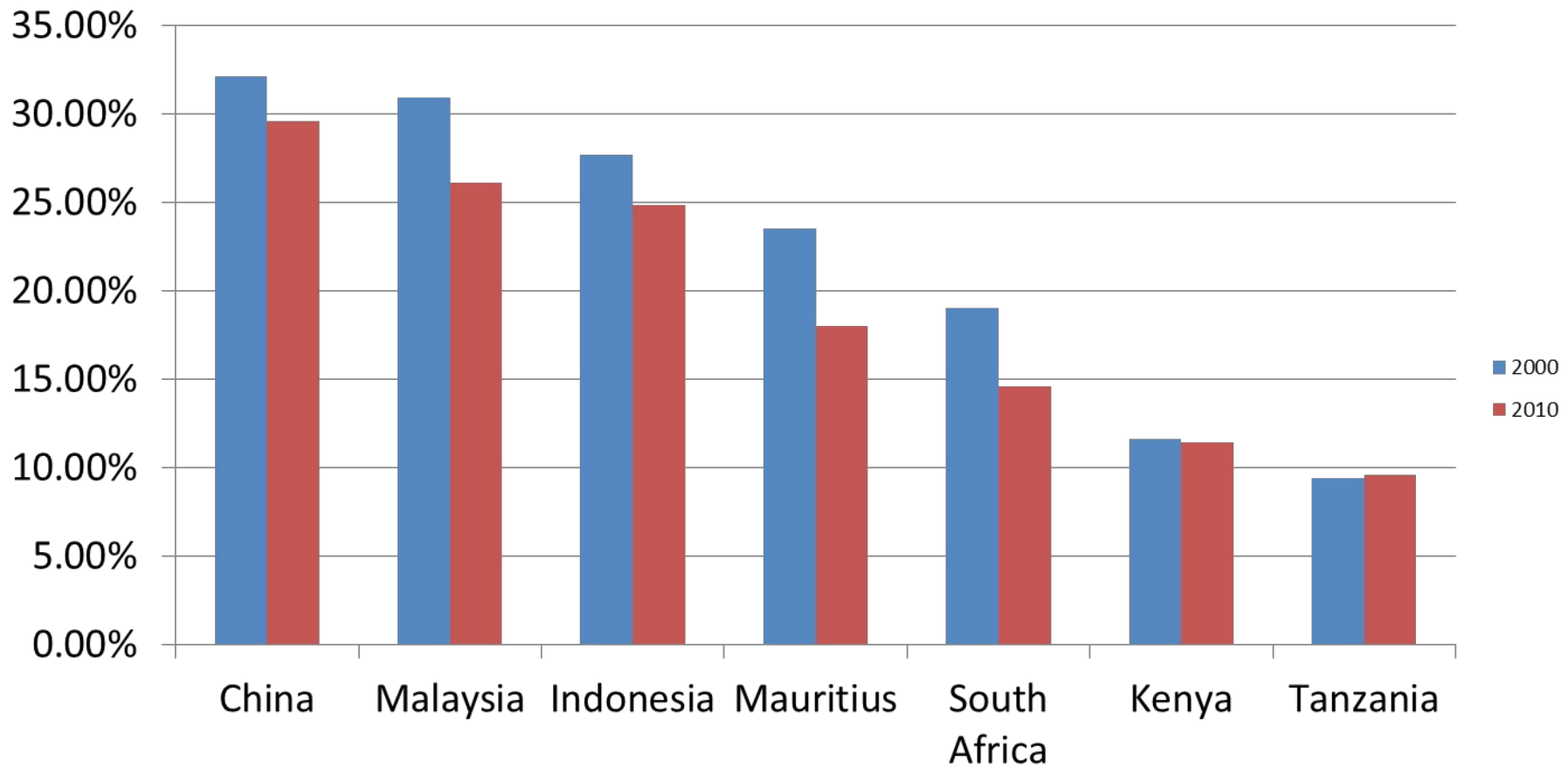


# Structural transformation in exports

More technology

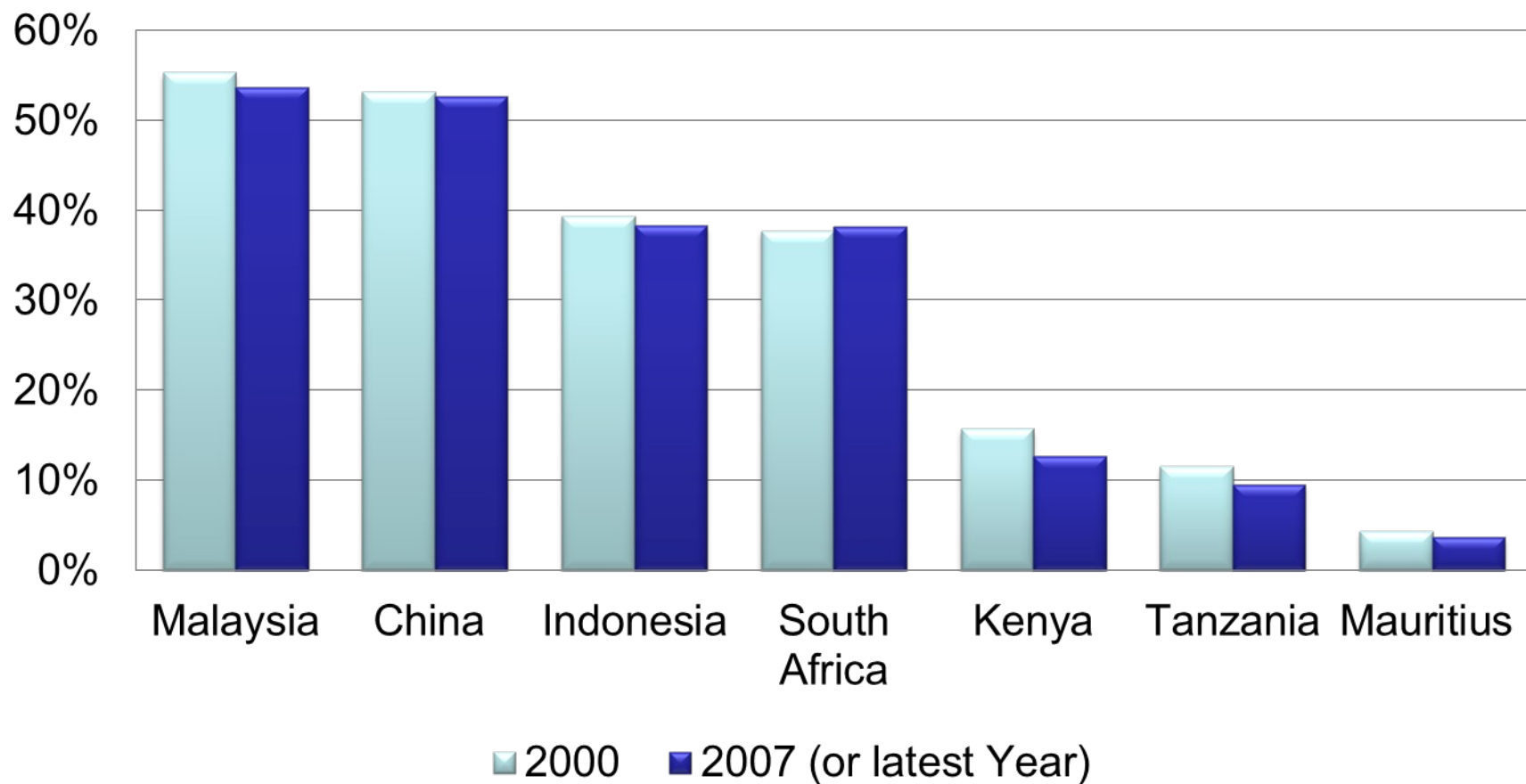


## No structural transformation of production yet (MVA in GDP)

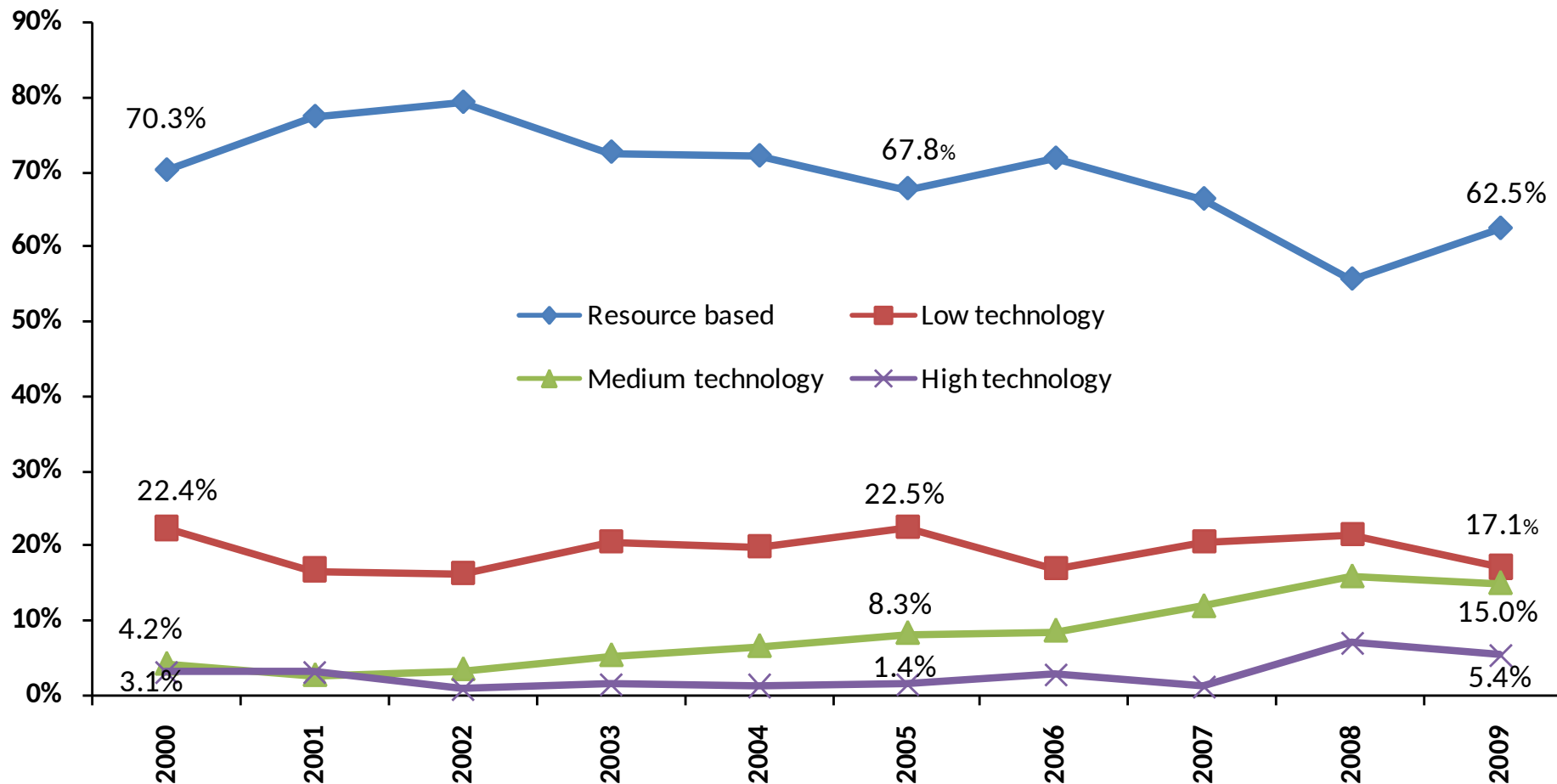




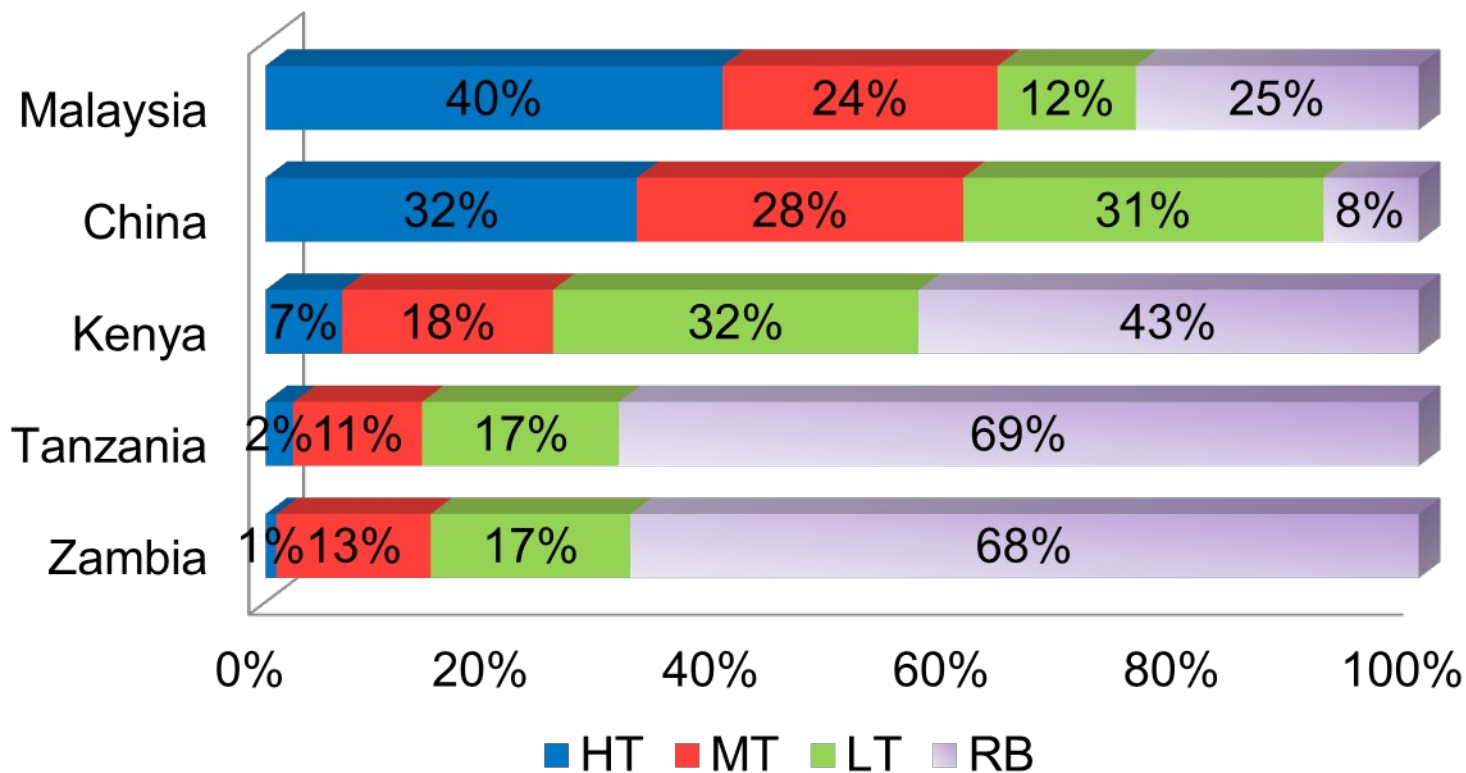
## No structural transformation of production yet (MHT in MVA)



# Manufactured exports are still mostly resource-based



## Technology Levels in Tanzania and Comparators



# What are Resource-based Products?

- Products based on agriculture and extraction
- Simply manufactured
- Low skills, low technology
- Petroleum dominates world RB trade
- In Tanzania, metals are most important

## Other Characteristics

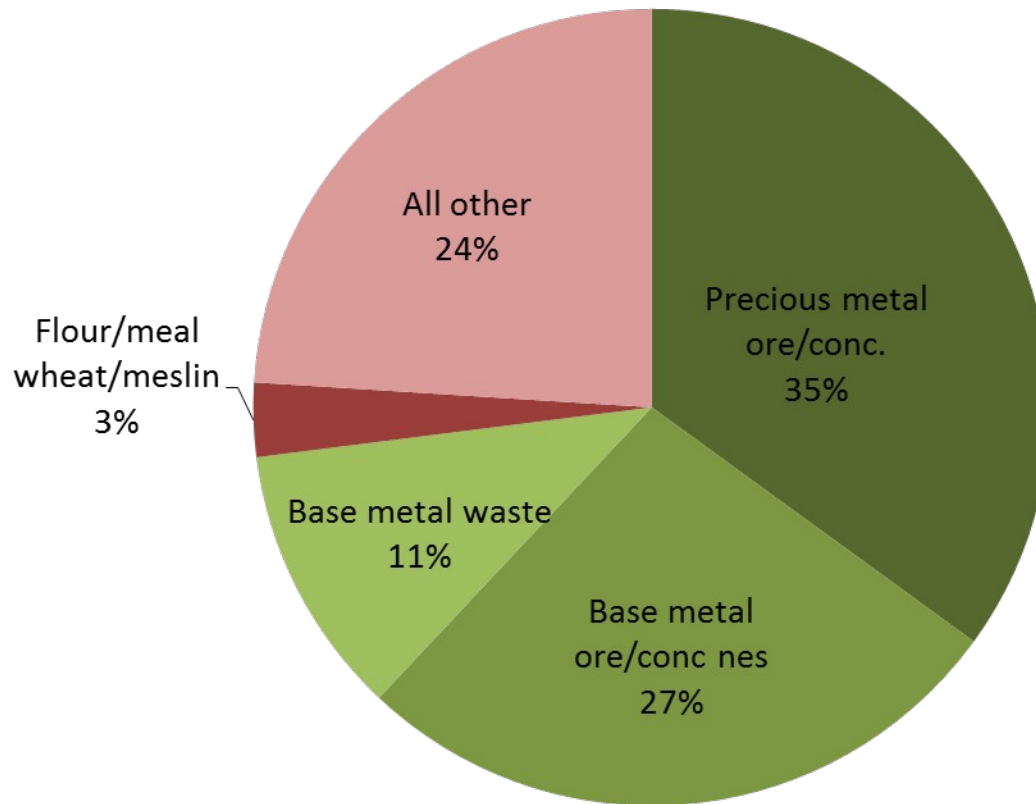
- Competitiveness of these products linked to natural resource endowments
- Vulnerable to price fluctuations in international markets
- Capital intensive extraction industry dominated by multi-nationals

## RB in Tanzania

- (i) Growth from 14% of Total Exports in 2000 to 34% of Total Exports in 2010
- (ii) Annual growth rate of 31%
- (iii) \$0.09billion USD to \$1.3billion USD



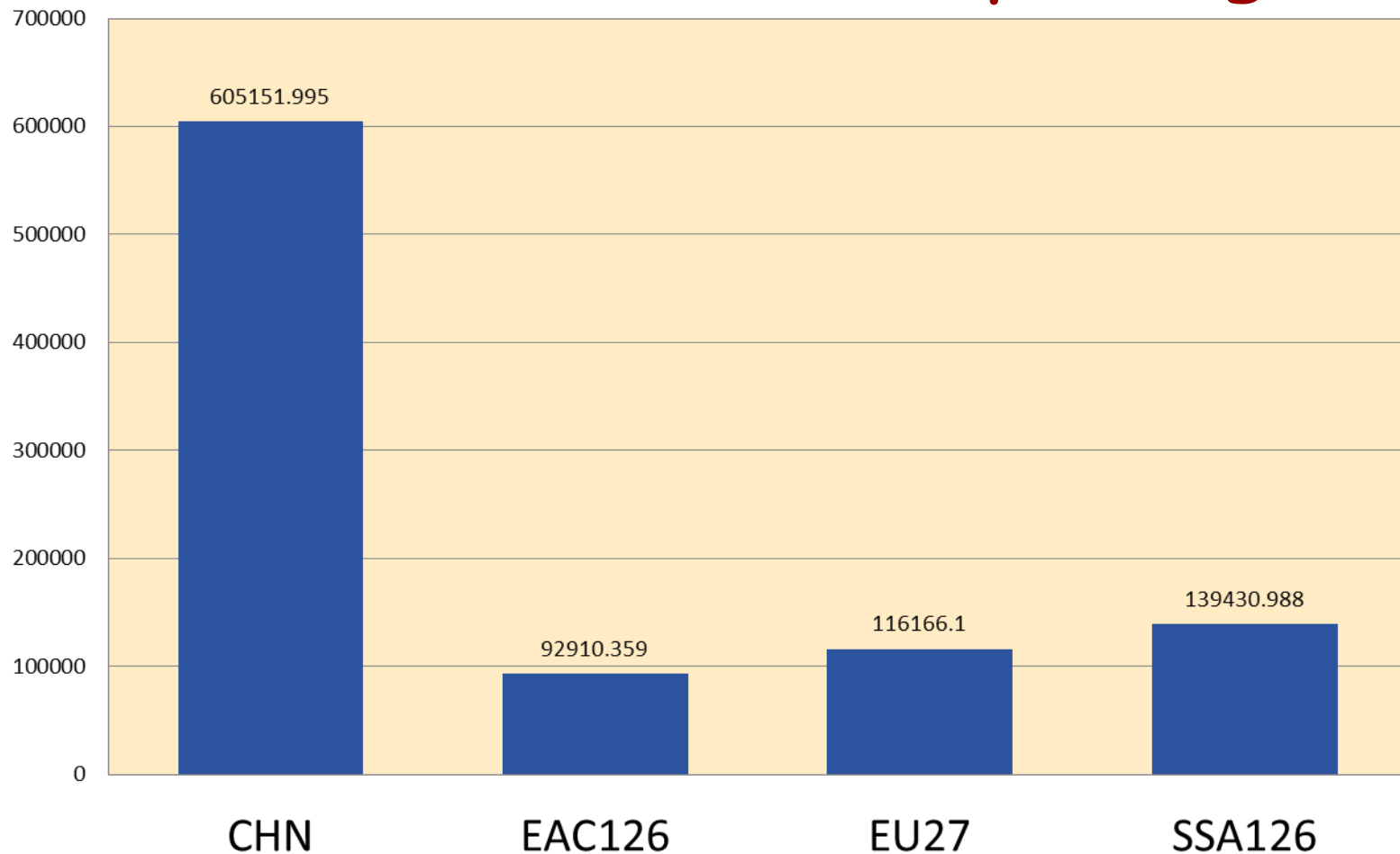
# What are the Key Products?



## What does this mean?

- Together the top 3 base metals account for 73% of all resource-based exports
- Growth in these products very high (precious metals 476% annual growth)
- Agriculture products play a very small role in exports

# Where do these RB exports go?



## What is the role of China?

- In 2000, Tanzania had a trade deficit with China of 5.6million USD for RB products
- In 2010, Tanzania had a positive trade balance of 470million USD with China in RB trade!
- In 2000, China accounted for 0.1% of RB exports
- China now accounts for 46% of all RB exports
- This is 15% of ALL EXPORTS.

## What does this mean?

- Export growth driven by Chinese demand
- Resource based products becoming most important export
- But heavily focused on three products and one market
- Therefore, a commodity collapse in prices or demand would be a big problem
- Chinese demand is likely to remain high for the next decade

## Other questions we can ask?

- What is the value addition in these RB exports?
- What is the employment absorption?
- What is China's role in Total Exports?
- How much of this growth is created by rising commodity prices?



## Policy Implications

- Is this sale of national resources being used to fund future development?
- Is there any attempt to promote renewable RB products?
- Tanzania has successfully taken advantage of opportunities from China, and should maximise this opportunity
- Tanzania likely has further growth potential in this sector, but it will become unsustainable

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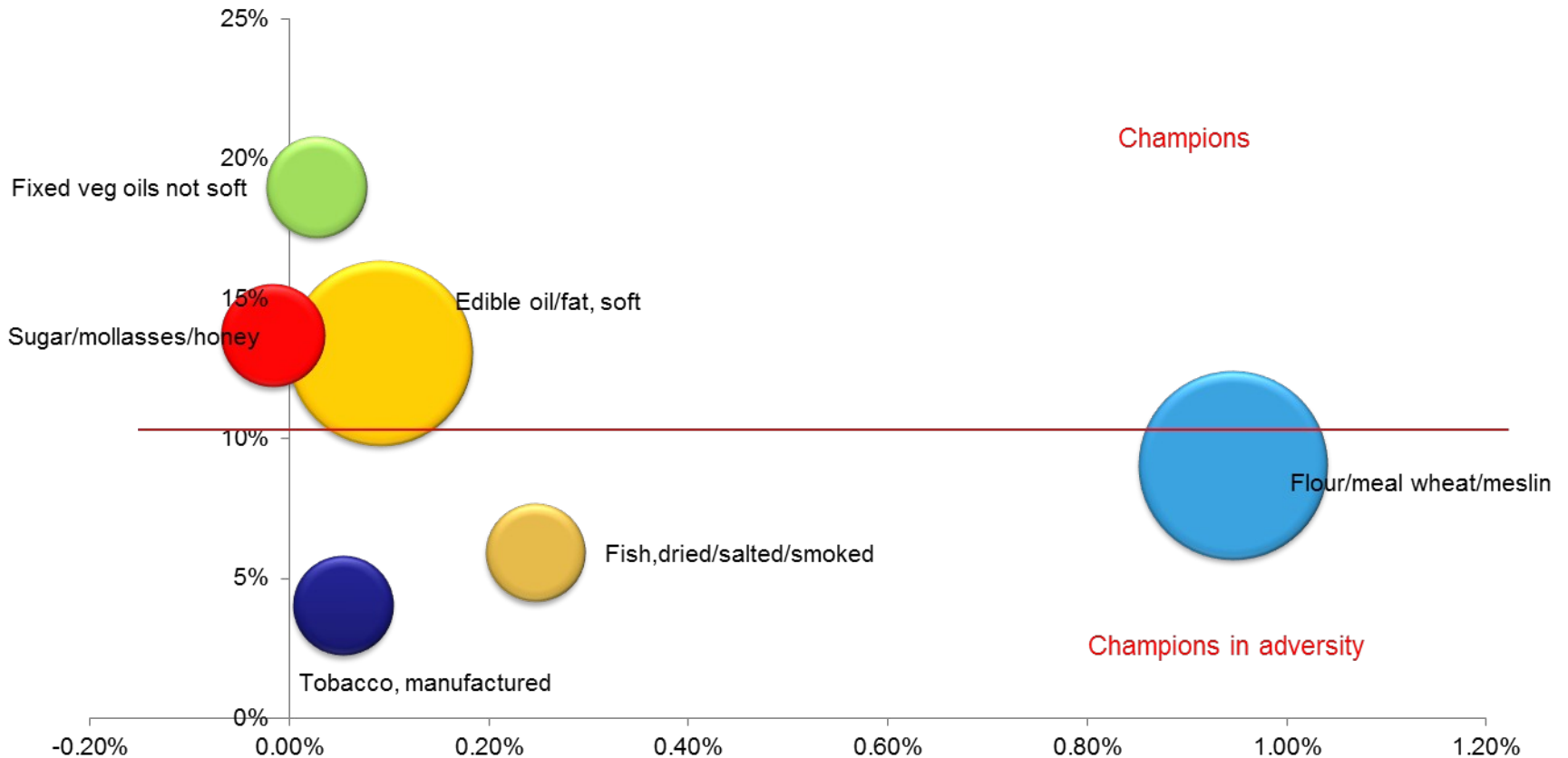
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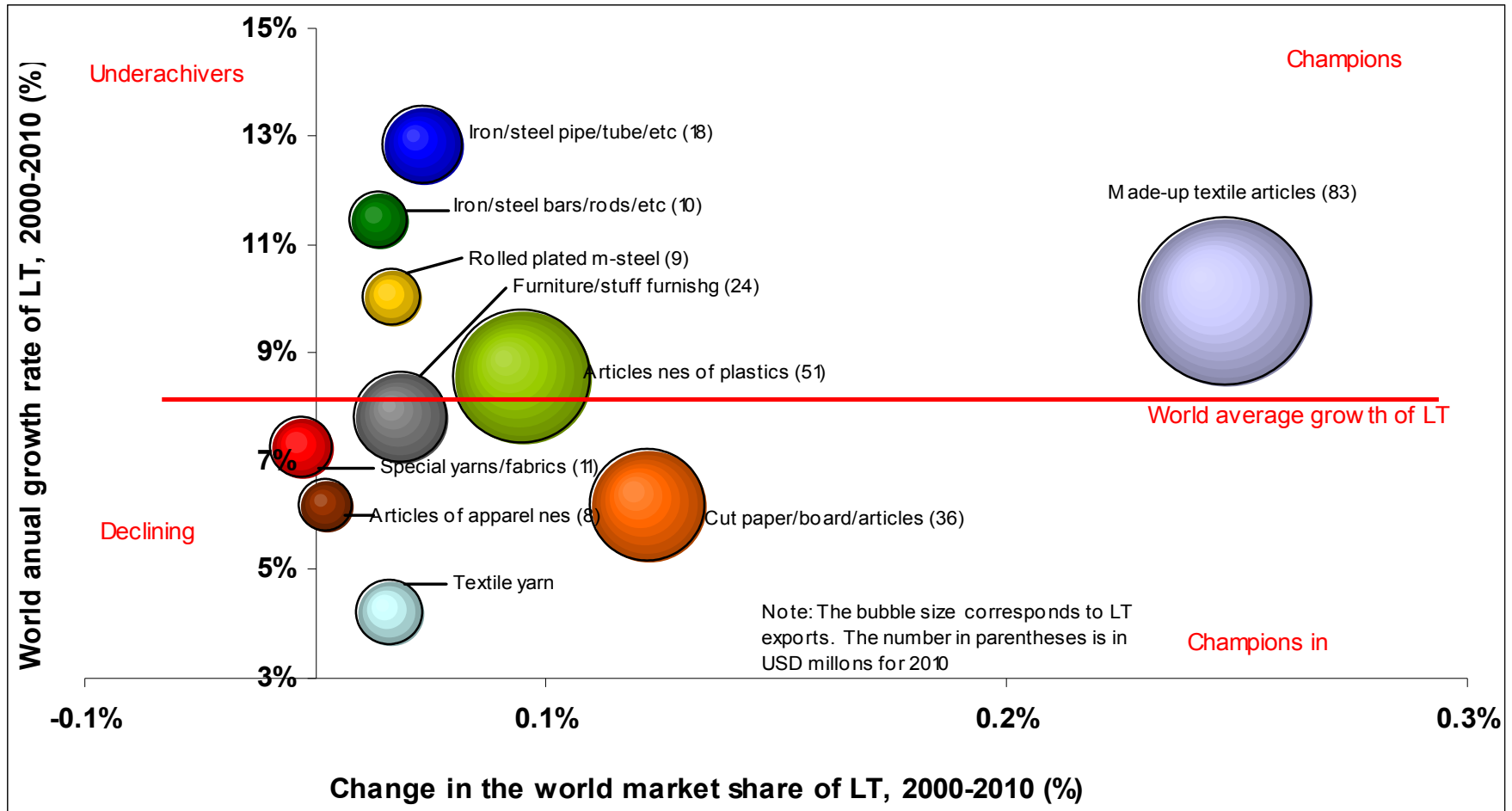
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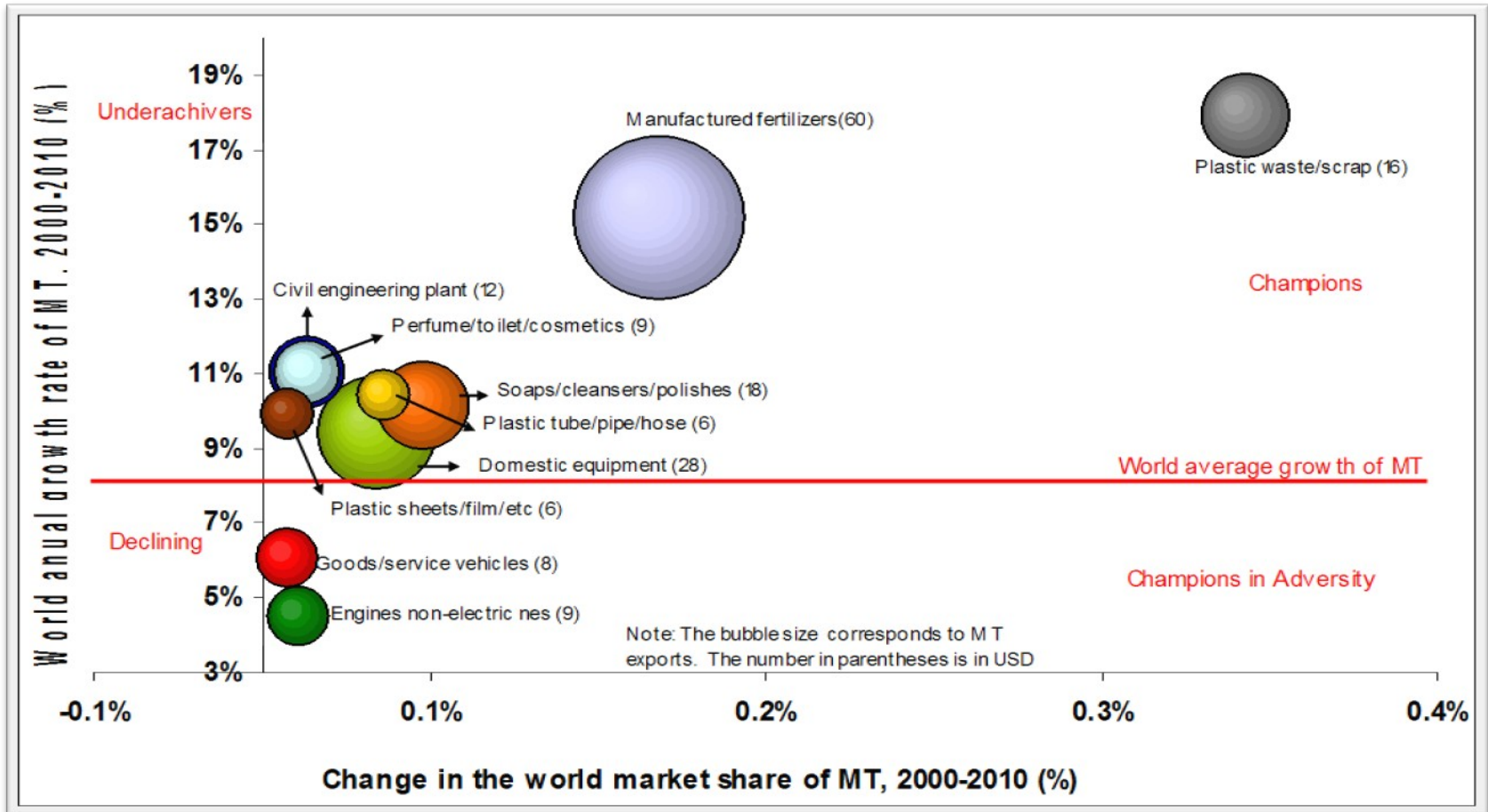
# Product Level Analysis of Agriculture Sector



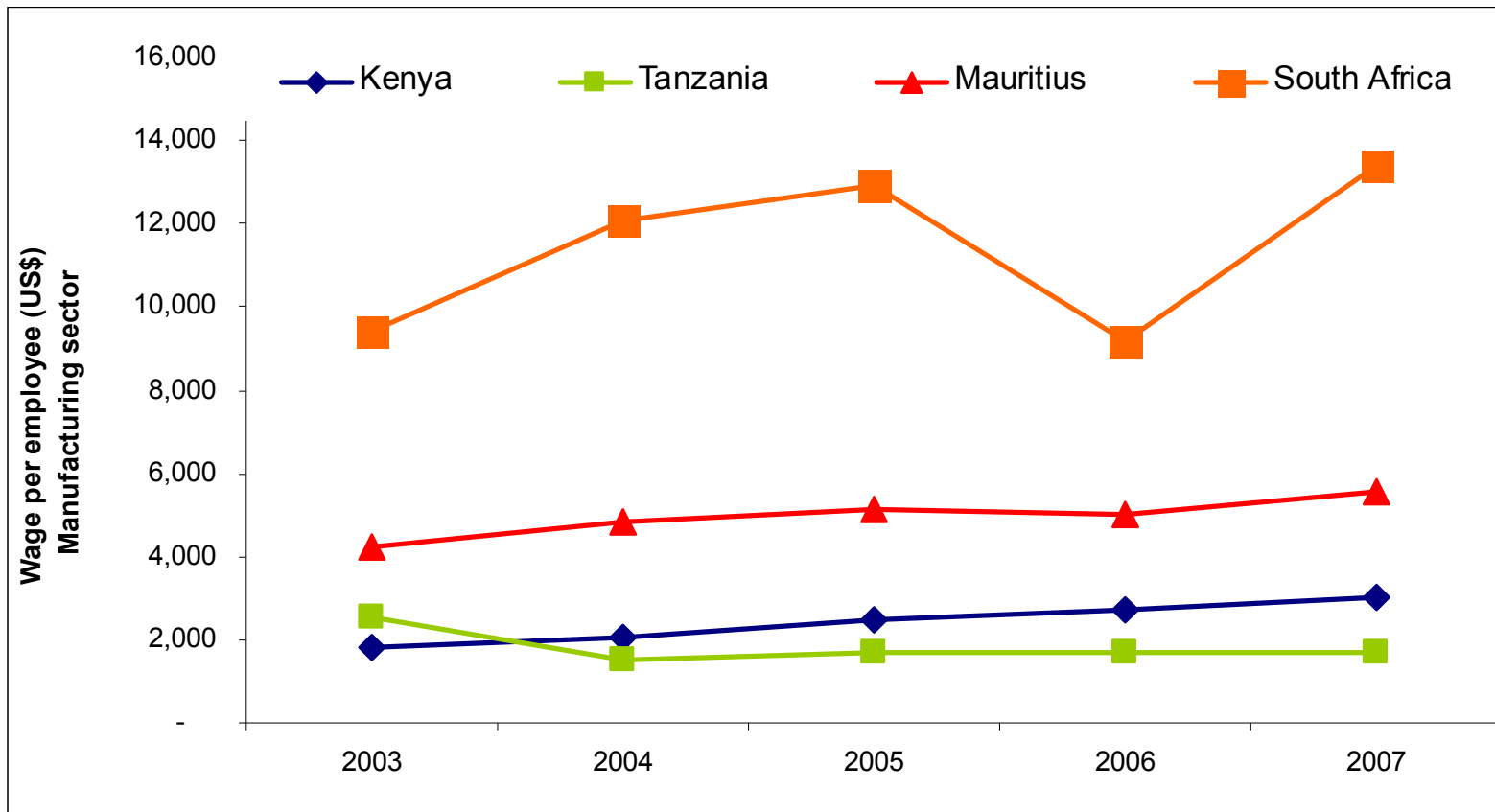
# Low-tech Markets



# Medium-tech Products

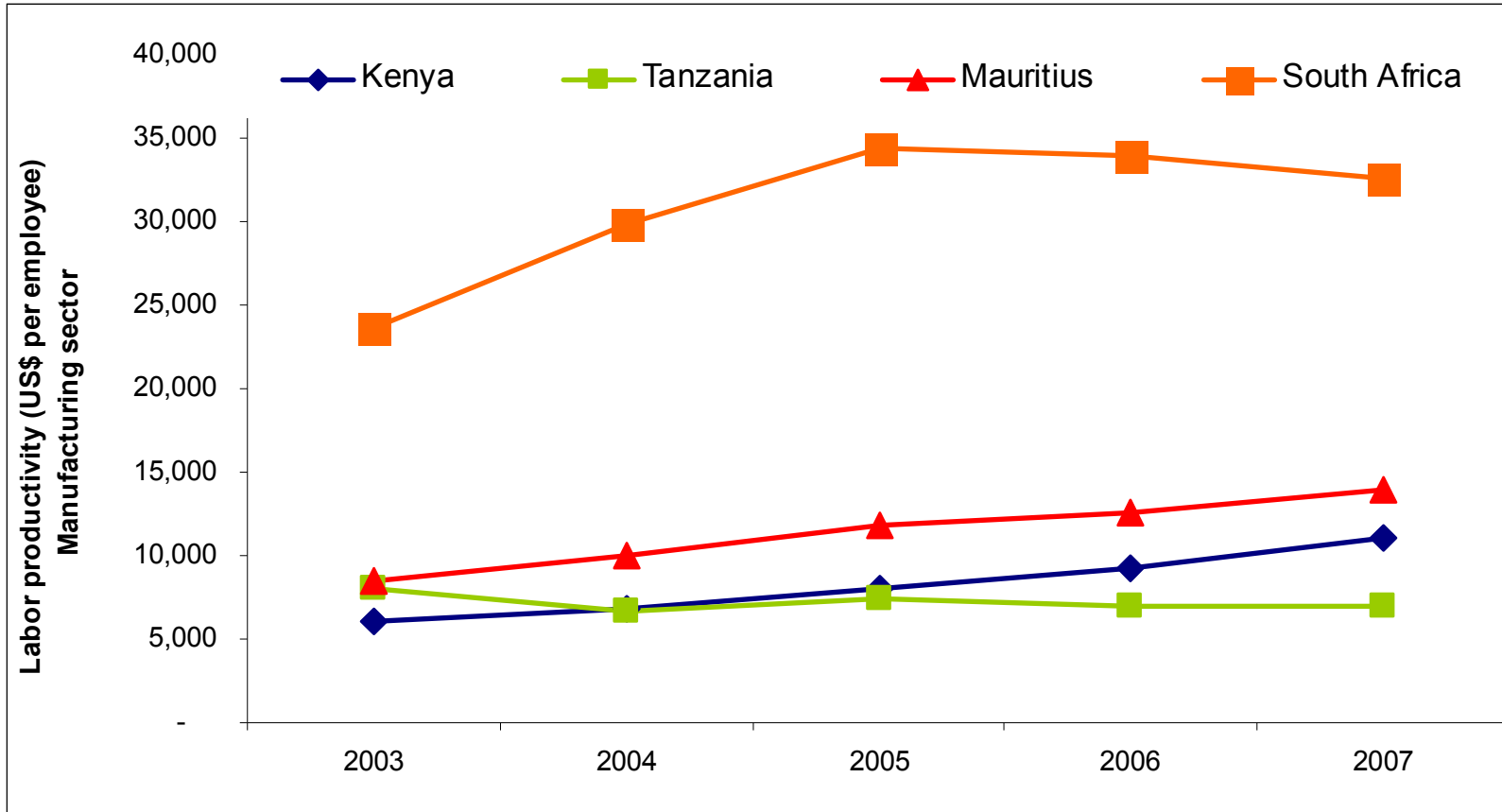


# Comparatively low wages beneficial for labor intensive industries





# But it will remain important to reduce the gap in manufacturing labor productivity



## Foreign Direct Investment

- The fastest and easiest way to improve the technological structure is through FDI
  - Technology transfer
  - Skills upgrading
  - New areas of experience
  - Competitive forces and linkage potentials for domestic industries

## Regional Integration opportunities

- The African market offers greater potential for sales of medium and high-tech goods
- Exports of MHT goods to SADC from Tanzania are 26%
- Opportunity to build competitiveness

## Conclusions

- Structural change needs to happen to support competitiveness and innovation
- Despite positive progress, much of this is focused on resource-based products
- Opportunities exist but require a more strategic approach
- UNIDO has a classification system to help assist and monitor these strategies



Asante sana!

Thank you very much for your  
attention!