



## Training course for policy makers on productivity and working conditions in SMEs



# SESSION 4: PRODUCTIVITY AND HOW IT IS MEASURED



# What is productivity?

Productivity is generally understood as a ratio of a volume measure of output to a volume measure of input use.

(OECD Glossary of statistical terms)



# What is productivity?

$$\textit{Productivity} = \frac{\textit{Output}}{\textit{Input}(s)}$$



# Output and Inputs

## Output:

- Measured in gross terms (how many cars are produced, how much money total production is worth) or
- As value added (what we have produced minus the inputs we got from other companies).

## Input(s):

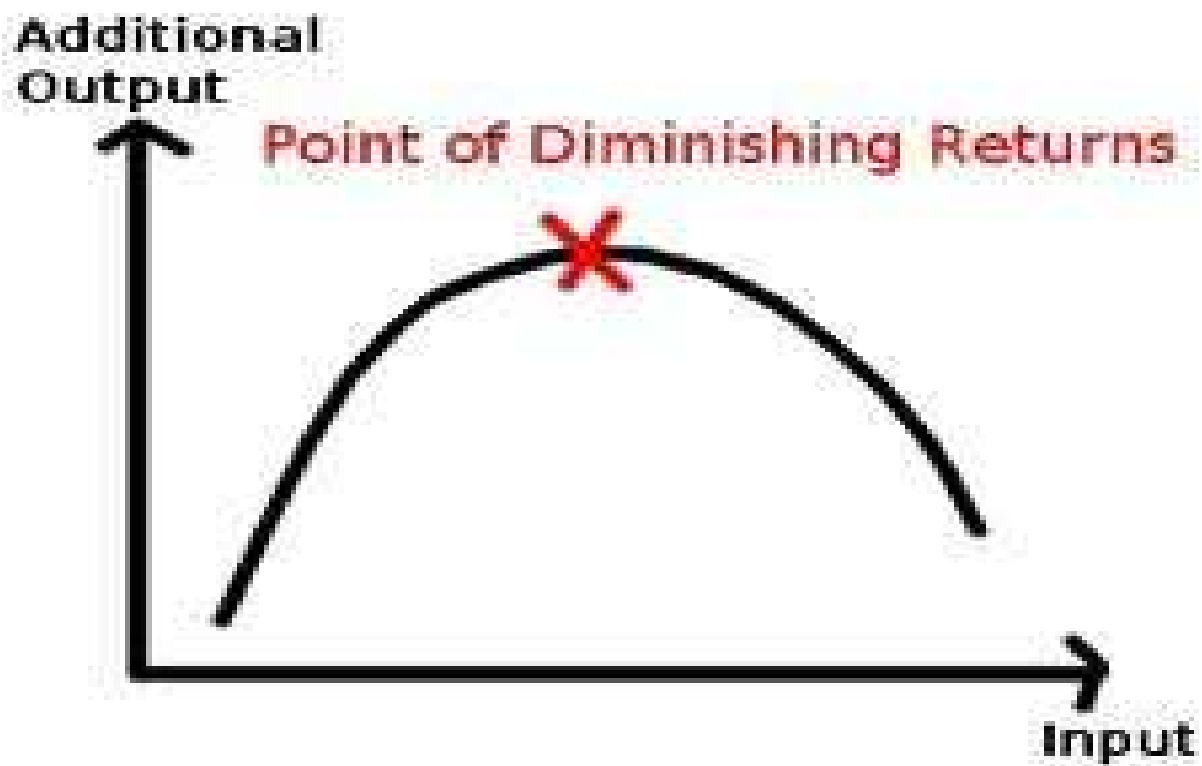
- There can be one input (labour, capital, energy, water, etc.) or
- A combination of inputs which is often the case for firms and economic output (GDP) of a nation.





In the long-term productivity is the engine of growth

**Output = Capital + Labour**





# Why should we care about productivity?

## Microeconomic level (firm level)

- Real cost savings
- Lower prices
- Reduced working time

## Macroeconomic level (national output)

- Higher real income level
- Greater demand for goods & services
- Living standards rise



## Why measuring productivity is important?

- **We can improve efficiency at firm level**
- **Promote healthy competition and growth**
- **Diagnose and inform policies at the macro level**







## Single Factor Productivity

- **Partial measure of productivity**
- **Computed as the ratio between output and a single input.**
- **Does not capture the single effect of an input, but the joint influence of changes in the productive process**
- **Labour productivity and capital productivity are the main single factor productivity measures**





## Labour Productivity

- $$\textit{Labour Productivity} = \frac{\textit{GDP at constant prices}}{\textit{Actual hours worked}}$$

### Pros:

- It is simple and readily available (at least for the formal economy).
- It relates output to the most important factor of production.
- It can be understood intuitively, because it relates directly to our average living standard.

### Cons:

- It is a combination of many effects: how much capital and other inputs are available per worker, how efficiently is labour combined with them and what is the level of technical change. Therefore, it can be difficult to interpret.





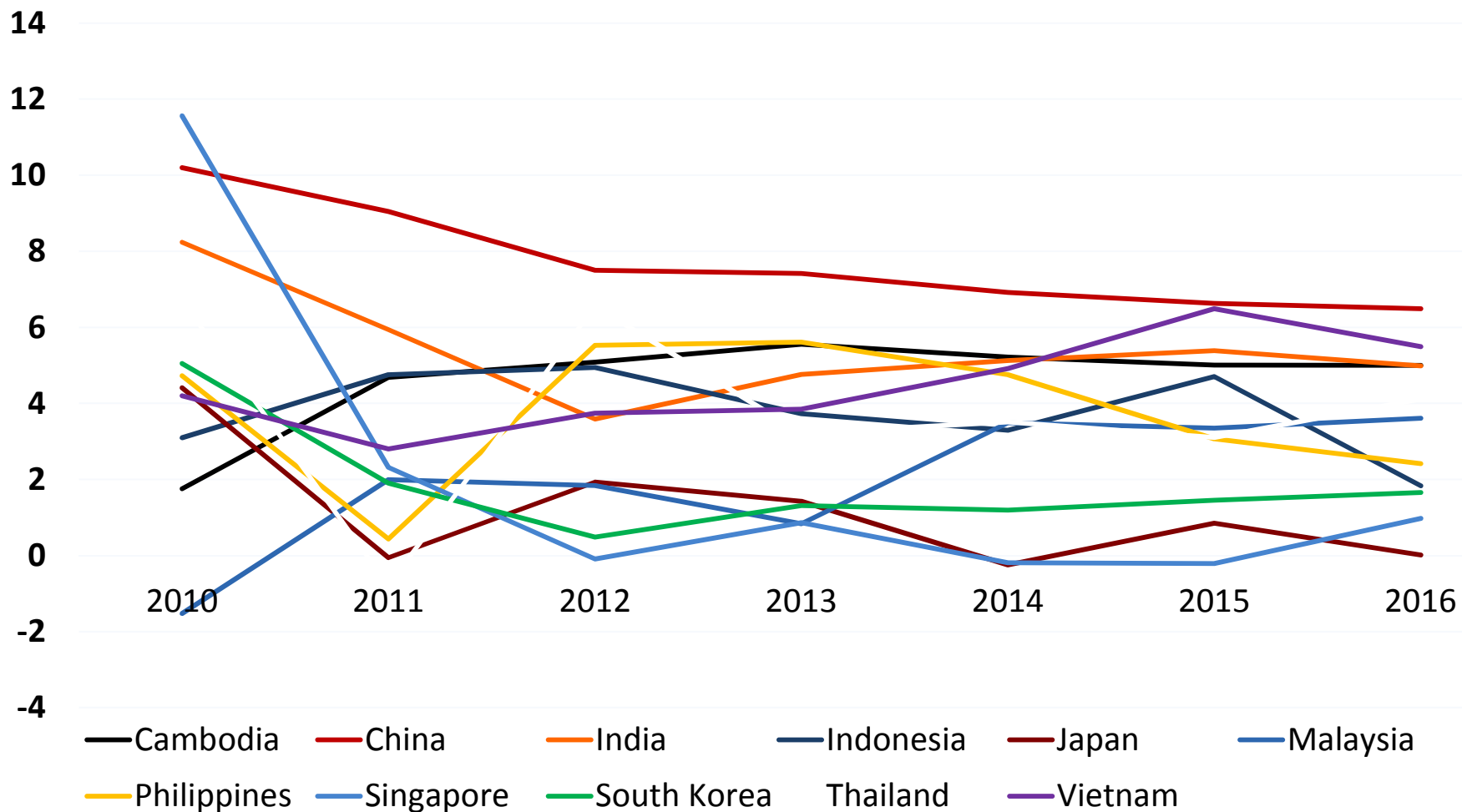
## Labour productivity in selected Asian economies

Country	1990	2000	2010	2016
Bangladesh	3,782	4,682	6,565	8,467
Cambodia	2,299	3,218	4,793	6,457
China *	2,893	7,005	18,068	27,621
India	4,568	6,744	12,296	16,443
<b>Indonesia</b>	<b>11,369</b>	<b>14,520</b>	<b>20,390</b>	<b>25,607</b>
Japan	62,586	70,640	75,411	78,392
Malaysia	30,841	44,117	53,792	62,432
Myanmar	1,971	3,046	6,921	9,620
Pakistan	12,164	14,561	15,871	18,179
Philippines	12,065	12,946	15,704	19,435
Singapore	77,919	106,341	129,492	134,268
South Korea	29,746	49,797	68,090	73,719
Sri Lanka	12,765	17,908	24,148	30,334
Thailand	13,143	18,475	25,304	30,678
Vietnam	3,346	5,597	8,499	11,093

\* Excluding Hong Kong & Taiwan



# Labour productivity growth in selected Asian economies



China (excluding Hong Kong & Taiwan)

Source: The Conference Board



# EXERCISE



# Is this a productivity measure?

1. *Earnings – Running costs – taxes*

2. 
$$\frac{\text{Total production} - \text{intermediate inputs}}{\text{Number of workers} \times \text{average hours worked}}$$

3. 
$$\frac{\text{Number of customer complaints this month}}{\text{Total number of customers this month}}$$

4. 
$$\frac{\text{Transjakarta Passengers travelled this week in Kota–Lebak Bulus route}}{\text{Liters of fuel spent this week in Kota–Lebak Bulus route}}$$





## Beyond labour productivity...

<b>Type of output measure</b>	<b>Type of input measure</b>			
	<b>Labour</b>	<b>Capital</b>	<b>Capital and labour</b>	<b>Capital, labour and intermediate inputs (energy, materials, services)</b>
<b>Gross output</b>	Labour productivity (based on gross output)	Capital productivity (based on gross output)	Capital-labour MFP (based on gross output)	KLEMS multifactor productivity
<b>Value added</b>	Labour productivity (based on value added)	Capital productivity (based on value added)	Capital-labour MFP (based on value added)	-
	<b>Single factor productivity measures</b>		<b>Multifactor productivity (MFP) measures</b>	

Source: OECD Manual





## Total-factor productivity (TFP) or Multi-factor productivity (MFP)

- Total-factor productivity is defined as output per weighted combination of inputs.
- TFP is more comprehensive than single factor productivity but also more difficult to calculate.

$$TFP = \frac{GDP \text{ at constant prices}}{Capital+Labour}$$





## KLEMS multi-factor productivity

- $$KLEMS\ Productivity = \frac{GDP\ at\ constant\ prices}{capital + labour + energy + services}$$

The result is a measure of how efficient the economy is in combining these production factors into outputs. It captures technical abilities and efficiency but also economies of scale, variations in capacity utilisation and measurement errors.





## Measuring TFP growth

$$\Delta \text{TFP} = \Delta \text{GDP} - (\Delta \text{Labour} + \Delta \text{Capital})$$

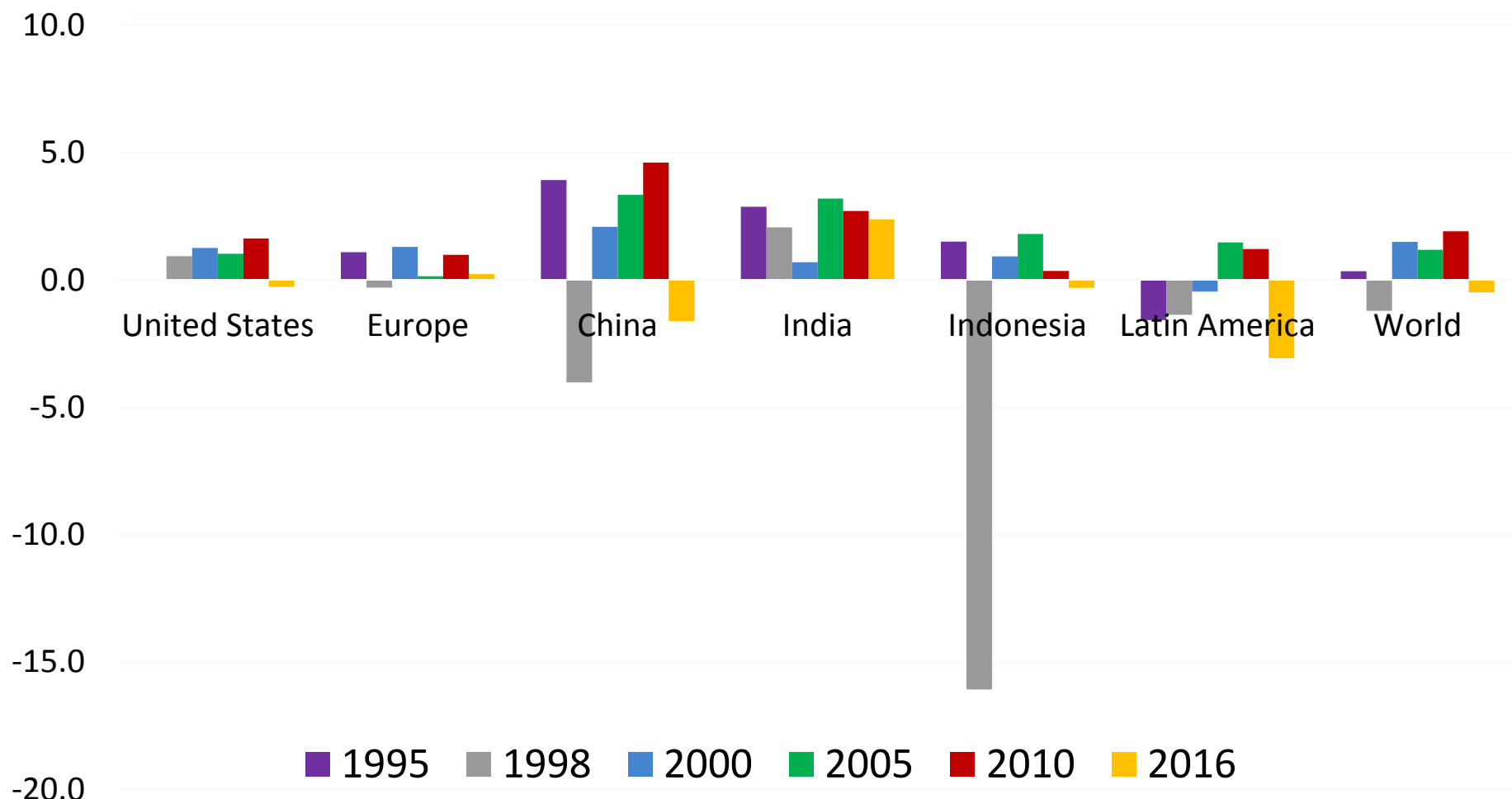
Change of TFP from one period to another is equal to the change in GDP **minus** change in labour and capital during that period.

In other words growth of TFP is measured as a “residual”





# TFP growth in selected Countries & Regions



Source: The Conference Board





# Recap productivity measurements

- Put simply, productivity measures the ratio between output and inputs
- Concepts of single factor and multifactor or total-factor productivity
- Importance of productivity in economic development and overall welfare



# Measurement Challenges

- Enterprise vs aggregate level
- Times series data not always available
- Some indicators measured partially owing to data gaps





## Productivity growth essential for long-term growth

- **In the short run**, productivity is pro-cyclical and varies with business cycles.
- **In the long run**, productivity growth through innovation and technology enhance growth.
- R. Solow (1958) work on growth accounting shows **TFP** as “**residual**” and major driver of GDP growth.



# Productivity leads to innovation and employment

- Creative destruction and economic diversification
- Productivity ultimately needed to move into the high-income group
- Historically productivity has gone hand in hand with employment growth





## Current debates on productivity & technology

- Lately, **lower productivity** growth in developed economies has opened up the debate on **secular stagnation**
- Productivity gain through **technological improvements** is having **implications for labour**
- Several **developing countries** have not reached technological frontier and **productivity in general is low** so there is more room

