

Should we teach total factor productivity?

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Outline

- Why TFP is wrong
 - What is total factor productivity?
 - The accounting identity problem
- What can be done?
 - Current way of teaching it
 - Possible way of not teaching it

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- **Why TFP is wrong**
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What is total factor productivity?

- Economic growth has two causes:
 - increase of the use of factors (capital and labour)
 - increase of productivity
- Increase of TFP is suppose to measure the second cause
- It is a measure of technical progress

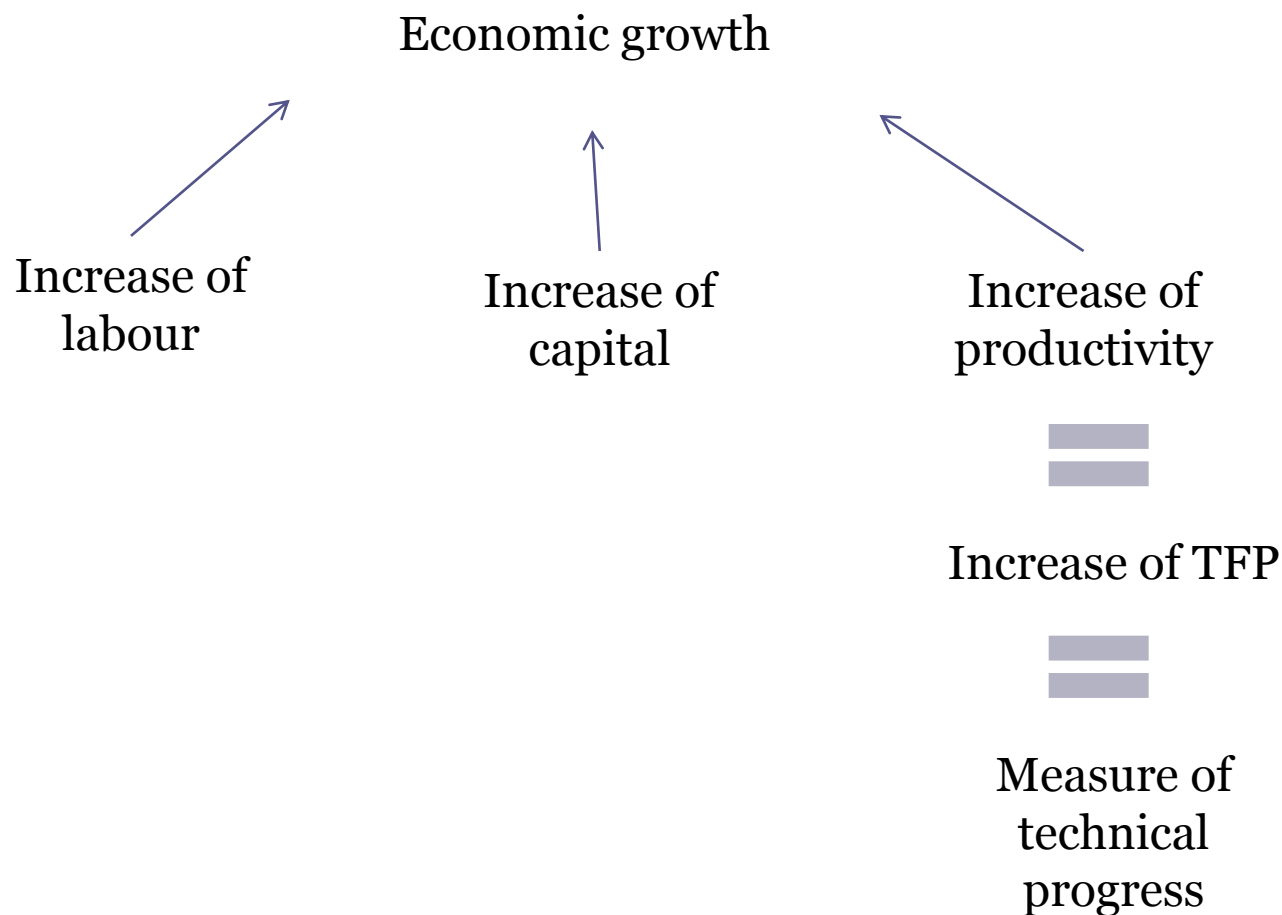
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What is total factor productivity?



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The accounting identity problem

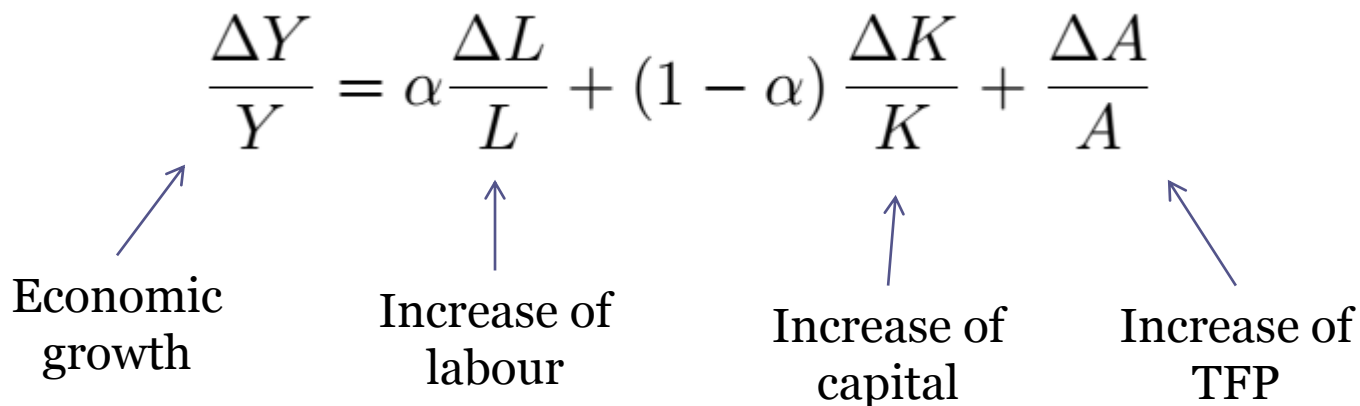
- Cobb-Douglas (1928)

$$Y = AL^\alpha K^{1-\alpha}$$

- Solow (1957)

$$\frac{\Delta Y}{Y} = \alpha \frac{\Delta L}{L} + (1 - \alpha) \frac{\Delta K}{K} + \frac{\Delta A}{A}$$

Economic growth Increase of labour Increase of capital Increase of TFP



The accounting identity problem

- Cobb-Douglas is a reformulation of an accounting identity (Phelps Brown, 1957)

$$Y \equiv wL + \pi K = AL^\alpha K^{1-\alpha}$$

- With the condition that α is constant over time

$$\frac{\Delta Y}{Y} = \alpha \frac{\Delta L}{L} + (1 - \alpha) \frac{\Delta K}{K} + \left[\frac{L}{Y} \Delta w + \frac{K}{Y} \Delta \pi \right]$$

Economic growth Increase of labour Increase of capital Increase of ... what???

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Current way of teaching it

- Objective: distinguish the different causes of economic growth

Annual variation of GDP (in %) and contributions to growth
(in points of %)

New-Zealand	2015	2016
Economic growth	<u>4.2 %</u>	3.8 %
Contribution to growth from the labour factor	1	3.2
Contribution to growth from the capital factor	1	0.8
Contribution to growth from total factor productivity	2.2	...

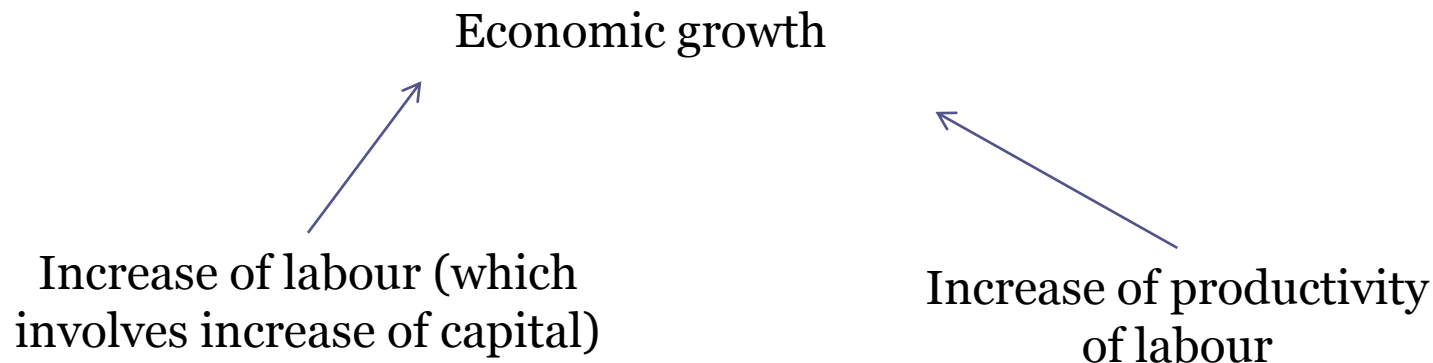
Source : OECD database, 2021

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Possible way of not teaching TFP

- Use of labour only
 - Keeps the distinction between the different causes



- No accounting identity problem

$$Y = L \left(\frac{Y}{L} \right) \quad \longrightarrow \quad \frac{\Delta Y}{Y} = \frac{\Delta L}{L} + \frac{\Delta \left(\frac{Y}{L} \right)}{\left(\frac{Y}{L} \right)}$$

Possible way of not teaching TFP

- Objective: distinguish the different causes of economic growth

Annual variation of GDP (in %) and variations of labour and labour productivity (in %)

New-Zealand	2015	2016
Economic growth	<u>4.2 %</u>	3.8 %
Growth of labour factor (in hours)	1.7 %	4.8 %
Growth of labour productivity (GDP/hours of labour)	2.5 %	... %

Source : OECD database, 2021

Conclusions

- The way the increase of total factor productivity is measured is wrong
- We can do without TFP if we want to explain the different causes of growth
- We should not teach TFP ... but we have to

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If you want to know more

Cobb, C.W. and P.H. Douglas, 1928: “A theory of production”,
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