

Paolo Sospiro
Dipartimento degli Studi sullo Sviluppo Economico
Facoltà di Scienze Politiche
Università di Macerata
paolo.sospiro@unimc.it

Development and Growth II:

Which relationship?

Macerata 4 October 2013
Development Economics
University of Macerata

The Solow Model

In order to understand the Solow model (1956) we should back to the H-D model and to the CD :

First of all we should analyse the C-D production function;

In fact, the MS, is a neoclassic model thus introduce on the growth theory the substitution principle of the factors production (labour and Kapital).

Only in this way, according to Solow, the growth become stable because it's based, on the long term, on the progress (innovation and technology).

Development and Growth: which relationship?

2

The Cobb-Douglas Production Function (1928)

7.1
$$Y = F(K, L)$$

7.2
$$Y = AK^\alpha P^{1-\alpha}$$

where Y, K, P are Production, Kapital and Population

Where $0 < \alpha < 1$ and A costant and positive represent the technology available

Development and Growth: which relationship?

3

How to measure Productivity on the C-D

- The 7.2 is writable in the following form

7.3
$$Y = K^\alpha (EP)^{1-\alpha}$$

- where E is $A^{1/(1-\alpha)}$

- thus EP is the amount of unit of labour used
- Therefore, the marginal productivity of K is given by

- 7.4

$$\frac{\delta Y}{\delta K} = \alpha AK^{\alpha-1} P^{1-\alpha} = \alpha \frac{Y}{K}$$

Development and Growth: which relationship?

4

The distribution of the result of the production C-D

- If the production function is
- 7.3 $Y = K^\alpha (EP)^{1-\alpha}$
- While the productivity is given by
- 7.4 $\frac{\delta Y}{\delta K} = \alpha AK^{\alpha-1} P^{1-\alpha}$
- then α and $1 - \alpha$ are the amounts that should be distributed to Kapital and labour.

Development and Growth: which relationship?

5

The distribution of the result of the production C-D I

- If
- 7.5 $K^{\alpha-1} = \frac{K^\alpha}{K}$
- And Y is given by
- 7.2 $Y = AK^\alpha P^{1-\alpha}$
- Then we can substitute 7.5 on 7.2
- 7.6 $\frac{\delta Y}{\delta K} = \frac{\alpha AK^\alpha P^{1-\alpha}}{K} = \alpha \frac{Y}{K}$

Development and Growth: which relationship?

6

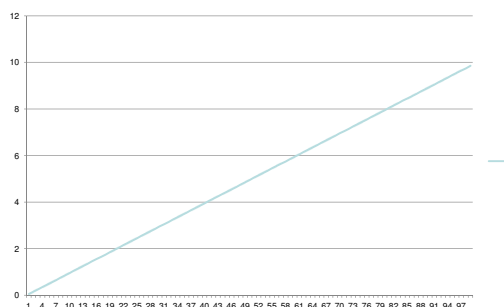
The distribution of the result of the production C-D II

- In order to verify the variation of the Kapital when the Production increase or decrease, it's necessary to take into account the elasticity thus the relative variation
- 7.7 $\frac{\delta Y}{\delta K} \cdot \frac{K}{Y} = \alpha \frac{Y}{K} \cdot \frac{K}{Y} = \alpha$
- Then α is the amount distributed to the Kapital.

Development and Growth: which relationship?

7

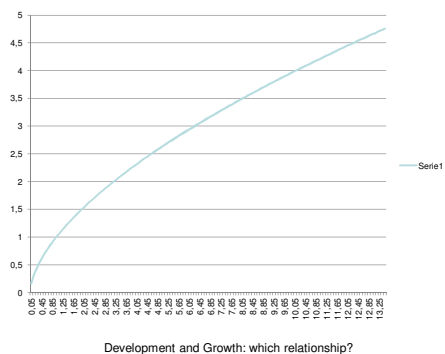
Constant return on the C-D



Development and Growth: which relationship?

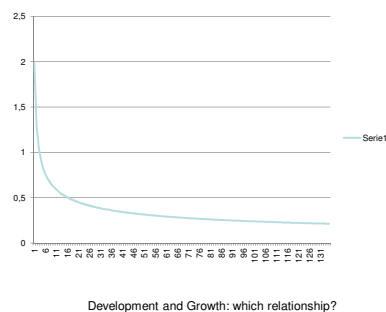
8

Increasing return on the C-D



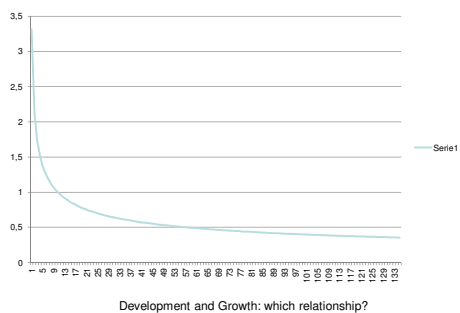
9

Decreasing return on the C-D II: derivative



10

Decreasing return on the C-D II: the relationship between Y and K



11