MAHATMA GANDHI CENTRAL UNIVERSITY

ECON3020: Theory of Economic Growth

Course Code: ECON3020

Model of Endogenous Growth: The AK Model

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Introduction

* The **AK model of economic growth** is an endogenous growth model used in the theory of economic growth, a subfield of modern macroeconomics.
* In the 1980s it became progressively clearer that the standard neoclassical exogenous growth models were theoretically unsatisfactory as tools to explore long run growth, as these models predicted economies without technological change and thus they would eventually converge to a steady state, with zero per capita growth.

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* A fundamental reason for this is the diminishing return of capital; the key property of AK endogenous-growth model is the absence of diminishing returns to capital.
* In lieu of the diminishing returns of capital implied by the usual parameterizations of a Cobb–Douglas production function, the AK model uses a linear model where output is a linear function of capital.
* Its appearance in most textbooks is to introduce endogenous growth theory.

Graphical Presentation

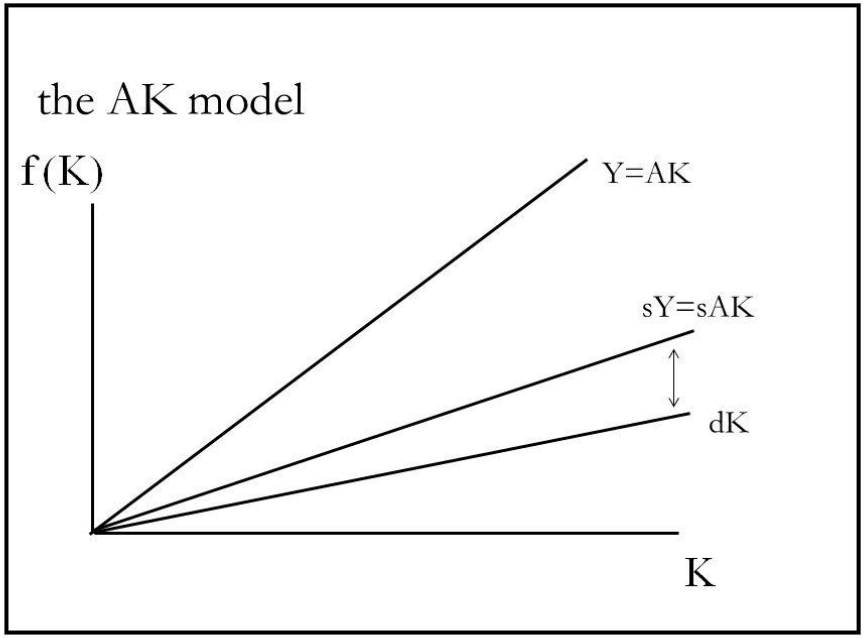
* $Y = AK$
* where *A* is a positive constant that reflects the level of technology and ‘K’ here is taken in a broader sense as it includes physical as well as human capital.
* This model shows constant marginal product to capital (as $MPk = dY/dK=A$) indicating that long run growth is possible. Thus, AK model is a simple way of illustrating endogenous growth.

Assuming

*
* Closed economy,
* The savings are equal to investment
* Under conditions of full employment.

* Since savings are the function f income and capital depreciates at a constant rate i.e. ‘δ’ the
* change in capital stock can be traced through following equations.
* $I = S = s.Y = s.AK$
* and, since capital depreciates at a constant rate, the change in capital stock i.e. can be expressed as $= s.Y - \delta$. . This change in capital stock can also be represented by a diagram given below.

Figure



* In this figure Y-axis show output per worker while the X-axis show the capital stock.
* The line $Y=AK$ having a constant slope shows the constant marginal productivity of capital; the line $S=s.Y$ is the gross investment line while the line δK shows the depreciation line or the total replacement investment.
* The difference between the gross investment line and the replacement line i.e. area between $S=s.Y$ line and δK line shows net investment in the economy which is positive and increasing.

* The growth of capital stock can be found by dividing both sides of the equation showing change in capital stock with 'K', we get

$$\frac{K^{\circ}}{K} = s.\frac{Y}{K} - \delta$$

* Since, Y=AK, i.e. Y/K =A, therefore, above equation can be rewritten as

$$\frac{K^{\circ}}{K} = s.A - \delta$$

* As, growth of output is equal to the growth of capital stock,

$$\frac{Y^{\circ}}{Y} = \frac{K^{\circ}}{K} = s.A - \delta$$

*

* An improvement in the level of technology,

* *A*, which raises the marginal and average products of capital, also raises the growth rate and alters the saving rate.
* We have to focus on changes in various kinds of government policies amount to shifts in *A*;
* that is, we can generalize the interpretation of the parameter *A* to go beyond literal differences in the level of the production function.

* In contrast to the effects on long-run growth in the *AK* model,

* Ramsey model implies that the long-run per capita growth rate is pegged at the value *x*, the exogenous rate of technological change.

* A greater willingness to save or an improvement in the level of technology shows up in the long run as higher levels of capital and output per effective worker but in no change in the per capita growth rate.

Thank You