

Quadrant II – Transcript and Related Materials

Programme: Bachelor of Arts (Third Year)

Subject: Economics

Course Code: ECD 111

Course Title: Growth and Development-I

Unit: III

Module Name: The Capital-Output Ratio

Name of the Presenter: Mr Alex Philip

Notes

The Capital-Output Ratio

Capital -Output Ratio or capital coefficient has assumed great importance in examining the quantitative relationship between capital formation and income growth. This ratio is used increasingly as a tool of policy formulation and planning in developed as well as less developed countries.

Meaning of Capital Output Ratio

Capital –Output Ratio may be defined as “the relationship of investment in a given economy or industry for a given time period to the output of the economy or industry for a similar time period.

The marginal productivity of capital indicates the contribution of capital alone to total output assuming other factors like land, labour etc to be constant while capital-output ratio allows for increases in other factors as well.

The marginal productivity of capital ranges from 5-10 per cent while the contribution of capital in combination with other input as measured under the capital-output ratio is bound to range from 25-40 % normally. Capital-Output ratio is exactly equal to marginal productivity of capital only if the contribution of all other factors is zero.

Types of Capital Output Ratio

There are various types of capital-Output ratio depending on the context in which this ratio is used. The most important types are discussed below

- 1) Average Capital –Output Ratio (ACOR) : It is defined as the ratio of existing capital stock to the aggregate level of current national output.
Thus $ACOR = K/Y$

It takes into account all the investment that has taken place hitherto and the resultant national output.

- 2) Marginal or Incremental Capital-Output Ratio (ICOR) - It is the additional amount of capital or investment needed to produce an additional unit of output per unit of time.

Thus $ICOR = \Delta K / \Delta Y$ where

$\Delta K (=I)$ is the addition to the capital stock or investment (I) and

$\Delta Y =$ is the addition to national output.

If we are talking of the whole economy and we have a given plan period in view, so that the plan covers n years then

$$ICOR = \frac{\sum_{t=1}^n I(t)}{Y(t+n) - Y(t)}$$

Where $t+n$ is the terminal year of the plan.

Sectorial Capital-Output Ratio- : It relates to sectorial investment to sectorial output. The sectorial marginal capital -output shows the additional investment that is needed at the sector level to attain a unit increase in output in that sector.

Thus $K_1 = I_1 / \Delta y_1$ where k_1 is the ICOR in sector 1,

I_1 is the investment in sector 1 and

Δy_1 is the increase in output in that sector.

Aggregate or countrywide Capital-Output ratio- It is the average of all sectorial capital-output ratios.

If we look at the additions to output that take place as a result of additional investment at the sectoral level then a weighted average of these sectoral ICORs would yield the aggregate or the country-wide capital-output ratio .

Net capital-Output ratio

The term net incremental capital-output ratio is used to cover capital caused changes in output i.e which are net of changes in other factors like trained manpower, entrepreneurship etc. In other words net ICOR has assumption namely that the supplies of all other factors are held constant.

Adjusted capital-output ratio

Adjusted ICOR associates output changes to changes in capital or investment recognizing that the factors changing the output are many, capital being one of them.

It follows that adjusted ICOR will show a lower ICOR factors other than capital having contributed to increase in output.

Difficulties in Calculating Capital-Output ratio

- 1) Difficult to measure total capital- Capital stock in a country consists of heterogeneous collection of goods and materials like buildings, public works, transportation equipment, planted trees, machinery, inventories etc. Each of them is a specific factor of production capable of producing only a specific product.
- 2) Complementarity of Investments- Most investment projects are inter-locked in an input-output relationship. Such technical complementarity among investment projects and external economies created by particular investments give rise to much larger aggregate national output than the sum total of individual products of different investments.
- 3) Investments in the Non-Monetized sector- In the LDC's the non-monetized sector is a significant part of the economy. In this sector hardly any accounts of investment made and additional output generated are maintained.
- 4) Capacity Utilisation- An accurate estimate of capital-Output ratio requires that some estimate of utilisation of installed or production capacity be made and further it should be assumed that throughout the life of a capital asset, capacity utilisation would remain constant.

However capacity utilization keeps changing over time and at the time of making the investment it cannot be predicted how it would change over the

life span of the capital asset. This renders estimation of capital-output ratio hazardous.

- 5) Imperfections of the market- Before investments is made some idea of the market imperfections is necessary since they affect the value of capital-Output ratio.

For instance an increase in the degree of monopoly in the market would raise the price of the product in the market, thereby increasing the value of output and reducing the capital-output ratio.

If market imperfections cannot be accurately estimated or changes in them clearly predicted capital-output ratios cannot be correctly calculated.

- 6) Considers only fixed Investments- It is customary to consider only fixed capital while estimating capital -output ratios. This however provides a fallacious picture regarding the relationship between capital and output. A .K Sen has found out that the inclusion of working capital would raise the capital-output ratio even in those industries where the capital coefficient is supposed to be low.

- 7) Additional work shifts- Additional work shifts mean getting more output from the same capital stock . Thus multi shift working would generate more output without the need for additional investment.

This factor also complicates the estimation of capital-output ratio.

So at the time of estimation some idea of the multi-shift operation of capital should be available.

Limitations of Capital-Output Ratio

- 1) Problem of Co-operant factors- In capital output ratio output is related to capital in a certain or predictable manner only if co-operant factors like trained manpower, entrepreneurial ability, infrastructural facilities are available. But in underdeveloped countries supply of co-operant factors cannot be taken for granted.
- 2) Too much emphasis on investment - The concept of capital –output ratio lays emphasis on investment for expansion of output.
In fact insistence on investment implies taking a mechanical view on the problem of capital formation and change.
In underdeveloped countries there are many possible ways of increasing output with very little or no capital investment.
- 3) Problem of time lag- The investment in the concept of capital –Output ratio relates to the current year while output relates to some year or years in the future. This is because investment in the current year does not lead to an increase in the output in the current year itself.
Thus there is a time lag between investment made and output obtained which makes the imputation of a given output to a given input impossible.

- 4) Not much suitable for making investment decisions- The capital output ratio does not indicate the extent to which other resources are to be increased in combination with capital.
The requirement of other factors can be known only if the production function is known.