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ECONOMIES OF SCALE AND RETURNS TO SCALEA CLARIFICATION

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ABSTRACT

This article humbly clarifies the two concepts ***economies of scale and returns to scale*** which is found confusing to many students and a few of the scholars in the field of economics. It sequentially explains the concepts by bringing them down to the earth with practical illustrations and graphical analyses; mathematics is reduced to the barest minimum. The conclusion has also been made in a way that it provides an answer on how to clearly distinguish returns to scale from economies of scale situation.

KEYWORDS: Economies of Scale, Returns to Scale, Efficient, Production, Input, Cost, Output

INTRODUCTION

In recent time, there is a confusion generating among economics students on what "economies of scale" and "returns to scale" really mean. They want to know whether these two concepts mean the same thing or are merely related. However, this essay intends to give a simple but a critical analysis of the two concepts so that the disparity entailed can be clarified. In this essay to make the concepts easily assimilated and understood by readers mathematical approach has been reduced to the barest minimum; as a result of this more of geometrical and theoretical presentations and assertions will be used.

At the outset, we shall begin with a definition of production? On one hand, production can be defined as the "creation of utility" and on another hand, it could be defined as the "creation of output from input". Scale of production is simply "the amount of inputs used in production", no matter the perspective we look at it. Generally, economists see "low level of input" as "small scale of production" and "a large level of input" as "large scale of production". Jhingan (2012) corroborates this position in his book, *principles of Economics, claiming* that "scale of production refers to the amount of factors used". He espoused,

> When a firm operates by using less capital and small quantities of other factors of production, the scale of production is said to be small. On the other hand, a firm using more capital and larger quantities of other factors of production is said to be operating on a large scale (Jhingan, 2012:150).

From the above quotation, we may infer that "scale of production" is simply a question of: what is the size of input? If we find the input to be small we can affirm that the scale is small; if the input is large, the scale of production could also be inferred as large.

Further to this line of thought, we can establish that "returns to scale" is how output respond to changes in input, it can be expressed in three forms: Increasing, constant and decreasing. Increasing returns to scale occurs- when a firm increases its inputs, and more than-proportionate increase in output result; if output increase just in proportion, there is a

constant return to scale; if output increases less than proportionately, there is a decreasing returns to scale.

Forms in which returns to scale occur is revealed in the table below,

Table 1

Change in Input	Response from Output	Conclusion
1. Increased by N%	Increase > N%	Increasing returns to scale.
2. Increased by N%	Increase = N%	Constant returns to scale
3. Increased by N%	Increase < N%	Decreasing returns to scale

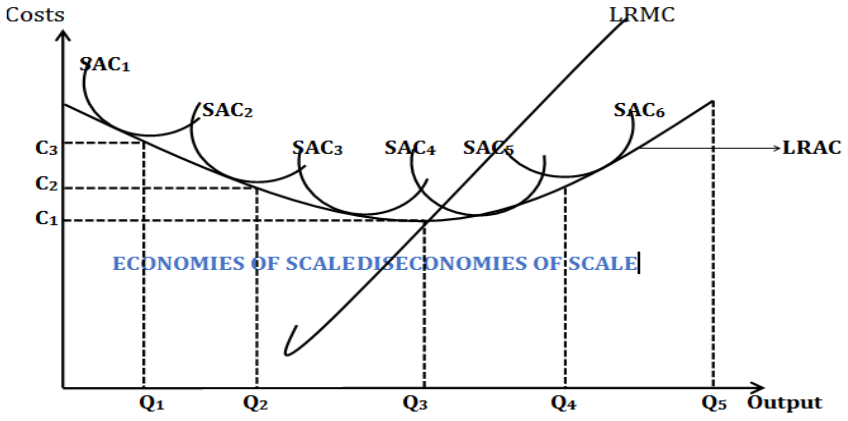
Considering the other concepts economies of scale and diseconomies of scale have been defined by several scholars just like returns to scale but the main thought is that economies of scale arise when the cost per unit falls as output increases while its counterpart diseconomies arise when cost per unit increases as output increases, the standard upon which economies of scale is measured is the LRAC(Long run average cost) which is usually the summation of all short run average total cost intersected by the LRMC(Long run marginal cost) at the minimum point of LRAC , a point which depicts constant returns to scale. The business dictionary makes this assertion,

The reduction in long-run average and marginal costs arising from an increase in size of an operating unit (a factory or plant for example). Economies of scale can be internal to an organization (cost reduction due to technological and management factors) or external (cost reduction due to the effect of technology in an industry).

The whole of this boils down to that,

- Economies of scale necessarily occur in the long run when all productive inputs are variable i.e. no productive inputis fixed.
- Economies of scale can be achieved by increasing input/scale of production.
- The costs (average and marginal) must necessarily reduce as more is produced.
- Economies of scale are classified into two,
- **Internal:** Arising within the company i.e. from managerial efficiency,
- **External:** Arising from extraneous factors such as number of firms in the industry.

Geometrically we can have the relationship of economies and diseconomies of scale as thus:



Explanation of the Graph

- As the firm moves from $Q_1$to Q_2 to Q_3 it experiences economies of scale because the LRAC (long run average cost) continually falls from C_3 to C_2 to C_1 within the range.
- From Q_3 henceforth (immediately LRMC cuts LRTC) the firm experiences diseconomies of scale, because as the LRAC increases, output the cost per unit also increases.

Given here are some illustrations to distinct increasing returns to scale, decreasing returns to scale, economies of scale and diseconomies of scale.

Illustration 1: Increasing Returns to Scale Given One Input Factor (Labour)

Chamberlain Limited initially used 10 men for its production of 100 bags of cement in January. It then increased the men to 15 (50% increase in input) and as a result the output increased to 160 bags of cement (60% increase in output), this is an illustration of increasing returns to scale since the proportional increase in input(50%) caused a greater proportional increase in output(60%).

Illustration 2: Economies of Scale

Daily Times limited, a broadcasting company incurs a Long run total cost of $6000 to produce 100 copies of a magazine but just only $8000 to produce 1000 copies of the same magazine. The Long run average cost of this company has fallen from $60 to $8 i.e. (LRAC=LRTC/output). A good reason such might have happened is because the main cost in producing a magazine (editing and design) is not related to the number of magazines produced since once done can be used for as many output as desired. This is an example of economies of scale

From these first two illustrations we can see that returns to scale is telling us what benefit do you get from increased input but economies of scale is telling us that it is good for cost to reduce as output increases.

Illustration 3: Constant Returns to Scale Given One Input Factor (Labour)

A beading firm engaged the service of 20 men in February2012 who produced200000 pins in the year, and increased the number of men to 40 in March the following month who ended up producing 400 000 pins for the month. We can see in this instance that the proportional increase in input (50%) and output (50%) in February and March is the same therefore the firm has experienced constant returns to scale.

Illustration 4: Decreasing Returns to Scale Given One Input Factor (Labour)

Mr. Henderson a Baker used 10 bags of flour to bake 1000 loaves of bread in January; he then increases the bags to 15 in February but was able to bake just 1200 loaves with the 15 bags. In this instance the Bakery has experienced decreasing returns to scale because he increased his input by 50% but his output only responded with 20% increase.

Illustration 5: Diseconomies of Scale

In January the long run cost of input of Mr. Henderson for producing 1000 units of output is $20000 as such the LRAC is $20. The baker then produced 1500 units with a cost of $37500 in February the LRAC then becomes $25. The firms has therefore experienced diseconomies of scale since the cost per unit increased from $20 to $25 as the firm increased its output from 1000 units to 1500 units.

From my first time encounter with these economic concepts I am not yet convinced that,

- Increasing returns to scale is the same as economies of scale
- Decreasing returns to scale is the same as diseconomies of scale
- And this is what is found in most economics textbooks today, but I want my readers to have some clarifications in mind that when making these two assertions, which are:
- Economies of scale is about increasing benefit/output alongside decreasing cost per unit in the long runbut increasing returns to scale is about more output increase from a given increase in input, which can be experienced in both short and long run.
- Diseconomies of scale refers to increasing benefit/output alongside decreasing cost but decreasing returns to scale is about less output increase from a given input increase.

An analogy of this viewpoint of mine is also given by Wikipedia in the article "Economies of scale",

Economies of scale are related to and can easily be confused with the theoretical economic notion of returns to scale. Where economies of scale refer to a firm's costs, returns to scale describe the relationship between inputs and outputs in a long-run (all inputs variable) production function.

Therefore, if any economist is to say it boldly that economies of scale and increasing returns to scale mean the same thing; diseconomies of scale is same as decreasing returns to scale then their viewpoints warrant explanations.

CONCLUSIONS

When we talk of the amount of input used in production,*scale of production*, how output relates to changes in input *returns to scale*, Does cost per unit decrease or increase as output increases *economies of scale*. The main relation between the concept of return to scale and economies of scale is that returns tries to look at the proportion at which output changes to a proportional increment in input but economies of scale is trying to look at whether or not the firm is more efficient as it produces more goods.

Definition of Terms and Abbreviations

- **Production:** Creation of output (goods and services) from inputs (factors of production).
- **Scale of Production:** The quantity of inputs (factors of production used).
- **Returns to Scale:** How output responds to an increase in input size
- **Short Run:** A period in production when at least one factor of production is fixed.
- **SAC:** Short run average costs, is the cost per unit of output produced. This is arrived at mathematically by dividing short run total cost by number of outputs produced.
- **LRMC:** Long run marginal cost, this is cost that the firm will incur in the long run to produce an extra unit of output.
- **LRTC:** Long run total cost. This is the addition of all short run average cost; an example is given in the graph on economies of scale.

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