Output Effect of Efficiency of Indian Stock Market in Indian Economy-A Study in Programming-Input-Output Frame-work

Topic: Productivity and efficiency analysis 3
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The paper focuses on the output effect of the efficiency and productivity of stock market which is a gap area in current literature.

Concepts

Numerous studies of stock market used Efficient Market Hypothesis (EMH) and employed RWM, ARCH, GARCH, and EGARCH models. But EMH considers only free flow of information as an index of competitiveness of the market, ignoring all other facets of efficient competitive markets. Impact of inefficient market operations on market's productivity and its effect on output of the economy are not analysed in these studies. Above limitations of models used in investigations so far induced the authors to empirically examine the efficiency/ productivity of stock market operations in the emerging market economy of India in order to fill up some knowledge gap.

Models used in Investigation

This study uses Linear Programming Model to measure market efficiency and Input-Output model is used to evaluate the impact of different layers of market efficiency/productivity on output of 130 sectors of the economy. Dickey- Fuller test of unit root and Engel-Granger unit root test of residuals for evaluating the genuineness of the regression model are used to find whether the series are stationary (D Gujarati- Sangeetha, 2007).

Inputs and Output of Stock Markets

This paper uses the concept of efficiency for measuring efficiency of stock markets in terms of their performance. Performance is measured by outcomes of operations in stock markets. The inputs used in stock markets operations:
(1) Number of shares; (2) Number of companies whose shares are traded; (3) Number of traders involved in market operations/transactions; and (4) Total transactions that occur on daily basis. Data have been taken from the website of BSE.

Linear Programming Model
Objective function- Maximize
Z = Sum(Pij Xij) .... (1)
i= 1,2,........12, and j=1,2,........30.
Subject to
Sum(aij Xij <= Yij) .... (2)

and Xij >= 0, Yij >= 0, for all i and j, and, Pij >= 0 for all i and j; Pij refers to price of ith Month of jth company's shares; Xij refers to shares of jth company actually sold in i-th month; Yij denotes total number of shares of jth company on offer for sale in i-th month, and aij are the coefficients.
In the L.P. model, number of shares sold and purchased is treated as resource inputs and output is measured by the volume of trade. Since the study is exploratory, for simplicity, we focus on monthly data, though it conceals rather than reveals the degree and direction of volatility which generally characterise the operations of stock markets all over the world.

The efficiency, and hence, the productivity of the market will vary significantly between the months and companies. Analysis of company wise data for each month separately will facilitate the identification of the month of the year which furnishes the best results. The worst performance month will also be identifiable. The average performance of all months will lie between these two extremes.
These results will furnish three different options for feeding investment data as final demand of input output model. An alternative exercise will be the identification of the best, worst and average performance companies. DEA will be useful for this part of the study. These results will offer another alternative. The standard Leontief static model will be used for this part of the exercise.

Appendix

A separate model is briefly outlined hereunder. Price of shares and number of transactions are treated as inputs and volume of trade is considered as the outcome/output of these two inputs. The following is the objective function:

Maximise

$$Z= a_i .U_{1i} +b_i .U_{2i}$$

Subject to

$$C_i .V_i =1 \qquad (1)$$
$$a_1.U_{11} +b_1.U_{21} - c_1 .V_1 <= o \qquad (2)$$
$$a_2.U_{12} +b_2.U_{22} - c_2 .V_2 <= o \qquad (3)$$
$$a_3.U_{13} +b_3.U_{23} - c_3 .V_3 <= o \qquad (4)$$
$$a_4.U_{14} +b_4.U_{24} - c_4 .V_4 <= o \qquad (5)$$
....
$$a_{30} .U_{1,30} +b_{30} .U_{2,30} - C_{30} .V_{30} <=0$$

Non-negativity constraints are $a,b,c>=0$ and $U_i, V_i >=0$, where

a: Coefficients of output of number of transactions
b: Coefficient output of volume of trade
c: Coefficient of input prices
U_{1i}: Number of transactions
U_{2i}: Volume of trade
V: Input prices.

Selected References

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