INPUT OUTPUT MODELING OF IMPACT OF STOCK MARKET ON GENERAL AND UNIT PRICES OF MUTUAL FUNDS

Ritisnigdha Panigrahi*
Shri Prakash**

Stock markets are known world over for their volatility and fragility. Besides, gold, real estate, and commodity futures' markets move in unison with stock market. Among these four, gold and real estate markets are much more stable than stock market. All the financial institutions, business houses and economies are affected directly or indirectly by the state as well as changes in the stock market. In and outflows of domestic investment happens to be related to the stock market. In and outflows of foreign investment, including FDI, are also directly related to the stock market. So far as mutual funds are concerned, returns to investors directly depend greatly upon the prices of stocks in which the given MFs (mutual funds) companies have parked their investment. *This paper attempts to analyze the impact of changes in stock prices upon the returns of mutual funds, and hence, unit prices, on the one hand, and impact of in and outflows of investment in mutual funds on the output and growth of different sectors on the other.* An Input output model has been developed for this purpose. The model has been supplemented by an econometric model. Stock market behavior has been linked to mutual funds which, in turn, have been linked to IO model. Other statistical tools have also been used.

Prologue

The financial sector reforms, role of regulatory authorities and high rate of increase in income, and hence, savings attracted investors towards stock market and mutual funds in 1980s. The attraction has been also raised by the link of investment in mutual funds to the savings in income tax liability. Mutual funds furnish advantage of experience, knowledge and expertise about stock market operations to their patrons. Patrons of MF companies comprise largely middle and upper middle income groups without much knowledge of stock market operations and risk seeking propensity. Most of them are risk averters rather than risk seekers. To the best our information, the problem has not been studied so far, especially in input output frame work.

The rapid development of stock market since mid-eighties made investment in mutual funds popular, though UTI had introduced mutual funds as an investment option in Indian economy in early sixties. The mutual fund companies of the country have developed with the growth of stock market. It is because returns from investment in stocks and mutual fund companies' are greatly related.

*Research Associate, Bimtech, E mail - rritisnigdha@gmail.com
** * Dean,Research,Bimtech,Plot No-5,Knowledge park-II,Greater Noid and,
E mail - Sri.prakash@bimtech.ac.in

Dependence of unit prices of mutual funds upon prices of stocks is three layered: Changes in stock market index affect unit prices in a general way so far as prices of most stocks tend to rise or fall together. So a rise in index is expected to raise the prices of stocks held by mutual funds also. Besides, prices change in stock markets both within and between days. So there is a great deal of volatility in stock prices, which affects the volume of investment. Relation of MF companies with stock market may impact volatility to unit prices. Secondly, changes in unit prices and volume of investment funds are directly related to the changes in prices of stocks held by MF. companies. So there is a direct relation between stock market and unit prices of mutual funds. If the prices of stocks increase, then the prices of units of mutual funds also tend to rise. But the impact of changes in stock prices will impact unit prices both directly and indirectly through their linkages with the economy for the study of which we have developed an input output model.

Can we consider price of different stocks as the price similar to the prices of other commodities and services? This is the price of money invested in a stock. But investment is real capital. So we may define the price of a stock as the price of a capital asset.

Objectives:

The study seeks to fulfill the following objectives.

- The first objective is to find out sector-wise distribution of Total Investment of MFs;
- Second objective is to find out forward and backward linkages, since the growth effect of investment depends on, besides the quantum of investment, the linkages of the sectors attracting investment from Mutual Funds;
- The third objective is to find out the impact of investment in different schemes in mutual funds to and impact of investment on different sectors of the economy
- Fourth objective is to determine the output effect of total Investment of Mutual Funds and its variation among sectors.

- Another objective is to determine the validity of the twin theorems relating to comparative economic statics of input output modeling which have been used to develop the model for this study.

Impact

Impact emerges in the short run. Besides, it is mostly direct, and hence, only partial. It may also be analyzed by regression models. But effect emerges in the long run. It is both direct and indirect, and hence total. If our data base is time series, we can capture only short run trend that shall entail impact. As against it, cross section data base furnish long run effect of change. Time series and cross section both constitute our data base. The results of analysis of time series data of stock market embody impact of change in equity price on investment. But IO table is cross section of 130 sectors. It yields estimates of output effect and price effect of stock market via unit prices of mutual funds.

Models

The following models have been employed in the study:

1. Model of Contribution of schemes to funds has been used to determine the impact of investment of different schemes on different mutual funds. A model has been used to determine the impact of investment of mutual funds on different sectors of the economy.
2. Input Output Model has been used to determine the output effect of investment of MFs on different sectors of the economy; and
3. We have used Prakash(1992) Model of linkages to determine the growth effect of investment, which depends on, besides the quantum of investment, the linkages of the sectors attracting investment from Mutual Funds
4. ANOVA and CV have been used to determine variation of output effect of MFs among the sector.
5. Regression Model has been used to estimate the effect of average price of stock market on prices of mutual funds. The model has also been used to derive estimates of investment by MFs in different sectors of the economy,

Input Output Models

Input Output is double entry book keeping accounting system.
Traditional Input Output model approach is demand driven.
Supply side model considers supply response to demand, we have combined accounting approach with supply side model a la Ambika Ghose(1959). Supply side model of contribution of schemes to total fund mobilized MF comprise may be synoptically presented as follows:

Contribution of Schemes to Mutual Funds

Schemes/ MFs	1,2,3,……,18	Total
1	Z_{11}, z_{12}, z_{13}……,z_{118}	Z_1
2	Z_{21}, z_{22}, z_{23}……,z_{218}	Z_2
3	Z_{31}, z_{32}, z_{33}……,z_{318}	Z_3
.	……	.
30	Z_{301}, z_{302}, z_{303},……, z_{3018}	Z_{30}
	z_1……z_{18}	Z

There are 30 schemes and 18 mutual funds covered by the study. These are major fund operators. First subscript refers to the scheme and second refers to the mutual fund. So each row shows the contribution of the given scheme to different mutual funds. As against this, columns show the contribution of different schemes to the mobilization of investment by the given mutual fund company.

Balance equation of the system may be given by the following:

$$\sum z_{ij} = z_{i1} + z_{i2} + \ldots\ldots\ldots\ldots + z_{i18} \quad \ldots\ldots\ldots\ldots (1)$$

$$Z_j = \sum z_{ij} = z_{1j} + z_{2j} + \ldots\ldots\ldots\ldots + z_{30j} \quad \ldots\ldots\ldots\ldots (2)$$

$$Z_i = \sum_{i}^{18} z_{ij}, \quad i = 1,2,3\ldots\ldots\ldots\ldots 30.$$

Where i stand for ith scheme and j represents jth mutual fund company.
This equation embodies the forward linkage of each specific scheme with mutual fund companies. Similarly, column shows the backward linkage of a given fund with different schemes. Allocation coefficients of total investment mobilized through a scheme by different MF companies is obtained by the individual row entries by row total. The scheme based structure of the total investment mobilized by an individual company is derived by the division of column entries by column total.
We can have another balance equation for the scheme composition of the funds mobilizes of the company.

$$\sum s_i = S$$

$$s_j = \sum_{i=1}^{30} s_{ij}, \quad j = 1,2,3,\ldots\ldots\ldots\ldots\ldots 30.$$

This represents the backward linkage of a company with respect to the schemes. The volatility of stock market gets transmitted to unit prices of mutual funds.

Contribution of funds to sectors

MFs/Sect.	1, 2, 3,…… ,42	Total
1	s_{11}, s_{12}, s_{13}……,s_{142}	S_1
2	s_{21}, s_{22}, s_{23}……..,s_{242}	S_2
3	s_{31}, s_{32}, s_{33}……,s_{342}	S_3
.	……	.
18	s_{421}, s_{422}, s_{423}, ……,s_{1842}	S_{18}
	s_1……s_{42}	S

Note: sectors have serially numbered, which do not correspond to sector code on the table.

In the above table there are 42 sectors and 18 mutual funds. First subscript refers to the sector and second subscript refers to the mutual fund. So each row shows the contribution of the given sector to different mutual funds. As against this, columns show the contribution of different sector to the mobilization of investment by the given mutual fund companies.

Balance equation of the system may be given by the following:

$$S_j = \sum_{i}^{18} s_{ji}, \quad i = 1,2,3\ldots\ldots\ldots\ldots 18.$$

Where j stands for jth scheme and i represent 18 mutual funds companies.
This equation embodies the forward linkage of a specific scheme with companies.
Similarly, we can have another balance equation for the scheme composition of the funds mobilizes of the company.

$$S_i = \sum_{j}^{42} s_{ji}, \quad j = 1,2,3,\ldots\ldots\ldots\ldots\ldots 42.$$

This represents the backward linkage of a company with a sector. There are 2 matrices of co-efficient have been estimated as follows:
S_{ji} / S_i , j ranges from 1 to 42 and i ranges from 1 to 18.

Input Output Model of Impact of Unit Prices on General Prices

The input output price model is the dual of quantity model which is as follows:

$P = V (I-A)^{-1}$ ……(1)

Where P is commodity price vector, $(I-A)^{-1}$ is Leontief Inverse, and V is value added vector per unit of output. Modeling of impact of unit prices on general price has been based on this model. First we normalize the unit prices as return on rupee one in mutual fund. Thus, unit price is nothing but return on one rupee worth of investment in mutual funds. These unit prices are then used to form value added vector, V, to modify the standard IO price model. The vector V_1 is net of wages and returns on components of capital other than investment by MF companies. The modified model is

$P_1 = V_1 (I-A)^{-1}$ ……(2)

Now we consider the mechanism of calculation of unit prices of mutual funds.

Unit prices are derived from NAV and changes thereof:

(GVA-E)= NAV;..... (2)

UP = NAV/UI;

Where GVA and NVA are gross and net values of assets of mutual funds, E denotes expenses incurred by mutual funds, UP shows unit price, while UI shows total units issued to investors. GVA depends on returns earned by MFs from investment in different instruments, including stock market. In order to isolate earnings from stocks market from earnings of other instruments, we have to first estimate

GVA (1) = GVA-GVA (2) ……(3)

Where GVA (2) represents gross value of assets other than stocks, and
GVA (1) is gross value of assets associated with stock market.

GVA (1) = Total Stocks Held/No. of Shares

The base of modeling of mutual funds shall be the level of in and out flows of funds in to the stock market. The structure of Inflows-Outflows of funds table is likely to be as follows:

Inflows into Mutual Funds and their Schemes

Inflows of funds in to mutual funds From/To	I II III……XXI 1……m
1)House Holds 2)Banks 3)Corporates 4)Educational Institutes 5)Health Institutes . 0)Others	x_{11} x_{12}……x_{1m} x_{21} x_{22}……x_{2m} . . . . x_{n1}……x_{nm}

Outflows from Mutual Funds and their Schemes

Outflows from funds from mutual funds From/To	I II III……XXI 1……m
1)Fixed and Variable returns Instruments 2)GIC 3)LIC 4)Infrastructure Bonds of Govt. . 30)Others	Y_{11} y_{12}……y_{1k} y_{21} y_{22}……y_{2k} . . …… . . . …… . . . …… y_{j1}……y_{jk}

The above tables shall be integrated in the basic production model of input- output. The model shall be worked out empirically with the help of 2003-04 input-output table of India and data collected about flow of funds from different sources about in and out flows of mutual funds.

Outflows from mutual funds from different instruments have been classified into appropriate sectors of input output table. These sectors flows are treated as then constitute final demand for input output model;

$X= (I-A)^{-1}F$

The above model uses two theorems of Comparative Economic Static of Input Output Modeling (1988) which are out lined below:

Theorem – 1

If the final demand of commodity j increases, while final demand of other sectors remains zero, output of all sectors increases, if Δ fj > 0, i≠j and Δ fi = 0 for all i except j, then ΔXj > o for all j(Prakash,1988, For proof, see appendix). Then, the model shall be

$\Delta X = (I - A)^{-1} \Delta f$ …… (4)

Let $\Delta X = (\Delta X_1 \ \Delta X_2 \ \ldots\ldots \Delta Xj \ \ldots\ldots\ldots\ldots \Delta Xn)$ … (5)

Where $\Delta X >= 0$.

Theorem-II

If the final demand for commodity j increases, while the final demand for all other commodities remains constant, gross output of each commodity increases but the largest increase in gross output is recorded by industry j itself:

If Δ fj > 0, i ≠ j

and Δfi = 0 for all i ≠ j

Then, ΔXj > 0 for all j …… (6)

and

ΔXj > ΔXi for all i ≠ j …… (7)

Model of Linkages

Output depends upon two things:

- Forward Backward and Residentiary Linkages; and
- Final Demand.

Final demand is given exogenously. Linkages are derived from the structure of production. Greater the stage of development of the economy, higher is the linkage

index and greater is the inter dependence between the sectors. Linkage will determine the magnitude of output effect. But degree of interdependence differs from sectors to sector. So, even the same level of final demand, in our case investment by mutual funds, will have differential output effect on different sectors due to differences in linkages.

We have preferred Prakash(1992) model of linkages to Rasmussen model. The model is outlined below:

Backward Linkages

The backward linkage of sector j is given by the following equation:

$$BLj = \sum_{i}^{n} A_{ij} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

j = 1,2,3,……………….......n

Where BLj is backward linkage of sector j and Aij are the elements of Leontief Inverse.

Similarly, the forward linkage of sector j is given by the following equation:

$$FLj = \sum_{j}^{n} Aji \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

j = 1,2,3,………………….n

Average linkage is estimated as follows:

ABLj =(BLj + FLj) /2…………………………..(7)

Rasmussen has used technology matrix A for estimating backward and forward linkages. Thus, he overlooks the indirect linkage effect. The above model eliminates these limitations of Rasmussen model. Empirical applications of two models have shown that the results derived from Prakash model are closer to the observed output effect of linkages.

Regression Model

$$Up_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + e$$

Where up_i is unit price of the MF, x_1 is volume of transactions in stock market, and x_2 is volatility index of daily prices.

Impact of Unit Prices on General Prices

$P_1 = v_1 (I - A)^{-1}$
$P_2 = v_2 (I - A)^{-1}$
v_1 = As respected in the table
v_2 = up/10

Empirical Analysis

We have organized empirical results in three parts:

(i) First part focuses on results of contribution of different schemes to mutual funds and contribution of mutual funds to different sectors;

(ii) Second part deals with the level and structure of linkages of the sectors absorbing investment from mutual funds. We postulate that greater the backward linkage of the given sector, greater is its dependence for inputs on output of other sectors. So growth of output of this sector induces growth of output of other sectors. Similarly, greater the forward linkage of a sector, greater is its role in the growth of sectors using its output as intermediate input. Growth of output of the given sector mitigates supply constraints of other sectors. This makes output effect of mutual funds partially, if not wholly, depend upon the degree and spread of linkages;

(iii) Third and last part deals with the sector wise and overall output effect of mutual funds on all sectors of the economy.

First, we analyze Contribution of different schemes to mutual funds,
then we shall analyze contribution of mutual funds to different sectors.

Can we consider the price of different stocks as the price similar to the price of the commodity and services? This is the price of money invested in a stock. But investment is the really capital. So we may define the price of a stock as the price of capital asset.

Contribution of Different Schemes to Mutual Funds

Schemes to Mutual Funds	**Minimum**	**Maximum**	**Range**
Average	34	12,380,489	12,380,455
SD	127	45,763,852	45,763,725
CV	363	370	7

Maximum	538	193,778,280	193,777,742

The minimum average value of investment in any of the 30 schemes of 18 mutual funds is 34 Rs lakh and maximum average investment is 12,380,489 Rs lakh. Thus there seems to be a great deal of variation of investment in different scheme. The magnitude of investment in a scheme may be taken to represent its popularity among investors. So the range is 12,380,455 Rs lakh, which is extremely high range.
The inference about variability is supported by the coefficient variation of the investment, which are ranges from 363 Rs lakh to 370 Rs lakh.
The minimum standard deviation of investment of 30 schemes to 18 mutual funds is 127 Rs lakh and maximum standard deviation of investment is 45,763,852 Rs lakh. So the range is 45,763,725 Rs lakh, which is extremely high range.
The minimum of maximum investment of 30 schemes to 18 mutual funds is 538 and maximum of maximum investment is 193,778,280 Rs lakh. So the range is 193,777,742 Rs lakh, which is extremely high range.
The variability is further examined more rigorously by the results of ANOVA.

Supply of Funds through Schemes

This defines by the structure of final demand. p_{ij} is the fund mobilized by ith scheme per rupee worth of investment of jth companies.

ANOVA: Two-Factor without Replication of Supply of funds through Schemes

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows	5.77119E+15	17	3.39482E+14	4.40024764	1.641E-08	1.643523721
Columns	2.94718E+15	29	1.01627E+14	1.31725237	0.127107188	1.490592983
Error	3.80353E+16	493	7.71506E+13			
Total	4.67536E+16	539				

Between schemes fund mobilization does not differs significantly. But the contributions to fund of different scheme do differ significantly.

Contribution to coefficients of different schemes from mutual funds

Schemes to Mutual Funds	Minimum	Maximum	Range
Average	1.25731E-06	0.453192666	0.453191409
SD	1.25841E-06	0.453477774	0.453476515
CV	0.983175405	1.000870271	0.017694866
Maximum	1468991.199	5.29371E+11	5.29369E+11

The minimum average value of investment in any of the 30 schemes of 18 mutual funds is **1.25731E-06** Rs lakh and maximum average investment is **0.453192666** Rs lakh. Thus there seems to be a great deal of variation of investment in different scheme. The magnitude of investment in a scheme may be taken to represent its popularity among investors. So the range is **0.453191409** Rs lakh, which is extremely high range.

The inference about variability is supported by the coefficient variation of the investment, which are ranges from **0.983175405** Rs lakh to**1.000870271** Rs lakh.

The minimum standard deviation of investment of 30 schemes to 18 mutual funds is **1.25841E-06** Rs lakh and maximum standard deviation of investment is **0.453477774** Rs lakh. So the range is **0.453476515** Rs lakh, which is extremely high range.

The minimum of maximum investment of 30 schemes to 18 mutual funds is **1468991.199**

and maximum of maximum investment is **5.29371E+11** Rs lakh. So the range is **5.29369E+11** Rs lakh, which is extremely high range.

The variability is further examined more rigorously by the results of ANOVA.

Co-efficient of Supply of funds through Schemes

Per unit of investment generated by TATA, Contribution of P1(1st scheme) is **44,142,736.**

These are supply side coefficients structure of relative contribution from different scheme.

ANOVA: Two-Factor without Replication of Coefficients of Supply of funds through Schemes

ANOVA						
Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Rows	1.4532E-08	16	9.08249E-10	1.2495E-06	1	1.665338146
Columns	3.194867215	29	0.110167835	151.559591	3.2589E-216	1.492034894
Error	0.337279053	464	0.000726895			
Total	3.532146282	509				

From the above table between schemes fund mobilization differs significantly. But the contribution to fund of different scheme does not differ significantly.

Contribution to different sectors from mutual funds

Sectors to Mutual Funds	**Minimum**	**Maximum**	**Range**
Average	**1.193655**	**1171556**	**1171555**
SD	**1.448654**	**4866903**	**4866902**
CV	**121.3628**	**422.8191**	**301.4563**
Maximum	**5.581736**	**20672734**	**20672728**

The minimum average value of investment in any of the 30 schemes of 18 mutual funds is**1.193655** Rs lakh and maximum average investment is **1171556** Rs lakh. Thus there seems to be a great deal of variation of investment in different scheme. The magnitude of investment in a scheme may be taken to represent its popularity among investors. So the range is **1171555** Rs lakh, which is extremely high range.
The inference about variability is supported by the coefficient variation of the investment, which are ranges from **121.3628** Rs lakh to **422.8191** Rs lakh.
The minimum standard deviation of investment of 30 schemes to 18 mutual funds is **1.448654** Rs lakh and maximum standard deviation of investment is **4866903** Rs lakh. So the range is **4866902** Rs lakh, which is extremely high range.
The minimum of maximum investment of 30 schemes to 18 mutual funds is **5.581736** and maximum of maximum investment is **20672734** Rs lakh. So the range is **20672728** Rs lakh, which is extremely high range.
The variability is further examined more rigorously by the results of ANOVA.

Supply Determined Allocation Pattern

It is assumed that Mutual Fund companies invest in sector's returns from which are expected to be higher.

q_{ij} is the amount of investment mobilized by ith mutual fund company for sector j of the economy.

ANOVA - Supply based Allocation Pattern

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows	8.48742E+13	17	4.99E+12	7.833666	3.85E-18	1.637442
Columns	2.7274E+13	41	6.65E+11	1.043764	0.398681	1.40664
Error	4.44216E+14	697	6.37E+11			
Total	5.56365E+14	755				

The fund contribution to different sectors differ significantly, but between the mutual fund companies the contribution to different sectors not significantly different. Both the results complement to each other.

Contribution to different sectors from mutual funds

Sectors to Mutual Funds	**Minimum**	**Maximum**	**Range**
Average	**2.55357E-07**	**0.250629**	**0.250629**
SD	**9.98853E-08**	**0.335575**	**0.335575**
CV	**0.007523337**	**0.026211**	**0.018687**
Maximum	**9.06003E-08**	**0.335551**	**0.335551**

The minimum average value of investment in any of the 30 schemes of 18 mutual funds is **2.55357E-07** Rs lakh and maximum average investment is **0.250629** Rs lakh. Thus there seems to be a great deal of variation of investment in different scheme. The magnitude of investment in a scheme may be taken to represent its popularity among investors. So the range is **0.250629** Rs lakh, which is extremely high range.
The inference about variability is supported by the coefficient variation of the investment, which are ranges from **0.007523337** Rs lakh to **0.026211** Rs lakh.
The minimum standard deviation of investment of 30 schemes to 18 mutual funds is **9.98853E-08** Rs lakh and maximum standard deviation of investment is **0.335575** Rs lakh. So the range is **0.335575** Rs lakh, which is extremely high range.

The minimum of maximum investment of 30 schemes to 18 mutual funds is **9.06003E-08**
and maximum of maximum investment is **0.335551** Rs lakh. So the range is **0.335551** Rs lakh, which is extremely high range.
The variability is further examined more rigorously by the results of ANOVA.

ANOVA - of Coefficients based on Supply

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows	1.77636E-15	17	1.04E-16	1.06E-13	1	1.637442
Columns	1.603156041	41	0.039101	39.68091	6.5E-154	1.40664
Error	0.686820294	697	0.000985			
Total	2.289976335	755				

The fund contribution to different sectors does not differ significantly, but between the mutual fund companies the contribution to different sectors significantly different.

Level and Pattern of Linkages

First we examine the backward linkages of 42 sectors in which mutual fund has been made. It carries more direct impact on growth than Forward linkages. Greater the backward linkage and larger is its spread over sectors, greater shall be the output effect of investment. Backward linkages vary between the sectors and its spread also differs. But both intensity and spread of linkage affects output effect, of the 42 sectors receiving investment from mutual fund. Minimum backward linkage is for Medicine and Health and maximum is for Electricity. Obviously Medicine and Health industry has low intensity and even lower sector spread of backward linkage. So the result is not surprising. Electricity obviously has maximum dependence on other sectors and both its intensity and spread are expected to be higher.

Out of the 42 sectors receiving investment of mutual fund, minimum forward linkage is for Tea and maximum is for Communication equipments. As Communication equipments industry includes both consumer and producer goods and these have been among the rapidly growing sectors of India during last 2 decades. This has made not only this industry to grow fast but to influence the growth of other industries. All IT based industries use Communication equipments as intermediate inputs. Now we move analyze the output effect of FI.

Output Effect of Mutual Funds

Inter sector variation of output effect of Investment on Mutual Funds in 2003-2004 has been analyzed by means of CV and ANOVA.
Total investment of mutual fund in Indian Economy was Rs 55805.7 crore in 2003-04. We have classified output effect into 2 groups: i) Output effect of Total Investment on Mutual Funds in 42 sectors of the economy, taken together, on individual sectors,; and ii) Output effect of Total Investment on Mutual Funds in one sector on other sectors of the economy.

Investment on Mutual Fund has been absorbed in 42 sectors out of 130 sectors. 88 sectors did not attract Investment on Mutual Funds. Investment is an important element of final demand. Total investment on Mutual Funds comprises two parts: Investment on Public Mutual Funds, and Investment on Private Mutual Funds. We have taken Investment on Mutual Funds as a whole rather than in its two parts. Final demand vector comprises investment on Mutual Funds in 42 sectors and the rest of the elements are zero. Output effect has been estimated form the models outlined under the section models. The specially constructed final demand vector serves two purposes: i) investment on Mutual Funds effect has been isolated from the effects of other components of final demand; and ii) effect of final demand on output of 88 sectors, where Investment on Mutual Funds was not made has also been eliminated .

Sectoral Variation of Output Effect of Foreign Investment

Both types of output effect vary between the sectors. The degree of variation of output effect may be assessed from the results of ANOVA given below:

ANOVA of Output Effect of Investment on Mutual Funds in 42 Sectors, 2003-04

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows	5093676.748	129	39485.87	1.18739	0.0729	1.2143
Columns	8055866.052	129	62448.57	1.87791	8E-09	1.2143
Error	553384668.7	16641	33254.29			
Total	566534211.5	16899				

It is inferred from the results of ANOVA that i) both within sectors output is highly statistically significant and ii) between sector output effect of Mutual Funds is not significant. This is the inference drawn from between the rows variation, which shows the effect of total Investment of Mutual Fund (both public and private) in 42 sectors on each of the 130 sectors of the economy does not varies greatly. It is

statistically not significant; as F = 1.19 < F* = 1.21, the critical value of F. CV is also as high as 181.43 percent. Though, F = 1.88 > F* = 1.21, column wise variation is statistically significant.

Output Effect of Foreign Investment in Specific Sector

Each of the 42 sectors in which MFs is parked shows the output effect of investment in the sector (represent by that column) on all other sectors of the economy. Column wise maximum output effect on all the sectors of the economy is Rs 24729.79 crore; it is again related to Banking sector. The minimum output effect of Foreign Investment in Miscellaneous Manufacturing sector is Rs0.05395 crore, it is related to Beverages sector. But these effects of Investment of MFs vary from one sector to another. This is also supported by the results of ANOVA. Effect of Investment of MFs in an individual sector on different sectors of the economy is not significant, but the between column variation is significant. Calculated value of F is 1.88 which is greater than critical value of F. F* = 1.21.

Marginal output investment ratio

The output effect of Investment of MFs on the economy as a whole is as high as 188.6 percent of total Investment of MFs. Marginal Output Investment ratio is thus 1.886. It means that one rupee of foreign investment leads to an increase in output worth 188 paisa. Thus, it shows a high level of capital productivity.

The maximum output effect of Foreign Investment in the economy is 40.83 percent on Banking sector. Thus, it shows low productivity.

The minimum output effect of Foreign Investment in the economy is 0.000136 percent on Beverages sector. It means that one rupee of foreign investment leads to an increase in output worth Rs 0.0001 crore. Thus, it shows extremely low productivity.

Output Effect of Total Investment by MFs on Individual Sectors
(Rs. Crore)

Range	0-500	501-1000	1001-1500	1501-3500	3501-5250	5251-7000	7001-25000
Sectors	91	14	5	13	4	2	1

Output Effect of Investment in Given Sector

Range	0.1-8.0	8.0-20.0	20.0-40.0	40.0-50.0	50.0-70.0	70.0-200.0
Sectors	112	6	3	3	4	2

ANOVA of Maximum and Average Output Effect

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows	44274002	1	44274002	7.908821	0.007515	4.078546
Columns	2.39E+08	41	5829225	1.041295	0.448774	1.681644
Error	2.3E+08	41	5598054			
Total	5.13E+08	83				

Maximum output effect and average output effect do not differ significantly between the sectors. But Maximum output effect and average output effect significantly vary within the sectors.

.

Stock Market Volatility and mutual funds

$Y = -1321.4 - 29.134x_2 - 1642.31\ x_3$, $R^2_{1(23)} = 0.983$

t : 3.21 5.43

These are the results of multiple regression.

$Y = 3.78946 + 0.317897x$, $R^2_{1(23)} = 0.12$ or 12%

t: 3.05 1.76 $F = 2.254$, $F^* = 0.152$

It implies corresponding to a change of rupee one change in the stocks, change in unit price of mutual fund is 32 paisa. But according to our multiple regressions,

volatility depends upon the volume of trade. So volatility of stock markets affects the volume more than the stock prices. Since unit prices are also depend upon the volume that reflects the NAV.

Impact of unit prices on general prices

Generally unit prices are affected by the stock market, that volatility is carry forward by general prices. From our results, we get 50 percent is accounted by the impact of unit prices via stock market. Another 50 percent is accounted by Intermediate Inputs, Wage and Salary, Capital Components other than mutual funds and loan and other components. Practically all the mutual funds invest their funds in all sectors of the economy. Because they diversify their fund into all sectors to mitigate risk and maximize return.

Conclusion

The capital marginal productivity of mutual funds is higher than the productivity of Foreign Investment, because choice of portfolio of mutual fund is better than FI. Generally FI look at quick returns from investment and MFs invest at least a period of 3 years.

References and Notes

Modeling of share price movements in NSE : An Empirical Study of Selected Cases, Shri Prakash and A. Ramasubramanian, Finace India,December 2006,vol xx No.4.

On Stability of Econometric Models of Financial Markets, Zbigniew Gontar, Wladyslaw Milo,University of Lodz, Poland.

Rasmussen, P.N.(1956), *Studies in Intersectoral Relations*, Amsterdam, North Holland.

Shri Prakash, Generalised Dynamic Linkage Pattern as a Base of Convergence of Unbalanced to Balanced Growth Theory: Some Methodological and Theoretical Issues with Application to Indian Economy, vol-II.

Shri Prakash and Ritisnigdha Panigrahi, Impact of Volatility of Stock Market on Foreign Investment and Growth of Indian Economy - A study in Input Output Framework, 2009, to be presented 17th International Conferences at Saopolo.

Shri Prakash and Ritisnigdha Panigrahi, Investors Choices of Mutual Funds And Their Schemes; A Study Of Inter Fund Variation In Returns, Sona Journal.

Ashish Garg and B.S. Bodla, Determinants of FIIS Investment in Indian Stock Market, Business Journal from Fore, March 2009,Vol.XXVI No. 4.

Agarwal R.N., “Foreign Portfolio Investment in Some Developing Countries: A Study of Determinants and Macroeconomic Impact”, Indian Economic Review, 32,No.2,pp.217-229,1997.

Aggarwal,R ”Exchange Rates and Stock Prices: A Study of the US Capital Markets Under Floating Exchange Rates”, Akron Business and Economic Review, Vol No. 12,pp 7-12,1981.

Venkateshwarlu, M and R. Tiwari,”Causality Between Stock Prices and Exchange Rates: Evidence for India,”2005.

“Foreign Institutional Investment in the Indian Equity Market: An Analysis of Daily Flows during January 1999 to May 2002”, Money and Finance ICRA Bulletin, April – September,pp. 21-51,2002.

Soenen L.A. and Aggarwal R., “Financial Prices as Determinants of Changes in Currency Values”, Paper Presented at the 25th Annual Meeting of Eastern Finance Association, Philadelphia,1989.

Soenen L.A. and Hennigar E.S.,”An Analysis of Exchange Rates and Stock Prices: The US Experience Between 1980 and 1986”, Akron Business and Economic Review, Vol No. 19, pp 71-76, 1989.