

## Chapter Two

# Impact of Housing Investment on Income Generation

### 1. Introduction

The analysis of inter-industry linkages of housing investment in Indian economy presented in the previous Chapter brings out the nature of interdependence between the output level in a given sector and the output levels in other sectors. It is evident in the light of such interdependence that a change in the final demand for the output of a given sector leads to changes in the output levels of almost all sectors of the economy. Moreover, when the sectoral output levels change due to a given change in final demand, value added by each sector also changes. This, in turn, leads to a change in national income, and consequently in personal income. Since the level of consumption expenditure depends primarily on the level of personal income, changes in personal income induce changes in aggregate consumption expenditure. This, in turn, implies changes in the final demand for the output of various sectors and, hence, it generates another round of changes in sectoral output levels, national income and consumption expenditures.

In view of the above considerations, it is obvious that any change in sectoral expenditure will have far-reaching implications in the form of a chain of repercussions on the output and income levels in all sectors of the economy. The overall impact of all these changes on the income generation in the economy as a whole can be measured by applying the technique of income multiplier analysis developed within the input-output framework. In this Chapter, we have made an attempt to examine the overall impact of housing investment on income generation, in relation to similar impact of investment in other sectors, in terms of an analysis of income multipliers computed for different sectors of Indian economy.

## 2. Concept and Measurement of Income Multiplier

Within the framework of an input-output model, it is possible to derive a set of income multipliers associated with increased expenditure in different sectors. These multipliers provide a summary measure of the total repercussions in terms of changes in output and net income in various sectors generated by a given change in the final demand for the output of a particular sector. The size of income multiplier indicates the extent of income leverage that is obtained by increasing the final expenditure in a given sector. Thus, given an input-output table, the income multiplier for  $j^{\text{th}}$  sector may be defined as the ratio of total direct and indirect, and sometimes also induced, additions to income in response to an initial expenditure of one unit in that sector.

The first step in calculating the income multiplier consists in the computation of direct income generated per unit of output in each sector. This is indicated by the value added proportions for different sectors. Since a unit of output produced in each sector requires inputs from several other sectors, an increase in the final demand for a given sector sets in motion a chain reaction of increased demand for the output of various sectors. Thus, the second round effects show the increase in output of various sectors that is required for providing additional inputs to the given sector, whose final demand has undergone an initial increase. Similarly, the third round effects show the increase in output levels of different sectors required to support the additional output generated in the second round. The chain would continue till the new equilibrium output levels are established.

The direct as well as indirect effects of a unit increase in final demand of a given sector are captured by the corresponding column of the Leontief Inverse in the open input-output model. The elements in the  $j^{\text{th}}$  column of the inverse matrix show the direct and indirect output requirements of various sectors to sustain a unit increase in the final demand of the  $j^{\text{th}}$  sector. Hence the total direct and indirect incomes generated by one unit of final demand can be computed by multiplying the elements of the given column by the corresponding value added proportions and aggregating them. The income multipliers can then be derived by dividing the total direct and

indirect income generated by the corresponding value added proportions for each of the sectors.

The income multiplier obtained by the above method captures the direct and indirect income effects of a unit increase in final demand of a given sector based on the assumption that, while the final demand of the given sector changes, the final demand of all other sectors remains unchanged. In reality, however, there exists a certain degree of inter-dependence among the final demands for the products of different sectors. Consequently, the final demand of other sectors may also change in response to any change in the final demand of a given sector.

The inter-dependence in the final demand of different sectors arises on account of two factors. Firstly, an increase in the output of different sectors may lead to an increased demand for investment expenditure, which in turn may produce a considerable effect on income. This effect becomes significant when the changes in final demand, and the resulting changes in sectoral output whose impact has to be assessed, are of a sizeable magnitude. For small changes, as are generally postulated in the marginal analysis, the total investment expenditure are not likely to change significantly and the same can, therefore, be treated as constant. The second factor, which introduces a significant element of interdependence in the final demand for different sectors, operates through the induced chain of secondary consumption responding arising out of an initial increase in income. This is the celebrated Keynesian multiplier effect. It states that an initial increase in the output and income levels leads to subsequent induced increases in final consumption expenditures which in turn generates secondary and tertiary changes in the output and income levels bringing about a series of chain reactions.

It follows from the above discussion that the income multipliers associated with a given change in final demand are of two types. The Type-I multiplier is based on the elements of the Leontief Inverse in the open input-output model. It shows the total direct and indirect income generation effect of a unit increase in the final demand of a given sector, assuming that the final demand of all other sectors remains constant. The Type-II multiplier takes into account not only the direct and indirect income

effect but also the induced income effect associated with the consumption multiplier. It indicates the sum total of direct and indirect as well as induced income generated by a unit increase in the final demand of a given sector, derived after considering the further increases in the sectoral output levels resulting from the induced increase in the final demand of the sectors.

To measure the size of the Type-II income multiplier, it is necessary to enlarge the technology matrix by incorporating the household sector within the framework of inter-sectoral transactions. To accomplish this, we can treat households as the production sector, whose output is net income or value added, and whose input requirement is consumption of goods and services. In such a treatment, we are essentially relating income to consumption, the latter being considered as the input necessary to produce the output in the form of income. Thus, in the extended technology matrix  $A^*$ , one row and one column are added to represent the household sector. The additional row represents the value added proportions for the respective sectors, while the additional column represents the proportion of total income spent in the form of final consumption expenditure on the products of the respective sectors. It may be noted that, introduction of the households sector within the framework of inter-industry transactions does not imply, in the above case, a closed system because the households do not spend all their income on consumption. A part of the household income is saved and invested, and a part is also paid in the form of taxes, which is, in turn, spent by the Government.

### **Limitations of Income Multipliers**

Two major limitations of the multipliers computed from the input-output table relating to a given reference year deserve special mention. Firstly, the multiplier effect indicated by the computed values of the income multipliers would operate in actual practice only to the extent to which there are no supply constraints and other bottlenecks in the economy. If the economy suffers from severe shortages of certain critical inputs in the short run, increased expenditure in a given sector may fail to bring about the corresponding increase in the output levels of related industries.

Consequently, the expected repercussions in the form of a chain of direct, indirect and induced income generation might fail to materialise.

Another major limitation of the income multiplier is that it looks at the problem of income generation in isolation from other important problems such as a more efficient and optimal utilisation of resources, the need for import substitution or export promotion, and the objectives of reducing income disparities or encouraging the production of certain specified industries. Thus, the industries having the highest multiplier effect might actually turn out to be relatively inefficient or less preferred when some of these other considerations are given due weightage.

### **3. Estimates of Income Multipliers**

To estimate the income multipliers for different sectors of the Indian economy, we have used the domestic technology matrix derived from the input-output table prepared by the Planning Commission for the year 1996-97. We have used the elements of inverse matrix  $(I+M-T)^{-1}$  for deriving the direct and indirect income multipliers for each of the fourteen sectors.

The estimates of income multipliers computed for each of the fourteen major sectors of Indian economy on the basis of input-output data relating to the year 1996-97 are presented in *Table 5* (Type-I) and *Table 6* (Type II). The Type-I income multipliers presented in *Table 5* capture the direct and indirect effects of a change in final demand of the given sector on the sectoral output and income levels based on the assumption that the final demand of all other sectors would remain unchanged.

**Table 5**  
**Estimates Of Income Multiplier (Type-I)**

Sl. No.	Sector	Income Multiplier	Sector's Rank
1	Agriculture	1.4169	6
2	Forestry & Logging	1.0887	13
3	Fishing	1.1411	12
4	Mining	1.2956	10
5	Construction related Manufacturing	3.1431	1
6	Other Manufacturing	2.7027	2
7	<b>Construction</b>	<b>1.9491</b>	<b>4</b>
8	Electricity, Gas and Water Supply	2.0650	3
9	Transport	1.8183	5
10	Trade	1.3301	7
11	Financial Services	1.2201	11
12	Social Services	1.3023	9
13	Public Administration and Defence	1.0000	14
14	Other Services	1.3047	8

It is evident from the estimates given in *Table 5* that the value of Type-I income multiplier varies considerably from sector to sector. Construction sector ranks fourth among 14 broad sectors in terms of the value of Type-I income multiplier. Construction related manufacturing sector has the highest value of 3.14 as its income multiplier. There are nine sectors for which the value of direct and indirect income multiplier is less than 1.5, while there are only two sectors for which the value of income multiplier exceeds 2.5. Type-I income multiplier for construction sector is estimated at 1.95. The three sectors whose income multiplier exceeds that of construction sector are : construction related manufacturing, other manufacturing and electricity, gas & water supply.

Estimates of Type-II income multiplier, which incorporate the direct and indirect as well as the induced effects of a change in sectoral final demand on the sectoral output levels, are presented in *Table 6*.

Sl. No.	Sector	Income Multiplier	Rank
1	Agriculture	3.4242	6
2	Forestry & Logging	2.6301	13
3	Fishing	2.7572	12
4	Mining	3.1304	10
5	Construction related Manufacturing	7.5939	1
6	Other Manufacturing	6.5288	2
<b>7</b>	<b>Construction</b>	<b>4.7098</b>	<b>4</b>
8	Electricity, Gas and Water Supply	4.9907	3
9	Transport	4.3928	5
10	Trade	3.2134	7
11	Financial Services	2.9481	11
12	Social Services	3.1461	9
13	Public Administration and Defence	2.4163	14
14	Other Services	3.1525	8

The value of Type-II income multiplier for the Construction sector is estimated to be 4.71 as against the corresponding value of 1.95 observed for the Type I multiplier. Thus, a unit increase in the final expenditure on the Construction sector would generate additional income in the economy as a whole, which would be almost five times as high as the direct income generated within the Construction sector itself.

Based on Type-II income multiplier, Construction sector ranks fourth among the 14 major sectors of the economy. The three sectors whose Type-II income multiplier exceeds that of Construction sector are : Construction related manufacturing, Other manufacturing and Electricity, Gas & Water supply. In fact the value of Type-II income multiplier is found to be significantly below 3.5 in all other sectors of the economy except transport, whose income multiplier is 4.39. Thus, Construction

sector is found to have a significantly higher income multiplier impact than most of the other broad sectors of the economy.

#### 4. Housing Expenditure and Sectoral Growth

The relationship between housing expenditure and sectoral growth can be examined in terms of the impact of an increase in housing expenditure on the output levels in different sectors. The estimates of inter-industry linkages of construction sector with other sectors in the economy constitute the basis for analysing the relationship between changes in housing expenditure and the corresponding changes in the output levels of different sectors. The estimates of direct and indirect backward linkages of expenditure in the construction industry help us to quantify the effect of a given increase in the housing expenditure in terms of the additional demand that it would generate for the output of different sectors. *Table 7* shows the direct and indirect increase in the gross output levels of various sectors that will be induced by a 10% increase in the final expenditure in the construction sector at 1996-97 prices.

Sl. No.	Sector	Increase in Gross Output	Increase in GDP at Factor Cost
1	Agriculture	6940	4897
2	Forestry & Fishing	1953	1791
4	Mining	607	468
5	Construction related Manufacturing	51449	16370
6	Other Manufacturing	30401	11251
7	Construction	141972	72835
8	Electricity, Gas and Water Supply	7169	3471
9	Transport	10599	5830
10	Trade	17355	13050
11	Financial Services	8268	6777
12	Other Services incl. Social Services & Public Admn.	4782	3670
	<b>TOTAL</b>	<b>281496</b>	<b>140412</b>



It is evident from the estimates presented in *Table 7* that a 10% increase in the final expenditure in the construction sector induces a significant increase in the output of almost every sector in the economy. On the whole, it will result in an increase of more than Rs.28 thousand crores in national gross output, which will translate into an increase of more than Rs.14 thousand crores in India's GDP at factor cost at 1996-97 prices, considering the direct and indirect income generation effects induced by the increased expenditure on Construction sector.

Estimates of the direct, indirect and induced increase in the gross output levels of various sectors resulting from a 10% increase in the final expenditure in the Construction sector are presented in *Table 8*.

Sl. No.	Sector	Type II Increase in Gross Output	Type II Increase in GDP at Factor Cost
1	Agriculture and Related Products	95517	67401
2	Forestry & Fishery	7091	6382
3	Mining	1313	1014
4	Construction related Manufacturing	70025	22281
5	Other Manufacturing	128476	47548
6	Construction	146068	74936
7	Electricity, Gas and Water Supply	20163	9762
8	Transport	34572	19017
9	Trade	52147	39211
10	Financial Services	20825	17068
11	Other Services incl. Social Services & Public Admn.	45191	34649
	<b>TOTAL</b>	<b>621388</b>	<b>339268</b>

As evident from *Table 8*, when we incorporate the induced income effects in addition to the direct and indirect income generation effects, 10% increase in the final expenditure in Construction sector will lead to an overall increase of more than Rs.62 thousand crores in national gross output, which will result in an increase of around Rs.34 thousand crores in India's GDP at factor cost at 1996-97 prices.

## **5. Sectoral Expenditure and Income Generation**

The estimates of income multipliers for different sectors constitute the basis for analysing the relationship between changes in sectoral expenditure and the resulting changes in the net income generated in different sectors. It would be interesting to examine the total direct and indirect additional income generated in the economy as a whole in response to a ten per cent increase in the final demand of a given sector. *Table 9* shows the total additional income in terms of GDP at factor cost at 1996-97 prices generated in all sectors taken together, resulting from additional sectoral expenditure equivalent to a ten per cent increase in the final demand in each of the sectors, keeping the final expenditure in all the remaining sectors unchanged.

It can be seen from the figures given in *Table 9* that, in terms of the direct and indirect income generation induced by increased sectoral expenditure, construction sector ranks third among the fourteen major sectors of the national economy. The total increase in the national income measured at 1996-97 prices resulting from a ten per cent increase in the final expenditure in construction sector, turns out to be Rs.14041 crores, which represents an increase of 1.2% in the aggregate GDP measured at 1996-97 prices. If we consider the total non-agricultural GDP, the additional income generation turns out to be 1.7% of non-agricultural GDP.

Sl. No.	Sector	Type I Increase in GDP at Factor Cost	Ratio of Additional GDP to Total GDP	Rank
1	Agriculture and Related Products	256826	2.2%	2
2	Forestry & Logging	6863	0.1%	14
3	Fishery	13428	0.1%	13
4	Mining	24376	0.2%	10
5	Construction related Manufacturing	42691	0.4%	9
6	Other Manufacturing	388060	3.4%	1
<b>7</b>	<b>Construction</b>	<b>140412</b>	<b>1.2%</b>	<b>3</b>
8	Electricity, Gas and Water Supply	14425	0.1%	12
9	Transport	68698	0.6%	6
10	Trade	104632	0.9%	5
11	Financial Services	16416	0.1%	11
12	Social Services	60899	0.5%	7
13	Public Administration and Defence	60277	0.5%	8
14	Other Services	116587	1.0%	4

The two sectors, for which the corresponding figures of income generation induced by ten per cent increase in the respective sectoral final expenditure are found to be higher than what is observed in the case of construction sector, are: Agriculture (Rs.25683 crores) and Other Manufacturing (Rs.38806 crores). In none of the remaining 11 broad sectors of the economy, which rank below Construction sector, the increase in GDP resulting from ten per cent increase in the sectoral final expenditure exceeds 1% of total GDP.

The above estimates do not include the induced income generation effect. The estimates of total additional GDP at factor cost at 1996-97 prices reflecting the direct, indirect and induced income effects generated in all sectors taken together resulting from a 10% increase in the final expenditure in each of the sectors is presented in *Table 10*. As in the case of earlier estimates based on Type-I income generation effects, Construction sector ranks third among the 14 major sectors when we consider Type-II income generation effects. Total increase in GDP resulting from 10% increase in final expenditure in Construction sector turns out to be Rs.34

thousand crores which amounts to almost 3% of the aggregate GDP measured at 1996-97 prices. Thus, an increase of 10% in the final expenditure on Construction sector has the potential of raising the growth of country's GDP by 3%. As the estimates given in *Table 10* clearly indicate, the overall growth potential of increased expenditure in Construction is significantly higher than all other sectors of the economy except Agriculture and Other Manufacturing.

Sl. No.	Sector	Type II Increase in GDP at Factor Cost	Ratio of Addl. GDP to Total GDP	Rank
1	Agriculture and Related Products	620647	5.38%	2
2	Forestry & Logging	16575	0.14%	14
3	Fishery	32436	0.28%	13
4	Mining	58890	0.51%	10
5	Construction related Mfg.	103136	0.89%	9
6	Other Manufacturing	937402	8.12%	1
7	Construction	339268	2.94%	3
8	Electricity, Gas and Water Supply	34841	0.30%	12
9	Transport	165950	1.44%	6
10	Trade	252758	2.19%	5
11	Financial Services	39639	0.34%	11
12	Social Services	147084	1.27%	7
13	Public Admñ. and Defence	145612	1.26%	8
14	Other Services	281680	2.44%	4

We can conclude from the above analysis that increased investment in the construction sector has a significant impact on the level of national income. It is also evident that the income generating potential of housing investment can be regarded as fairly high especially in relation to that of comparable investment expenditure in several other sectors of the economy.