CHAPTER - III

AN EXPORT BASE MODEL FOR TRIPURA

An export base growth model, being an analytical framework to link regional development with the national demand for the products of the region, is most suitable for small regions characterised by openness. The operational efficacy of such a model thus depends \textit{inter alia}, on three conditions concerned with the basic character of the regional economy. Firstly, the region must be so small that its income and tempo of its development are likely to be determined by the national demand for its product, but the region itself is unable to influence the national economy to any significant extent. Secondly, historically the development of the region must have been vitally influenced by the factors exogenous to its economic structure. Thirdly, the region should preferably be one which is still in its early stage of economic development, so that it can not progress meaningfully by endogenous growth alone.

These tests of applicability are easily satisfied by Tripura, the tiny State in the north-eastern part of India. Tripura has an area of just 10,477 sq. km. and has a population of 15,56,342 persons according to the census conducted in 1971. Tripura's area constitutes only 0.31 p.c. of total area of India and her population is only 0.29 p.c. of the national population. According to the State Statistical Department, Tripura's net domestic product (at factor cost) at current prices in 1970-71 was about `4,7,962 lakhs, only 0.23 p.c. of net domestic product.
(at factor cost, current prices) of India (which was Rs 34,909 crores in 1970-71 according to C.S.I. estimates.) Secondly, development of Tripura, after its integration with India in 1949, has been piloted by a dynamic government sector supported by massive resource transfer from the Centre. An enquiry into the budgets of Government of Tripura reveals that during the '60's and early '70's more than 90 p.c. of the State government expenditure was financed by Central aid (grants and loan). Resource transfer by the Centre varied between 21 p.c. and 30 p.c. of the net domestic product of the State. The table No.3.1. sets in juxtaposition Tripura's net state domestic product, government expenditure, government receipts from within the State, and Central aid flow to Tripura during the '60's (values are estimated at current prices). The table shows that Central economic intervention introduces an exogenous influence of vital importance for Tripura's economy. The avowed objective of the generous flow of transfer from the Centre has been rapid socio-economic development of this backward State. In the parlance of base theory, the objective of resource transfer may be termed as one of creation of an economic base in this State so as to generate a built – in dynamism in its economy. Therefore, an X-ray of Tripura's economy through base exercise will be an important device to examine how far this objective has been realised and how far the economic base created and/or sustained in this State directly or indirectly by the government sector has been able to have spread effect to speed up the
overall growth rate or hasten structural changes.

Thirdly, Tripura being a recognised backward area of India, provides a fit case for application of the export base theory.

Table No. 3.1.

Tripura's State Income, State Government Expenditure & Receipts and Resource Transfer by the Centre to Tripura during the 'sixties:

<table>
<thead>
<tr>
<th>Year</th>
<th>State Income N.S.D.P. in Lakhs (at current prices)</th>
<th>State Govt. Expenditure in Lakhs</th>
<th>State Govt. Receipt in Lakhs</th>
<th>Resource Transfer ( O_3 - O_4 ) in Lakhs</th>
<th>Ratio of Resource Transfer to Govt. Exp. ( \frac{O_3}{O_4} ) x 100</th>
<th>Ratio of Resource Transfer to State Income ( \frac{O_3}{O_1} ) x 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960-61</td>
<td>2,823</td>
<td>738</td>
<td>50</td>
<td>688</td>
<td>93.20</td>
<td>24.37</td>
</tr>
<tr>
<td>1961-62</td>
<td>3,373</td>
<td>878</td>
<td>62</td>
<td>816</td>
<td>92.90</td>
<td>24.79</td>
</tr>
<tr>
<td>1962-63</td>
<td>3,463</td>
<td>804</td>
<td>54</td>
<td>750</td>
<td>93.30</td>
<td>24.66</td>
</tr>
<tr>
<td>1963-64</td>
<td>3,689</td>
<td>989</td>
<td>48</td>
<td>941</td>
<td>95.10</td>
<td>25.51</td>
</tr>
<tr>
<td>1964-65</td>
<td>4,180</td>
<td>1,237</td>
<td>132</td>
<td>1,105</td>
<td>89.30</td>
<td>26.43</td>
</tr>
<tr>
<td>1965-66</td>
<td>4,594</td>
<td>1,231</td>
<td>119</td>
<td>1,112</td>
<td>90.30</td>
<td>24.20</td>
</tr>
<tr>
<td>1966-67</td>
<td>5,685</td>
<td>1,462</td>
<td>109</td>
<td>1,353</td>
<td>92.50</td>
<td>23.80</td>
</tr>
<tr>
<td>1967-68</td>
<td>6,849</td>
<td>1,735</td>
<td>157</td>
<td>1,978</td>
<td>90.90</td>
<td>23.03</td>
</tr>
<tr>
<td>1968-69</td>
<td>7,207</td>
<td>2,376</td>
<td>154</td>
<td>2,222</td>
<td>93.50</td>
<td>30.83</td>
</tr>
<tr>
<td>1969-70</td>
<td>7,685</td>
<td>1,985</td>
<td>166</td>
<td>1,819</td>
<td>91.60</td>
<td>23.67</td>
</tr>
</tbody>
</table>

Source: Statistical Department, Government of Tripura.
The Model - Its Basic Equations

We have made use of the broad framework of the export base model employed by R.E. Bolton (1966) with necessary modifications. Bolton's study had the ultimate purpose of estimating the impact of defence spending on U.S.A. regions and individual States over the period 1947-62, whereas our objective is to estimate the impact of Centre's resource transfer on Tripura's economy. Besides this similarity of objective, we have chosen his model because it incorporated several improvements upon more naive versions of the export base model. First, it used income as the growth measure rather than the less precise yardstick of employment (employment as a measure of growth is quite unreliable in an underdeveloped economy ridden with the problem of underemployment and disguised employment). Secondly, it adopted a broad definition of exogenous income and recognised that exports alone form too narrow a base for forecasting regional change. Our main difference with Bolton's model is that he uses published data on personal income whereas we define state income as the net state domestic product at factor cost (1960-61 constant prices).

Since Bolton deals with 'personal income' he includes transfer payment or transfer income as an element of income which does not find place in our 'net state domestic product'. In our model, resource transfer from the Centre is not regarded as income as such. Only that part of it which through the State Government budget directly and indirectly contributes to value
added in the region is taken note of in our analysis and its relation with the residual part of state income is explained.

The model consists of two interlinked parts - (i) income equations and (ii) growth equations.

The short-run income model consists of the following equations.

\[ Y_T = Y_n + Y_x \] \hspace{1cm} (3 - 1)
\[ Y_n = a + b Y_T \] \hspace{1cm} (3 - 2)
\[ Y_n = \frac{a}{1 - b} + \frac{b}{1 - b} \cdot Y_x \] \hspace{1cm} (3 - 3)
\[ Y_T = \frac{a}{1 - b} + \frac{1}{1 - b} \cdot Y_x \] \hspace{1cm} (3 - 4)

Where
- \( Y_T \) = Net state domestic product (Tripura's state income).
- \( Y_n \) = Net state domestic product generated in the sectors considered to be endogenous (non-basic income).
- \( Y_x \) = Net state domestic product generated in the sectors considered to be exogenous (basic income).

The endogenous sector is defined as one whose level of activities is set by forces within the economic system of the region. The exogenous sector is defined as one whose level of activities is set by forces emanating from outside the economic system of the region.

The 'b' function applies to spending after import leakages have been deducted.
Following Tiebout (1960), the parameter 'b' may be called 'marginal income-creating propensity to spend within Tripura'. This parameter 'b' is not just marginal propensity to spend on local goods. Because, 'b' will apply only to that portion of expenditure on local goods which form local income. If, for example, Rs. 10,000/- is spent by the households on the products of an enterprise in Tripura, the whole of this amount does not go to form local income. Only that part of Rs. 10,000/- which constitutes value added within Tripura will create income. This means that value of imported raw materials etc. have to be deducted from it to arrive at the contribution to local income creation. Moreover, even if this Rs. 10,000 is spent on goods imported from outside, the entire amount does not constitute leakage. Because, a part of this Rs. 10,000/- will contribute to local income in the shape of profit margin in trade, transportation charge etc. Therefore, 'b' represents marginal income creating propensity to spend within Tripura.

In the income equations, apart from the intercept 'a' the level of endogenous income as well as state income depends on exogenous income (the base) and the way in which an increment of total expenditure is divided between value added internally and the value imported. In this model \( \frac{1}{1-b} \) is the base multiplier which is always equal to one plus the coefficient \( \frac{b}{1-b} \) in equation (3-3). \( 1-b \) constitutes leakages. As indicated in the definition itself, the dimension of \( Y_d \) will be represented by the value of state domestic product. The magnitudes of \( Y_n \) and
\( y \) have been estimated through detailed analysis of state income (N.S.D.) originating in various sectors in Tripura. With the aid of the time series data on the above variables we have estimated the values of the parameters 'a' and 'b' in these equations.

When the model is used in the context of growth, we obtain,

\[
y_n = y_x \cdot \frac{b y_x}{a + b y_x} \quad \ldots \quad (3 - 5)
\]

\[
y_T = y_x \cdot \frac{y_x}{a + y_x} \quad \ldots \quad (3 - 6)
\]

Where \( y_n \) and \( y_T \) represent the growth rates of endogenous income, exogenous income and state income respectively.

\[
\frac{y_x}{a + y_x} \quad \text{in equation (3 - 6) may be named 'base growth multiplier', because, if we multiply the growth rate of exogenous income (base), we obtain the rate of growth of state income.}
\]

Equations (3 - 5) and (3 - 6) show that the sign and value of the intercept 'a' in equation (3 - 2) become especially important when the model is employed in the growth context. If \( a = 0 \), both \( y_T \) and \( y_n \) grow at the same rate as \( y_x \); if \( a < 0 \) and income change is positive, both \( y_T \) and \( y_n \) grow more slowly than \( y_x \); if \( a > 0 \), \( y_T \) and \( y_n \) grow faster than \( y_x \).

Thus while in 'income equations' the value of 'b' assumes the crucial role, 'a' becomes a determining parameter in the 'growth
Economic meaning of this mathematical relation is that while the relation between the state income and its exogenous component will depend on the 'marginal income-creating propensity to spend within the region', the relation between the growth rates will depend on the nature of functional dependence of endogenous income on state income; i.e., whether endogenous income responds proportionately, less than proportionately or more than proportionately when state income changes. Of course, 'b' or 'marginal income-creating propensity to spend within' retains its role in the relation between the growth rates of endogenous and exogenous components of state income as is evident from (3 - 5). Given the existing value of exogenous income, and given that 'a' has a non-zero value, higher the value of 'b', higher will be the 'multiplier effect' of a given exogenous growth rate on the growth rate of endogenous income.

Determination of State Income - Impact of Base Expansion and Significance of Income Leakage - A Diagrammatic Representation

In the preceding section, we have observed from the equational set (3 - 1) to (3 - 4) that in our export base income model, there are two crucial factors determining the level of state income (regional income). One is the size of the base or amount of exogenous income and the other is the extent of income leakage occurring in the state. We, therefore, propose to make a comparative - static analysis of what happens to state
income (assumed to be in a condition of equilibrium initially) in three situations viz: (a) when there is a rise in exogenous income, (b) when extent of income leakage is reduced, and (c) when expansion of exogenous income and reduction of income leakage take place simultaneously. Figures 3.1a, 3.1b and 3.1c portray a simple export base income model. In these diagrams we measure $Y_n$ along the horizontal axis and $Y_x$, $Y_n$ along the vertical axis.

According to equation \((3-2)\) which runs as $Y_n = a + bY_x$, endogenous income is a linear function of state income (regional income). Geometrically, endogenous income function may be represented by a straight line having a slope equal to $b$ and making an intercept on the vertical axis equal to $a$. Exogenous income $Y_x$ is independent of the level of state income and, therefore, may be represented by a straight line parallel to the horizontal axis.

The three diagrams show that a simple export base income model is nothing but a regional counterpart of simple Keynesian national income model. In this model external demand or exogenous income plays the same role which is played by investment demand in the simple Keynesian model and income leakage occurs only through imports. When $X'Y_n = s_o + b_o Y_n$, the equilibrium point is indicated by $E_0$ in all the three figures and $Y_{n0}$ is the equilibrium state income.
FIG. 3-1A  EFFECT OF EXPANSION IN EXOGENOUS INCOME ON STATE INCOME
Fig. 3: Effect of Reduction of Income Leakage on State Income

\[ Y_d, Y_n \]

\[ Y_c + Y_k \]

\[ Y_n = \alpha + \beta Y_d \]

\[ Y_n = \alpha_0 + \beta_0 Y_d \]

\[ Y_d = Y_k \]

\[ Y_T \]
Joint effect of expansion of exogenous income and reduction of income leakage on state income.
Fig. 3.1a shows the impact of a rise in exogenous income (expansion of the base) on equilibrium state income. When $Y_0$ rises from $F_x$ to $F_x$, equilibrium state income rises from $Y_{t_0}$ to $Y_{t_1}$ and $E_1$ is the new equilibrium point.

Fig. 3.1b shows the effect of reduction of income leakage. The coefficient 'b' being the marginal income-creating propensity to spend within the State, a rise in the value of 'b' indicates fall in income leakage. When 'b' rises from $b_0$ to $b_1$ ($b_1 > b_0$), the slope of the endogenous income function rises and it is represented by $y^* = a_0 + b_1Y^*$. The equilibrium state income is now $Y_{T_0}'$, $Y_{T_0}'$ represents the new point of equilibrium.

Fig. 3.1c shows the combined effect of rise in exogenous income from $F_x$ to $F_x$ and rise in the slope of the endogenous income curve (i.e. reduction in income leakage) from $b_0$ to $b_1$. In consequence of the joint effect, the equilibrium state income rises from $Y_{T_0}'$ to $Y_{T_0}'$.

The foregoing analysis clearly points out the fact that measures to boost up a regional economy should aim both at the

2. Similarly, these diagrams may be used to illustrate the effects of base contraction and increase in income leakage, both of which will depress the level of equilibrium income.
expansion of the export base and at the reduction of income leakage. We will soon have the occasion to observe that steps to reduce income leakage is of special significance in case of Tripura.

Implementing the Model: Identification of Exogenous Income (Base Determination)


For dividing income generated in these sectors into two broad categories - exogenous and endogenous, we follow a hybrid of ad hoc assumption method and L.Q. method. Following ad hoc assumption procedure, we find that 9 sectors can be treated as pure sectors (i.e. sectors falling wholly in either endogenous or exogenous category).

Purely endogenous sectors are:-
Fishery (3)
Small Enterprises (5)
Transport and Communication (7)
Trade (8)
Banking and Insurance (9). 1

Purely exogenous sectors are:
Factory Establishments (4)
Construction (6)
Real Estate (10)
Public Administration (11)

Mixed sectors are:
Agriculture and Animal Husbandry (1)
Forestry (2)
Other Services (12)

For the mixed sectors L.Q. technique is applied to separate exogenous and endogenous contents of income originating in them.

Rationale of Classification

Sectors listed in the purely endogenous category are mainly engaged in the production of goods and services to meet local demand. The level of their activities, therefore, may be assumed to be a function of local income. Sectors (7), (8) and (9) are service industries which are obviously local in nature. Sector (3) produces a commodity in which supply falls far short of demand in Tripura. Exports from the sector (5), if any, is negligible.

1. Banking and Insurance is an endogenous sector in the sense that the services rendered by banks and insurance companies are wholly enjoyed by the local inhabitants. It is also an endogenous sector for the reason that there is a net out-flow of funds through these institutions rather than an inflow of funds from outside.
Sectors placed in the purely exogenous category are either dependent on export or are financially supported by the resource transfer from the Centre or are so that income generated in them has much greater link with the expanding government sector (backed by resource transfer from the Centre) than with the level of local income. Industries in sector (4) consisting mainly of tea factories are clearly export oriented. Sector (6) is overwhelmingly dependent on government finance. Income of sector (10) is a function of urbanisation and development activities and hence is not a dependent variable of local income. It may be mentioned here that R.E. Bolton (1966) classified this sector (10) (property income) as an important source of exogenous income. Sector (11) obviously falls in the exogenous category, being dependent on resource transfer caused by the Central Government.

Mixed sectors contain both endogenous and exogenous elements. Though the major portion of the products of sector (1) is meant for local consumption, it exports commodities like tea leaf, jute, mesta, cotton and cotton seeds, hides and skin etc. Sector (2) also exports timber. Sector (12) consists of a number of sub-sectors with income dependent on both government finance and local demand. For example, income originating in private schools and colleges is mostly financed by government grants in Tripura. But income from the services of a doctor or a lawyer etc. is dependent on local demand.

To separate exogenous content of income originating in
the mixed sectors, we applied the following formula of location quotient.

\[ L_{Qi} = \frac{OR_{i}/ON_{i}}{OR/ON} \]

Where

- \( L_{Qi} \) applies to the industry (sector) \( i \) and
- \( OR_{i} \) = Net state domestic product of Tripura originating in the \( i \) th sector,
- \( ON_{i} \) = Net domestic product of India originating in the \( i \) th sector,
- \( OR \) = Tripura's net domestic product,
- \( ON \) = India's net domestic product.

We compute the level of income of a mixed sector that is necessary to make \( L_{Qi} = 1 \) and deducting this income from the actuals, we arrive at the estimate of exogenous content of sectoral income.

Estimates of state income (N.S.D.P. at 60-61 prices at factor cost), exogenous income and endogenous income for each year from 1960-61 to 1970-71 are presented in Table No. 3.2. Table Nos. 3.3 and 3.4 show the break-up of exogenous income and endogenous income respectively.
### Table No.3.2

**Tripura**

Estimates of State Income (N.S.D.P.), Exogenous Income and Endogenous Income at 1960-61 prices:

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<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>(ii)</td>
<td>(iii)</td>
<td>(iv)</td>
</tr>
<tr>
<td>1960-61</td>
<td>2,823</td>
<td>696</td>
<td>1,927</td>
</tr>
<tr>
<td>1961-62</td>
<td>3,244</td>
<td>1,096</td>
<td>2,148</td>
</tr>
<tr>
<td>1962-63</td>
<td>3,297</td>
<td>1,178</td>
<td>2,119</td>
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<tr>
<td>1963-64</td>
<td>3,383</td>
<td>1,243</td>
<td>2,140</td>
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<tr>
<td>1964-65</td>
<td>3,550</td>
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<tr>
<td>1965-66</td>
<td>3,747</td>
<td>1,490</td>
<td>2,227</td>
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<tr>
<td>1966-67</td>
<td>3,868</td>
<td>1,610</td>
<td>2,258</td>
</tr>
<tr>
<td>1967-68</td>
<td>3,909</td>
<td>1,547</td>
<td>2,392</td>
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<tr>
<td>1968-69</td>
<td>4,080</td>
<td>1,633</td>
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<tr>
<td>1969-70</td>
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<tr>
<td>1970-71</td>
<td>4,524</td>
<td>1,776</td>
<td>2,746</td>
</tr>
</tbody>
</table>

**Note:** Figures rounded off to the nearest lakh of Rs..

**Source:** Computed by the author from the data obtained from the Department of Statistics, Government of Tripura.

Detailed break-up given in Table Nos. 3.3 and 3.4.
<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Agriculture and Animal Husbandry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(M)</td>
<td>304.30</td>
<td>482.20</td>
<td>482.30</td>
<td>481.90</td>
<td>440.90</td>
<td>656.30</td>
<td>667.60</td>
<td>502.30</td>
<td>511.00</td>
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<td>332.30</td>
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<tr>
<td>Forestry (M)</td>
<td>42.30</td>
<td>24.80</td>
<td>23.40</td>
<td>25.60</td>
<td>46.80</td>
<td>18.50</td>
<td></td>
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<td>Factory Establishment (Ex)</td>
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<td>18.00</td>
<td>19.00</td>
<td>19.00</td>
<td>19.00</td>
<td>19.00</td>
<td>28.00</td>
<td>28.00</td>
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<td>151.00</td>
<td>165.00</td>
<td>168.00</td>
<td>162.00</td>
<td>160.00</td>
<td>177.00</td>
<td>267.00</td>
<td>302.00</td>
<td>331.00</td>
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<td>79.00</td>
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<td>83.00</td>
<td>86.00</td>
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<td>97.00</td>
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<td>476.00</td>
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<tr>
<td>Other Services (M)</td>
<td>169.50</td>
<td>165.10</td>
<td>193.40</td>
<td>212.10</td>
<td>244.30</td>
<td>246.50</td>
<td>259.40</td>
<td>325.20</td>
<td>359.60</td>
<td>420.20</td>
<td>432.40</td>
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<tr>
<td>Total</td>
<td>896.10</td>
<td>1096.10</td>
<td>1177.80</td>
<td>1242.60</td>
<td>1289.00</td>
<td>1490.30</td>
<td>1610.00</td>
<td>1516.50</td>
<td>1632.60</td>
<td>1797.60</td>
<td>1777.70</td>
</tr>
</tbody>
</table>

**Notes:**
- Ex = purely exogenous sector; M = mixed sector.
- Source: Computed by the author from the state income data obtained from the Department of Statistics, Government of Tripura.
### Table No. 3.4

Income Generated (in Lakhs) at 1960-61 Prices.

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</tr>
</thead>
<tbody>
<tr>
<td>Agriculture &amp; Animal Husbandry (M)</td>
<td>1391.70</td>
<td>1533.80</td>
<td>1506.70</td>
<td>1502.10</td>
<td>1601.10</td>
<td>1501.70</td>
<td>1512.40</td>
<td>1645.70</td>
<td>1681.00</td>
<td>1847.60</td>
<td>1931.70</td>
</tr>
<tr>
<td>Forestry (M)</td>
<td>36.70</td>
<td>42.20</td>
<td>42.90</td>
<td>47.40</td>
<td>46.20</td>
<td>59.50</td>
<td>36.00</td>
<td>37.00</td>
<td>53.00</td>
<td>52.00</td>
<td>59.00</td>
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<td>Fishery (En)</td>
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<td>9.00</td>
<td>29.00</td>
<td>31.00</td>
<td>31.00</td>
<td>32.00</td>
<td>34.00</td>
<td>34.00</td>
<td>34.00</td>
<td>34.00</td>
</tr>
<tr>
<td>Small Enterprises (En)</td>
<td>128.00</td>
<td>130.00</td>
<td>135.00</td>
<td>132.00</td>
<td>140.00</td>
<td>144.00</td>
<td>148.00</td>
<td>152.00</td>
<td>156.00</td>
<td>160.00</td>
<td>163.00</td>
</tr>
<tr>
<td>Transport and Communication (En)</td>
<td>54.00</td>
<td>56.00</td>
<td>60.00</td>
<td>66.00</td>
<td>66.00</td>
<td>72.00</td>
<td>75.00</td>
<td>79.00</td>
<td>76.00</td>
<td>96.00</td>
<td>85.00</td>
</tr>
<tr>
<td>Trade (En)</td>
<td>117.00</td>
<td>137.00</td>
<td>154.00</td>
<td>156.00</td>
<td>140.00</td>
<td>147.00</td>
<td>147.00</td>
<td>146.00</td>
<td>156.00</td>
<td>157.00</td>
<td>154.00</td>
</tr>
<tr>
<td>Banking &amp; Insurance (En)</td>
<td>11.00</td>
<td>10.00</td>
<td>14.00</td>
<td>14.00</td>
<td>15.00</td>
<td>15.00</td>
<td>14.00</td>
<td>15.00</td>
<td>16.00</td>
<td>15.00</td>
<td>21.00</td>
</tr>
<tr>
<td>Other Services (M)</td>
<td>183.50</td>
<td>210.90</td>
<td>217.60</td>
<td>219.90</td>
<td>223.70</td>
<td>256.50</td>
<td>274.60</td>
<td>265.80</td>
<td>273.40</td>
<td>293.80</td>
<td>298.60</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1926.90</td>
<td>2147.90</td>
<td>2119.20</td>
<td>2140.40</td>
<td>2261.00</td>
<td>2226.70</td>
<td>2258.00</td>
<td>2392.50</td>
<td>2447.40</td>
<td>2654.40</td>
<td>2746.30</td>
</tr>
</tbody>
</table>

**Note:** En = purely endogenous sector; M = mixed sector.

**Source:** Computed by the author from the state income data obtained from the Department of Statistics, Government of Tripura.
FIG: 3.2  TREND OF STATE INCOME OF TRIPURA DURING THE 1960'S (AT 1960-61 PRICES)

- Total State Income
- Endogenous Income
- Exogenous Income

State Income (Net State Domestic Product) Rs. Lakhs

Figure 3: Relation between Exogenous Income ($Y_x$) and Endogenous Income ($Y_n$) in Tripura (1960-61-1970-71)

The relationship is given by the equation:

$$Y_n = 1243 + 0.75 Y_x$$

Endogenous Income of Tripura (Rs. Lakhs)

Exogenous Income of Tripura (Rs. Lakhs)
Estimates of \( a \) and \( b \) in the equations of our model have been made in three ways, all the three giving almost identical results.

First, the values of \( a \) and \( b \) have been estimated by regressing endogenous income \( Y_n \) on state income \( Y_t \) from the regression equation of the form

\[
Y_n = a_1 + b_1 Y_t + u_1 \quad \ldots \ldots \ldots \ldots \ldots \ldots (3 - 7)
\]

Where \( a_1 \) and \( b_1 \) have the same meaning as \( a \) and \( b \) in equation \((3 - 1)\) and \( u_1 \) is a stochastic disturbance term.

By this procedure we get

\( a_1 = 630.71 \) ; \( b_1 = 0.45 \) and the coefficient of correlation between \( Y_n \) and \( Y_t \) viz: \( r = 0.9728 \).

Consequently, we get \( a = 630.71 \) and \( b = 0.45 \).

Equations \((3 - 2)\) to \((3 - 6)\) are then reduced to

\[
Y_n = 630.71 + 0.45 Y_t \quad \ldots \ldots \ldots \ldots \ldots \ldots (3 - 8)
\]

\[
Y_n = 1146.75 + 0.82 Y_x \quad \ldots \ldots \ldots \ldots \ldots \ldots (3 - 9)
\]

\[
Y_t = 1146.75 + 1.82 Y_x \quad \ldots \ldots \ldots \ldots \ldots \ldots (3 - 10)
\]
Secondly, we have estimated *a* and *b* by regressing endogenous income, \( Y_n \) on exogenous income, \( Y_x \) i.e. by employing a regression equation of the form

\[
Y_n = a_2 + b_2 Y_x + u_2 \quad \text{(3 - 13)}
\]

Where

\[
a_2 = \frac{a}{1 - b} \quad \text{and} \quad b_2 = \frac{b}{1 - b} \quad \text{in equation (3 - 3)}
\]

and \( u_2 \) is a stochastic disturbance term. This exercise gives \( a_2 = 1243.00 \) and \( b_2 = 0.75 \) and \( r \), the coefficient of correlation between \( Y_n \) and \( Y_x \) is seen to be 0.91.

We derive the following equations as equivalent to the equational set (3 - 2) to (3 - 6):

\[
Y_n = 740.285 + 0.43 Y_x \quad \text{(3 - 14)}
\]

\[
Y_n = 1243.00 + 0.75 Y_x \quad \text{(3 - 15)}
\]

\[
Y_T = 1243.00 + 1.75 Y_x \quad \text{(3 - 16)}
\]

\[
Y_n = Y_x \cdot \frac{740.285 + 0.43 Y_x}{Y_x} \quad \text{(3 - 17)}
\]

\[
Y_T = Y_x \cdot \frac{Y_x}{Y_x} \quad \text{(3 - 18)}
\]
Thirdly, we have estimated the parameters by regressing $Y_T$ on $Y_X$ directly, i.e. from the regression equation of the form

$$Y_T = a_3 + b_3Y_X + u_3 \quad \quad (3-19)$$

Where $a_3 = \frac{-\alpha}{1-\delta}$ and $b_3 = \frac{1}{1-\delta}$ in equation (3 - 4), and $u_3$ is a stochastic disturbance term as usual. From this we obtain, $a_3 = 1172.5$, $b_3 = 1.8$ and $\alpha = 0.98$.

Thus we derive the following equations as specified form of the equational set (3 - 2) to (3 - 6):

$$Y_T = 651.40 + 0.44Y_T \quad \quad (3 - 20)$$
$$X_n = 1172.50 + 0.80X_X \quad \quad (3 - 21)$$
$$X_T = 1172.50 + 1.80X_X \quad \quad (3 - 22)$$
$$\frac{0.44X_X}{Y_T} = \frac{X_X}{Y_T} = 651.40 + 0.44Y_X \quad \quad (3 - 23)$$
$$Y_T = \frac{X_T}{Y_X} \quad \quad (3 - 24)$$

From these three methods of estimation we get the values of:

a (intercept in the endogenous income function).

b (the marginal income-creating propensity to spend within Tripura).
1 - b (import leakages)  
r (the coefficient of correlation as an index of reliability of estimation).

The values are tabled below:

Table No. 3.5.

Values of the Parameters in the Model according to Different Estimates:

<table>
<thead>
<tr>
<th>Method No.</th>
<th>Parameters and Coefficients:</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>b</td>
<td>1 - b</td>
<td>( )</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>1</td>
<td>630.71</td>
<td>0.45</td>
<td>0.55</td>
<td>1.82</td>
<td>1146.75</td>
</tr>
<tr>
<td>2</td>
<td>740.29</td>
<td>0.43</td>
<td>0.57</td>
<td>1.75</td>
<td>1243.00</td>
</tr>
<tr>
<td>3</td>
<td>651.40</td>
<td>0.44</td>
<td>0.56</td>
<td>1.80</td>
<td>1172.50</td>
</tr>
</tbody>
</table>

For purely statistical reasons the second method of estimation is preferable, since by the first and the third methods, regression analysis is carried with two variables one of which is the whole and the other a part of it. This may be misleading as it may give spuriously high value of correlation. The second method is comparatively free from this defect. But values of the parameters and coefficient of correlation derived by all the three methods are not far apart. High value of coefficient of correlation shows that error of estimation from the sample period is very low. This is an indicator of goodness.
Let us now attempt to analyse the economic implications of the values of the parameters obtained and set in Table No. 3-5.

First, we observe that the value of 'a' is positive and fairly large. This implies that there is a component in the endogenous income which is autonomous of base expansion, i.e., which will stand even if exogenous income falls to zero and will not change with the change of the base. This is clear from the value obtained for \( \frac{a}{b} \) which is the constant term in the equation (3 - 3) relating endogenous income to exogenous income. We may identify this component of endogenous income with that of subsistence agriculture which is neither export-oriented (or internal market-oriented) nor is significantly affected by the expansion of government sector. Its level of production is rather insensitive to the rising level of state income. In terms of the growth equations (3 - 5) and (3 - 6) positive value of 'a' implies that both state income and endogenous income grow less than proportionately to exogenous income. Large value of 'a' means that the difference in the growth rates between endogenous income and exogenous income, and also between exogenous income and state income will be substantial. This shows that Tripura's economy is still relatively stagnant.

3. Hildebrand and Mace (1950, P. 243), suggest 0.90 as the minimum value of 'r' for multiplier analysis. This seems to have been satisfied in this case.
The table shows that the value of 'b' - the income-creating marginal propensity to spend within Tripura is about 0.43. This means that 43 p.c. of an increment of income in Tripura is spent on value added within Tripura, the remaining 57 p.c. stands for leakage. Thus not only a part of Tripura's economy is non-responsive to base expansion, but relatively responsive sector also suffers from heavy income leakage. Base multiplier is 1.75 only. This value of the multiplier is low considering the facts that, in Tripura, base multiplier applies only to a part of the economy (subsistence and traditional agriculture being non-responsive) and that, Tripura is a region much larger in spatial dimension than a city (to which base multiplier analysis has generally been applied) and hence it should have larger scope of expansion of its endogenous sector in response to base expansion. Hence the above value of multiplier worked out for the decade of the '50's suggest that expansion of exogenous sector predominantly backed by transfers from the Centre did not have an appreciable impact on Tripura's economic structure. It has attained rather limited success in initiating a growth process strong enough to remove Tripura's structural imbalance and overall underdevelopment.

In the chapters that follow, we will attempt to locate the points of income leakage, examine the factors contributing to income leakage in Tripura and try to find out policy implications.