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ECONOMICS
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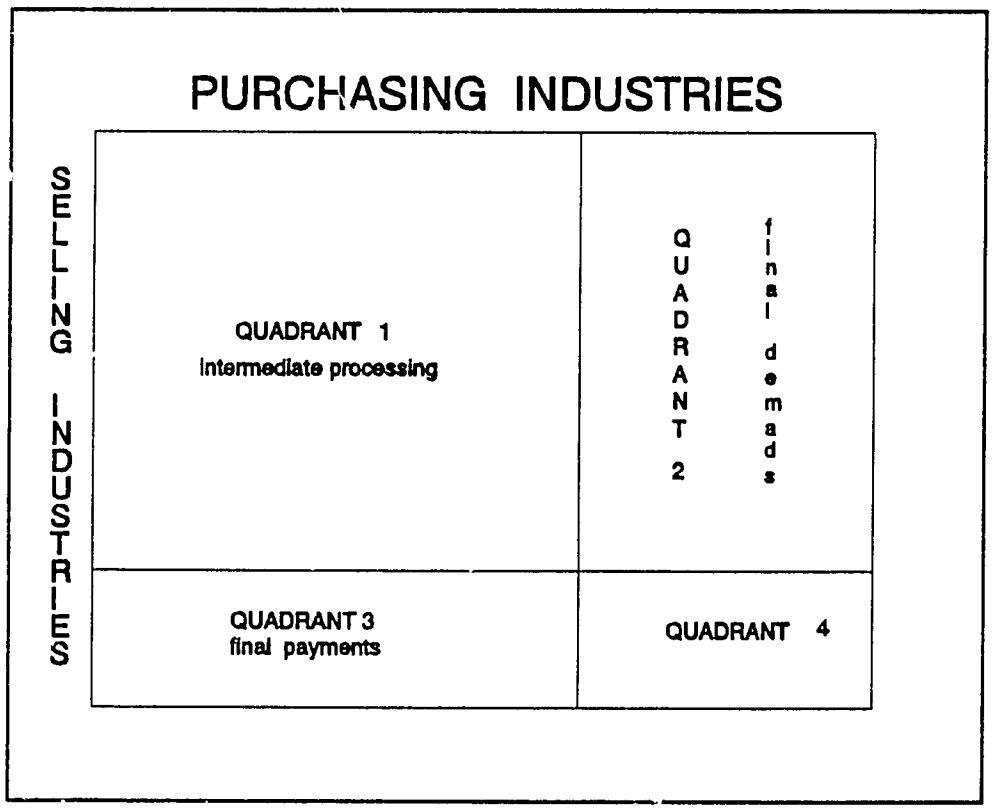
PROJECT

# INTERINDUSTRY LINKAGES AND IMPACTS OF AGRICULTURE IN THE PAKISTAN ECONOMY





ECONOMIC WING

*Ministry of Food, Agriculture and Cooperatives*

ISLAMABAD



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# INTERINDUSTRY LINKAGES AND IMPACTS OF AGRICULTURE IN THE PAKISTAN ECONOMY

*Prepared By*


GARTH TAYLOR
(*Technical Advisor*)

RAO SHFIQ-UR-REHMAN
(*Research Economist*)

ABDUL SHAKOOR SABRI
(*Research Officer*)

UNDER THE GUIDANCE OF

DR. A. H. MAAN



ECONOMIC WING
Ministry of Food, Agriculture and Cooperatives

ISLAMABAD

## FORWARD

This Research Report on Pakistan's Economy is one in the series published by Economic Wing of the Ministry of Food and Agriculture (MINFA). It emphasizes the role of agricultural production and agribusiness in Pakistan's economy by using Input/Out Model (I/O). I/O system is the best means to analyze the impacts of changes in agriculture and other sectors of the economy. Conversely, through this system, the impact of changes in other sectors on agriculture is examined. The main purpose of this report is to :

(1) Devise a standardized method using National Income and Product accounts to provide periodic updates of the national I/O model to reflect the dynamic economy of Pakistan;

(2) Provide an analysis of the backward and forward linkages in the industrial sectors of the Pakistan economy, with emphasis on agriculture; and

(3) Provide a brief background to the Economic Wing of MINFA and other economic to assist in a greater understanding of the Pakistan's economy using I/O Model.

The efforts made in collecting, collating and computing the raw and scattered data and information in accomplishing this assignment by Mr. Abdul Shakoor Sabri, Research officer of the Economic Wing of MINFA, are commendable. My special thanks are also due to the Chief of the Party Dr. Richard McConnon, Dr. R. G. Taylor and Mr. Rao Shafiq-ur-Rehman, Research Economist of the EPA/Chemonics for their valuable co-operation and assistance which made it possible to compile this report. Since there is always a room to improve things, comments or suggestions, if any, will be appreciated.

( A. H. MAAN)
DIRECTOR GENERAL

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Input-Output (I/O) comprises both a system of economic accounts and a model of an economy. As such, I/O data are useful both as a consistent descriptor of an economy and all its component parts, and as a tool of economic analysis. First and foremost Input-Output is a type of social account. A social account is an empirical framework which sets forth relationships between various aspects of a social entity. Since the accounting framework underlies any attempt to use I/O as a model, accounting will be discussed first followed by the use of I/O as a model and its application to the economic linkages of the Pakistan economy.

## I/O ACCOUNTING SYSTEM

As with any accounting system I/O accounts are governed by rules that allows a uniform interpretation of the accounting system. Briefly these rules are; 1) Production, distribution, and consumption 2) that I/O is a double entry accounting system where every purchase is balanced by an exact amount of sales, and 3) that sector are defined upon homogenous input technology and output.

Spending flows among sectors in the Input-Output (I/O) framework are displayed as a table or matrix. The matrix format of the accounts is a convention to allow the second function of I/O, that of an analytical model, to be accomplished. An I/O table of gross flows (transactions among sectors) can be broken down into the four quadrants shown in table 1; (1) the intermediate processing transactions matrix, (2) the columns of final demands, (3) the rows of primary inputs to processing, and (4) the rows of primary inputs to final demands. Quadrants (3) and (4) together are often referred to as final payments. Each of component quadrants will be discussed, in that order, with reference to the 1984/85 Pakistan I/O model in Appendix 2 that will be explained in a later section.

### Quadrant 1 - Intermediate Processing Transactions

This quadrant constitutes the bulk of the I/O table. To maintain a double entry accounting framework, the n number of purchasing (column headings) sectors are the same n number of producing (row headings) sectors. Thus, quadrant 1 is a square n by n matrix, where n is the number of intermediate processing industries in the national economy. The intermediate processing quadrant only contains industries that purchase inputs to combine, transform, or use them in production. End users of inputs, such as governments or exports are excluded from the first quadrant. By convention, columns of an I/O transactions table are the purchasing sectors and rows are the producing or supply sectors. As with standard matrix notation, an entry in the transactions among sectors table is denoted as the $i^{th}$ row and the $j^{th}$ column. In order to maintain equality of row sums and column sums, rows exist for profit and saving as well as spending. Consider the interindustry processing quadrant for the 1984/85 Pakistan I/O in Appendix 2.

Figure 1. SCHEMATIC OF AN I/O TRANSACTIONS TABLE,
SHOWING THE FOUR QUADRANTS OF ACCOUNTS \ PURCHASING INDUSTRIES & AGENCI

| SELLING INDUSTRIES & AGENCIES | | |
|---|---|---|
| | QUADRANT 1<br>intermediate processing<br><<INTERDEPENDENT VARIABLES>> | QUADRANT 2<br>final demands<br><<INDEPENDENT VARIABLES>> |
| | QUADRANT 3<br>final payments<br><<DEPENDENT VARIABLES>> | QUADRANT 4 |

## Quadrant 2 - Final Demands

This quadrant accounts for the exogenous demand for goods and services made upon national production capabilities. Since final demand is exogenously determined, it is in effect the driving force for the economy. According to the I/O model framework, if the spending in quadrant 2 were to disappear, i.e. go to zero, the total economy of the nation would also disappear.[1] By exogenous, we mean that purchases of these goods and services are either made by sectors located outside the nation or factors which influence changes in these demands are outside the control of national business or personal spending decisions. For the 1984/85 Pakistan model, one of the final demands are exports, which are 5404 for agriculture, 25535 for large scale

[1] Note that total final payments equals total final demand so it is also true that when total final payments equals zero the economy will disappear. This is because (theoretically) the intermediate processing sectors buy all their inputs for further processing and without the availability of the final payments inputs the intermediate processing sectors could not function.

agricultural processing etc. The final demand spending represents sales which are not inputs to local processors but include all other sales. For example, exports could be for final use outside the nation, final use inside the nation by tourists, or intermediate inputs to processors located outside Pakistan.

**Quadrant 3 - Primary Inputs**

This quadrant accounts for the purchases of inputs from industries outside the nation and for other money flows which are not respond within the nation. Primary inputs are often termed leakages because they are the flow of money out of the economy to taxes, savings, or imports if national industries are unable to produce needed inputs. The more self-sufficient a nation is, the smaller these purchases of primary inputs will be and the more an economy will depend upon its own industry.

**Quadrant 4 - Primary Inputs to Final Demands**

The fourth quadrant records the primary inputs purchased directly by the sectors of final demand. If households are exogenous, a major entry in this quadrant will be the imports consumed directly by households and the taxes paid by households. Wages and transfers paid by government to households would also show up here. If households are endogenous (contained in quadrant 1), then primarily savings and imports by government will appear in this quadrant. If firms import goods and then export them in the same form that amount less trade margins will also appear in quadrant 4.

## THE I/O ACCOUNTING IDENTITY

Armed with the definitions of double entry accounts and the descriptions of four quadrants we can demonstrate the accounting identity embedded in the I/O matrix. To do this we can use figure 2 which shows the four quadrants with notation for the highly aggregated accounts within each quadrant. The accounting identity is obtained by summing down all the columns and across all the rows.

Gross outlay by the $i^{th}$ industry, $X_i$, is obtained by summing down the $i^{th}$ column. Correspondingly, total gross outlay by all sectors in the nation is obtained from summing the column totals: $X = (X_1 + X_2 + X_3 + \ldots + X_n) + C + G + K + E$ where, C is consumption, G is government, K is investment, and E exports. Thus, total national outlay is the sum of all column totals of interindustry spending plus the sum of household consumption, state and federal government, investment, exports, and capital losses.

Gross output by the $i^{th}$ industry, $X_i$, is obtained by summing across the $i^{th}$ row. Correspondingly, total gross output by all sectors in the nation is obtained by summing row totals:

$$X = (X_1 + X_2 + X_3 + \ldots + X_n) + H + T + M,$$

where; H is household wages, T taxes, and M imports (see figure 2) Thus, total nation output

is the sum of the row totals of interindustry spending plus the sum of value added paid to households, taxes, rents, depreciation, and imports.

We can equate the two parts of the identity using the definition inherent in our I/O double entry accounting principle, total national outlay is defined to equal total national output and thus:

$$X_1 + X_2 + \ldots + X_n + C + G + K + E + (X_1 + X_2 + X_3 + \ldots + X_n) + H + T + M.$$

By further noting that for intermediate processing sectors, output equals input, we can cancel the processing quadrant flows ($X_1 + X_2 + X_3 + \ldots + X_n$) for the above equation. This gives the desired result of the nation's final product measured in terms of final payments to factors equaling national final product measured by final demand.

$$H + T + M = C + G + K + E.$$

This identity holds only for the total of all final payment and final demand sectors of the nation not for each sector individually.

The final step is to express gross national income as equal to gross national product. To obtain gross national product exports and imports can be netted out to create net exports (E-M). The accounting identity can now be displayed as:

$$Y = C + G + K + (E - M),$$

where Y is household income and other value added, i.e. $Y = H + R + T + D$.

This identity now shows that national income on the left-hand side is composed of wages and other value added and equals gross national product on the right-hand side, composed of consumer spending plus capital losses plus government plus new investment plus net exports. By subtraction of imports, the I/O accounts are converted to the analogous national income and product accounts (NIPA).

re 2. SCHEMATIC OF AN I/O TRANSACTIONS-AMONG-SECTORS TABLE, LABELING T
ACCOUNTS IN THE 4 QUADRANTS ¹, \ PURCHASING INDUSTRIES & AGENCIES

| SELLING INDUSTRY | X1 | X2 | C | G | K | E | R | |
|---|---|---|---|---|---|---|---|---|
| | $z_{11}$ | $z_{12}$ | $C_{1C}$ | $G_{1G}$ | $K_{1K}$ | $E_{1E}$ | $R_{1R}$ | $X_1$ |
| | $z_{21}$ | $z_{22}$ | $C_{2C}$ | $G_{2G}$ | $K_{2K}$ | $E_{2E}$ | $X_{2R}$ | $X_2$ |
| | $H_1$ | $H_2$ | $H_C$ | $H_G$ | $H_K$ | $H_E$ | $H_R$ | |
| | $D_1$ | $D_2$ | $D_C$ | $D_G$ | $D_K$ | $D_E$ | $D_R$ | |
| | $R_1$ | $R_2$ | $R_C$ | $R_G$ | $R_K$ | $R_E$ | $R_R$ | |
| | $VA_1$ | $VA_2$ | $VA_3$ | $VA_4$ | $VA_5$ | $VA_6$ | $VA_7$ | VA |
| | $T_1$ | $T_2$ | $T_3$ | $T_4$ | $T_5$ | $T_6$ | $T_7$ | T |
| | $M_1$ | $M_2$ | $M_3$ | $M_4$ | $M_5$ | $M_6$ | $M_7$ | M |

1
The intermediate processing sector in quadrant one is aggregated to two industries for illustration.

## I/O AS A MODEL OF AN ECONOMY

An industry within an economy demands inputs for its production process, which after processing it supplies to other industries in the economy or sells to final demand. The inputs an industry demands are backward linked from the production process as shown in figure 3. The output of the industry to the industries along its marketing chain are defined as forward linked from the industry. The backward linked or demand driven I/O invokes a production function to develop a model of the economy and is the conventional method by which I/O accounts are transformed into a model of the economy. However, with analysis of linkages a supply driven or forward linked view of the economy becomes necessary. Therefore, we will begin with a detailed discussion of transforming the I/O accounts into a demand driven model of the economy and then provide a briefer explanation of the supply driven model.

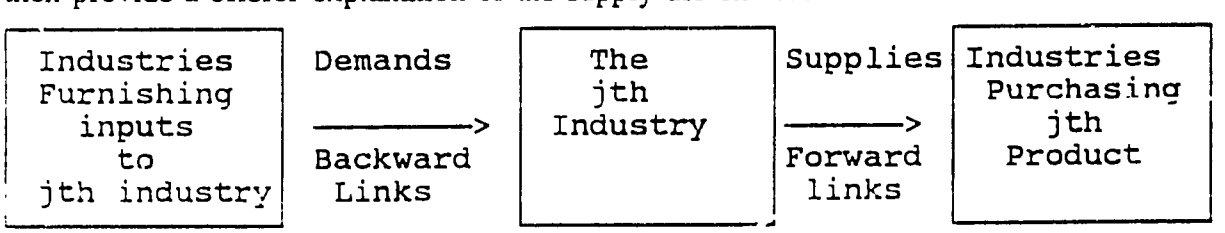


Figure 3. Schematic of forward and backward linkage from the $j^{th}$ industry.

## BACKWARD LINKED OR DEMAND DRIVEN I/O

The underlying theory that transforms the I/O accounting framework into an economic forecasting model for a nation is the interpretation of the spending flow accounts through a national production functions. To view the I/O accounts on the basis of production functions let us first define a production function and then set forth the assumptions that make the interpretation possible.

A production function defines the engineering/technical or physical relationship between inputs and outputs for a firm or for an industry. Input/Output accounts are assumed to contain information reflecting production functions of industries in the nation. No one argues that outputs are not a direct result or function of inputs i.e., the existence of a production function. The exact nature of the form of this relationship is a matter for empirical testing. In the I/O model, however, it is a consequence of the simplified accounting system that is necessary to capture interindustry flows in a linear model. The idealized assumptions of this production system are (Czamanski, Richardson):

(1) Homogeneous inputs and homogenous outputs for each sector. Thus there can be no joint products nor joint inputs. Conformation to this assumption is the reason that we set forth the ideal accounting classification based on identical technology for firms in a sector.

(2) The production function in I/O is where input budget shares remain in a fixed proportion. Either relative prices of inputs are assumed to remain fixed or changes in relative prices (due to inflation) of inputs results in substitution among inputs so that spending shares remain constant among inputs (unitary elasticity of substitution). Thus the spending by a given industry is defined as fixed percentages down a column of the transactions matrix, $a_{ij}=z_{ij}/X_j$; where each $a_{ij}$ is the technical coefficient showing direct input requirements for each rupee of output. The constancy of the spending distributions down each industry column is a critical requirement for the I/O technique to provide accurate forecasts. Another assumption implied by the fixed spending distributions is constant returns to scale, i.e. as industries grow in size, their efficiency or ratio of output to inputs remains constant.

(3) The total production activity of the nation is the sum of the separate activities which is implied by the constant returns to scale. This additivity assumption bars negative or positive externalities. Expansion in one sector does not create efficiency changes in other sectors. A simple definition of an externality is a product produced by one industry that physically changes the production efficiency of another industry but not through market transactions.

Furthermore, trading patterns (the share of spending on imports) is assumed fixed as the economy grows. Since new industries tend to enter a nation as its threshold of economic activity is sufficient to support them, an I/O model needs to be updated periodically to include those new sectors and changing trading patterns.

(4) No capacity constraints exist so that the ability to produce or import each good is always available as the economy expands.

We now turn attention to the mathematical formulation of the I/O production function in greater detail.

**Calculation of Demand Driven Technical Coefficients**

The technical coefficients, also called the direct requirements coefficients, are the fixed relationship between any sector's flow of output and inputs both measured in rupees. A technical coefficient tells us the direct requirements as a fraction of percent of total spending by an industry. A technical coefficient is the rupees worth of inputs each industry needs to produce a rupees's worth of output. A technical coefficient is found by dividing the payment flow to each input supply sector ($z_{ij}$) by the purchasing industry's column total ($X_j$) and thus is a fraction of the total. The direct requirements for an industry can be found reading down a column in technical coefficients matrix .

**I/O Output Equilibrium for the Backward Linkages**

The accounting identity and the definition of technical coefficients provide the information necessary to complete the equilibrium conditions of the I/O modeling technique. We began by using the accounting identity for the demand side of the I/O accounts (column sums of the transactions table);

$$X = (X_1 + X_2 + X_3 + \ldots + X_n) + C + G + K + E.$$

To develop the I/O data as a forecasting model we now turn our attention away from aggregated national output and focus on the interindustry relations among the accounts. Each sector of the economy is in equilibrium when the sum of the interindustry demands plus the sum of the final demands for that same sector equals total gross output. For the $i^{th}$ industry, in the notation above, output equilibrium can be expressed as:

$$X_i = (z_{i1} + \ldots + z_{ij} + \ldots + z_{in}) + C_i + G_i + K_i + E_i$$

Notice the similarity between this equation and the above national aggregate. All that has changed is that we are dealing with a single industry (row of the intermediate processing section of the transactions table) instead of the aggregates of industries. Thus we have used the sum of the interindustry flows for the $i^{th}$ industry ($z_{i1} + \ldots + z_{ij} + \ldots + z_{in}$) instead of the aggregate for all industries ($X_1 + X_2 + X_3 + \ldots + X_n$) and also the final demands for the $i^{th}$ industry instead of the aggregate final demands.

Changes in final demand set off a series of transactions as each industry responds to either direct or indirect changes in their demands. An example of direct change in demand would occur if agricultural exports increased, while an example of an indirect demand change could be the response of farms to increase output and in so doing they purchase more fuel, fertilizer, machinery, labor and similar inputs thus creating the indirect or "derived" demand for other sectors of the economy. When the other sectors find their demand rising they too will buy more inputs and thus the original export change causes a series of reactions and reverberations throughout the economy. These reverberations gradually die out since during each round of spending part of the spending leaks out to saving, taxes, and imports. The greater the leakage the faster the effects die out or the smaller the multiplier effect is said to be.

In our example model, there are three balance equations corresponding to the three dependent sectors of the model, farming, manufacturing, and households. These 3 sectors are assumed to react to satisfy all increased demands through a profit motive. Aggregating all exogenous values together as, $Y_i = C_i + G_i + K_i + E_i +$ $i=1...3$; the three balance equations are:

$$X_1 = z_{11} + z_{12} + z_{13} + Y_1$$

$$X_2 = z_{21} + z_{22} + z_{23} + Y_2$$

$$X_3 = z_{31} + z_{32} + z_{33} + Y_3$$

where $X_i$ is total output in industry $i$, the z's are transactions among the intermediate processing sectors, and $Y_i$ stands for the total final demand for industry $i$.

To put all n industries into one equation we can use matrix algebra. To simplify notation, let Z stand for the intermediate processing matrix (quadrant 1) and Y stand for the final demands matrix (Quadrant 2). The accounting equation for output can now be written as;

$$X = (Z)(U) + (Y)(U) \text{ (accounting equation);}$$

where U is a column vector of ones whose function is to provide conformation of matrices for addition and which results in the summation to column vectors of the matrices which it follows. Again, this is the statement in matrix form, that total output of the national economy is composed of intermediate processing transactions and final demands which includes all sectors of the economy. The output equilibrium for the example economy show in table 1 is:

$$\begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} = \begin{bmatrix} Z_{11} & Z_{12} & C_1 \\ Z_{21} & Z_{22} & C_2 \\ H_1 & H_2 & H_3 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} + \begin{bmatrix} G_1 & I_1 & E_1 \\ G_2 & I_2 & E_2 \\ G_3 & I_3 & E_3 \end{bmatrix} \begin{bmatrix} L_1 \\ L_2 \\ L_3 \end{bmatrix}$$

with this example equilibrium statement there are 9 unknowns (the z's) which are the dependent intermediate spending flows among industries and only 3 equations. A solution will not be possible for this system of simultaneous equations unless the number of unknowns can be reduced to equal the number of equations. To reduce the number of unknowns to be equal with the number of balance equations, we can substitute the definition of technical coefficients in place of the $z_{ij}$'s. A sector's technical coefficient is defined as $a_{ij} = z_{ij}/X_j$. Thus we can replace the z's above with $z_{ij} = (a_{ij})(X_j)$.

A sector's technical coefficient is defined as $a_{ij} = z_{ij}/X_j$. In matrix notation the n by n matrix of technical coefficients is

$$A=(Z)(X\sim)^{-1},$$

where Z are the intermediate processing flows and $X\sim$ is a matrix with the total output vector on the main diagonal and zero's elsewhere. The technical coefficients for the example model are shown in table 2. (note that an inverse of a diagonal matrix is simply a diagonal matrix of the reciprocals of the original elements)

$$\begin{bmatrix} a_{11} & a_{12} & a_1 \\ a_{21} & a_{22} & c_2 \\ h_1 & h_2 & c_3 \end{bmatrix} = \begin{bmatrix} Z_{11} & Z_{12} & C_1 \\ Z_{21} & Z_{22} & C_2 \\ H_1 & H_2 & H_3 \end{bmatrix} \begin{bmatrix} 1/X_1 & 0 & 0 \\ 0 & 1/X_2 & 0 \\ 0 & 0 & 1/X_3 \end{bmatrix}$$

Post multiplying through by $X\sim$ and rearranging terms gives us an expression for the intermediate processing quadrant Z;
$Z=(A)(X\sim)$.

$$\begin{bmatrix} Z_{11} & Z_{12} & Z_{13} \\ Z_{21} & Z_{22} & Z_{23} \\ Z_{31} & Z_{32} & Z_{33} \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} & c_1 \\ a_{21} & a_{22} & c_2 \\ h^1 & h_2 & h_3 \end{bmatrix} \begin{bmatrix} X_1 & 0 & 0 \\ 0 & X_2 & 0 \\ 0 & 0 & X_2 \end{bmatrix}$$

For example, intermediate processing flows expressed in terms of the matrix of technical coefficients is illustrated above. This term, $(A)(X^{-})$, we will substitute into the accounting equation in place of Z. Output equilibrium in the national economy can now be stated as;

$$X = \quad )(X\sim)(U) + (Y)(U),$$

which reduces to:

$$X = (A)(X) + (Y)(U), \text{ since } (X\sim)(U) = X.$$

Further, we can solve the equation for final demands by isolating the final demand vector (Y):

$$X - (A)(X) = (Y)(U),$$

this can be restated as:

$$(I-A)(X) = (Y)(U),$$

where I is the identity matrix with ones on the diagonal and zero's elsewhere and U is a column vector of ones.

This output equilibrium shows the amount of output from each of the sectors necessary to supply the exogenously determined final demands.

$$\begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} - \begin{bmatrix} a_{11} & a_{12} & c_1 \\ a_{21} & a_{22} & c_2 \\ h_1 & h_2 & h_3 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} = \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 & -a_{11} & -a_{12} & -c_1 \\ 0 & 1 & 0 & -a_{21} & -a_{22} & -c_2 \\ 0 & 0 & 0 & -h_1 & -h_2 & -h_3 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} = \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix}$$

$$\begin{bmatrix} (1-a_{11}) & -a_{12} & -c_1 \\ -a_{21} & (1-a_{22}) & -c_2 \\ -h_1 & -h_2 & (1-h_3) \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} = \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix}$$

Final demands can exist at any given positive level and national production is assumed to be able to fulfill those demands. The goal is to solve the equilibrium statement for national production. This is accomplished in several steps:

$$(I-A)^{-1}(I-A)(X) = (I-A)^{-1}(Y)(U);$$ [2]

$$(I)(X) = (I-A)^{-1}(Y)(U);$$

$$X = (I-A)^{-1}(Y)(U).$$

For ease of notation, the Leontief matrix is relabelled as $B = (I-A)^{-1}$, thus;

$$X = (B)(Y)(U).$$

$$\begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} = \begin{bmatrix} (1-a_{11}) & -a_{12} & -c_1 \\ -a_{21} & (1-a_{22}) & -c_2 \\ -a_{31} & -a_{32} & a_{33} \end{bmatrix} \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix}$$

The "inverse" matrix shows the "total requirements" per rupee of exports by the industry named at the head of the column. Total requirements are composed of the direct and indirect requirements. If households is included as a dependent sector in quadrant one, then the total requirements are said to also include "induced" requirements. Each entry in the inverse matrix is an interdependency coefficient. Each coefficient, $b_{ij}$ represents the direct and indirect requirements of sector i per unit of final demand sold by sector i.[3] By setting the level of final demands at any level (including the current level) we can now obtain the gross national economic activity (direct, indirect, and induced, thus total) in each sector that goes to supplying that level of demand can be obtained.

The immediate impacts computed in the technical coefficients table are followed by even longer term effects which can be found by calculating "total requirements". Successive rounds of production and demand arise because suppliers need inputs to make and sell their outputs. "Total requirements" coefficients indicate the cumulative influences of each industry on each other and back on itself. Total requirements are much larger than the direct requirements shown by the technical coefficients because the total requirements incorporate all of the cumulative effects of each industry supplying each other industry to reach a new equilibrium of the economy while the technical coefficients only show the initial round of spending.

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2 The inversion of the Leontief matrix of course assumes that the matrix is nonsingular i.e. that $|I-A|$ N.E. 0.

3 In calculus terms, $b_{ij} = dX_i/dY_j$, the change in the $i^{th}$ sector of the regional economy when the $j^{th}$ final demand changes by an infinitesimal amount.

The output multiplier (sometimes called the business multiplier), for any sector j, is the sum of the direct and indirect (and induced if the model is closed with respect to households) requirements from all sectors of the national economy needed to sustain one additional rupee of output to final demand by sector j. The output multiplier is obtained by summing down the column of the inverse matrix for industry j.

Since each element of $(I-A)^{-1}$, bj measures the total stimulus, direct and indirect (and induced), to the ith gross output when the jth final demand changes by one unit; the output multiplier ($\Sigma_i$ $b_{ij}$) measures the total effect on gross output of all sectors when final demand for the jth sector changes by unity and all other final demands are zero.

The magnitude of the multiplier indicates the amount of demand stimulus that sector of the economy will create when it makes added sales to final demand. Each entry in a column of the Leontief inverse shows the total production requirements from the sector at the left when the sector at the column head increases sales to final demand by one rupee. Sectors with large output multipliers have relatively small leakages in their direct and/or indirect purchases. In other words, a large multiplier means that the sector directly and indirectly purchases a larger proportion of its inputs from within the nation instead of importing. Comparing multipliers for similar sectors across different national I/O models thus gives a measure of the self sufficiency of a nation. Nations with large multipliers have greater development of intermediate production.

The closing of an I/O model means that sectors previously in the Final Demand and Primary Input quadrants are relocated within the Interindustry transactions quadrant. The method by which a model is closed is that the row and the column of the sector to be closed are moved into the interindustry quadrant, the technical coefficients are then calculated for the newly enclosed sector and lastly the matrix (I-A) is then reinvented.

The most common sector as candidate for enclosure into the transactions quadrant is the household sector. By enclosure, households are now part of the production function for the economy and as part of the production function for the nation, households can no longer be autonomous; ie have independent tastes and preferences. Households can no longer be independent of output. Two changes occur in the household sector[4]; (1) its income (sales) are determined simultaneously with the sale of other processing sectors rather than being independent and, (2) its consumption pattern out of income is fixed by technical coefficients (each element of the household column is not independently determined as when household is interpreted as the average and marginal propensity to consume.

Closing a model results in less leakage which increases interdependence and increases size of the multipliers. Type II multipliers which measure not only direct and indirect but include induced effects. Induced meaning the multiplier now measures the spending induced from households as a result of a change in final demand.

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4 Or in any sector that is closed.

## FORWARD OR SUPPLY DRIVEN I/O

Whereas the concept that transforms the I/O accounts into the backward concept of an economy is a production function for that economy, the forward linked I/O is based upon a concept of fixed sales or marketing chain. Forward linked or supply driven I/O says that inputs determine the total output of the economy: that output of the economy is determined by availability of primary inputs. Thus the economic activity of an economy is forward linked or stems from the primary inputs. This is a restatement of Say's Law that supply creates its own demand. Sectors are assumed to expand as allowed by the availability of inputs.

Forward linked equilibrium is calculated by transposing the vertical (column) view of the demand driven I/O to a horizontal view of the transactions table. Instead of dividing each entry in the column of a transactions matrix Z by the gross output of that column to obtain technical coefficients, sales coefficients are calculated by dividing each entry in the row of a transactions matrix by gross output of that row. In matrix form:

$$Z = X \sim A^f, \text{ thus}$$

$$A^f = X \sim^{-1} Z$$

The accounting identity for the forward linked model is:

$$X' = U'Z + P;$$

where P is a vector the total primary inputs of the economy. This accounting identity states that the total output of the economy (X) is the sum of the interindustry transactions and primary inputs. As an example;

$$X_1 = (z_{11} + z_{21} + z_{31} \ldots) + P_1;$$

where $P_1$ is the sum of $H_1 + T_1 + M_1$ (refer to previous notation). The definition of the sales coefficients can be substituted back into the accounting identity:

$$X' = U'X \sim A^f + P.$$

The Leontief solution for the supply model follows by solving for the output of the economy in terms of the total value added in the following steps:
beginning with the accounting

$$X' = U'X \sim A^f + P$$
$$P = X'A^f - X' \text{ (since } U'X \sim = X')$$
$$P = X'(I - A^f)$$
$$X' = P(I - A^f)^{-1}$$
$$X' = PB^f,$$

where $B^f$ is the supply Leontief inverse, $(I - A^f)^{-1}$.

The Leontief inverse for the supply driven model can be interpreted in calculus terms $\delta X_j / \delta W_i = b^f_{ij}$, note that the order of the subscripts in this partial derivative are reversed from the $b_{ij}$ of the demand driven model since the model was transposed. Each element, $b^f_{ij}$ can be interpreted as: given a unit change in the primary input to sector i the resulting direct and indirect change in the output of sector j. The multipliers for the supply side model are row sums (as opposed to the column sums of the demand model) i.e:

$$(I - A^f)^{-1}U .$$

For example:

$$b^f_{11} + b^f_{12} + b^f_{13} \ldots = \text{Multiplier}$$

In summary, the assumptions of forward linked analysis can be contrasted with backward linked. Demand driven I/O can be defined as (ie $X = (I-A)^{-1}Y$ ) assuming that the final demands Y in an economy determines the level of output (X), i.e. demand drives the economy. If any given level of final demand is presented to the economy producers in that economy will strive to fulfill that demand using the production technology dictated by the technical coefficients of the model. There are assumed no supply constraints on the economy. In contrast,the forward linked uses sales coefficients: $A^f = (X \sim)^{-1}Z$ sales coefficients say that sales have to be made to each buyer in the same proportion. The sales coefficients are a far weaker assumption; as there are no constraints to whom an industry sells output i.e. there is no technology or behavioral constraints on sales. In contrast, the demand driven I/O says that to produce a product a certain technology or production function is required which provides the restriction dictating the technical coefficients. The second major contrast in assumptions is that the forward analysis assumes no final demand limitations (at the price level given) for the economy ie that demand exists for any level of supply. In effect this says that a developing country such as Pakistan can sell a limitless amount of its exports on the world market without influencing price. In short, demand driven I/O says that to meet any given level of final demand here are the proportion of inputs we need to buy; the supply driven view of the economy is seriously flawed, in saying that in order to buy these imports here are the fixed proportions of output that we have to sell.

## BACKWARD AND FORWARD LINKAGE ANALYSIS

Formulating a strategy for development and growth in an economy involves the identification of key sectors of that economy. These key sectors can either be bottleneck or opportunity sectors to be targeted for development policy. In this context, linkages are a principal criteria for selection of key sectors. The powerful economic growth in forward and backward linkages are external to market prices. Thus, traditional benefit-cost analysis which measures private benefits and costs cannot reflect total social benefits. Total social benefits of a development policy will diverge from private benefits if linkages are not considered.

This section will first discuss the methods of backward linkage analysis in the Pakistan economy, followed by the methods of forward linage analysis. After methods, the data sources, or other words the Pakistan I/O models, on which the methods of linkage analysis will be applied will be discussed. This section will concluded with the results of the linkage analysis.

## BACKWARD LINKAGES

The goal of backward linkage measures are to measure the potential stimulus to other sectors of the economy from a change in output from the $j^{th}$ sector. To review, a backward link is the demand for inputs in the production process resulting from the sales of goods and services to final demand. To measure both the direct and indirect backward linkages we need to call into use the backward or demand driven Leontief inverse to make comparisons between sectors. Backward linked average of the total (direct and indirect) impacts of the $j^{th}$ sector relative to the overall average of the entire economy can be indexed as;

$$I_j = (1/n\ \Sigma_i\ b_{ij} / 1/n^2\ \Sigma_i \Sigma_i\ b_{ij})$$

$$= n * (j^{th} \text{ sector output multiplier/sum of output multipliers})$$

where n is the number of sectors in the economy (Rasmussen). The numerator of this backward linked index is the average direct and indirect change in economic activity of the whole economy when final demand for the $j^{th}$ sector changes by one unit and the denominator is the average change in economic activity for the whole economy when all final demands change by one unit. Thus the average impact of the $j^{th}$ sector is relative to the average of all sectors in the index for unit change in economy. When $I_j$ is greater than one investment in the jth sector will yield above national average backward linked impacts.

While the backward linked index measure the relative magnitude of the impact the index says nothing about the backward linked concentration of economic activity throughout the economy. Impacts resulting from an increase in final demands for one sector may be concentrated in only few sectors or be felt as ground swell of economic activity throughout the economy[5]. One may gain visual perspective of the potential that a sector has for dispersed economic activity by examining the number of nonzero entries for a sector in the gross flows I/O table or the number of high versus low valued entries. Visual inspection is only a qualitative measure of the direct whereas the following provides a measure of coefficient of variation of direct and indirect;

$$V_j = (1/(n-1)\Sigma_i(b_{ij} - (1/n\Sigma_i\ b_{ij}))^2 / (1/n\ \ \Sigma_i b_{ij})^1/2.$$

A high coefficient of variation tells us that the direct and indirect economic activity resulting from changes in final demand is concentrated in a few sectors of the economy. While a low

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5 This concept may have even more relevance where the I/O model is a social accounting matrix and the sectors of the economy are various income groups. The goal may be to generate income across as many income groups as possible.

coefficient means that backward links for the sector are spread evenly throughout the economy.

The $j^{th}$ sector's backward linkages are the sum of the forward linkages of industries that supply inputs to the $j^{th}$ sector, while the $j^{th}$ sector forward linkages are the sum of backward linkages from the sectors that demand sector product. For the economy as a whole consideration of both forward and backward linkages would double count economic activity. However, for an individual industry both the supplying (backward linked) and consuming (forward linked) can be stimulated from an increase in output from that industry.

## FORWARD LINKAGES

Consideration of only backward linkages is a one sided view of the sector interdependence in the Pakistan economy. Whereas many industries have considerable dependence on inputs supplied within the economy creating the backward links other industries supply inputs to numerous industries creating the forward links. The so-called base industries (e.g. mining, agriculture) are examples where the industry's output has to undergo numerous levels of processing by other sectors of the economy before final consumption or export. Primary industries such as machinery manufacturing also sell to numerous sectors in the economy, as most sectors require some machinery.

Forward linkage measures, measure the potential stimulus to other sectors of the economy from a change in inputs to the $j^{th}$ sector. To measure both direct and indirect forward linkages we need to call into use the forward or supply driven Leontief inverse to make comparisons between sectors. Forward linked impacts of the $j^{th}$ sector relative to all other sectors the average direct and indirect backward stimulus can be indexed as:

$$I_j = (1/n\Sigma_j b^f_{ij} / 1/n^2 \Sigma_i\Sigma_j b^f_{ij})$$

$$= n * (j^{th} \text{ sector forward output multiplier/sum of forward output multipliers})$$

where n is the number of sectors in the economy (Bulmer-Thomas; Jones). The numerator of this forward linked index is the average direct and indirect change in economic activity of the whole economy when primary inputs for the $j^{th}$ sector changes by one unit and the denominator is the average change in economic activity for the whole economy when all primary inputs change by one unit. Thus the average impact of the $j^{th}$ sector is relative to the average for all sectors for unit change in the economy. When $I_j$ is greater than one investment in the $j^{th}$ sector will yield above average forward linked impacts.

While the forward linked index measure the relative magnitude of the impact the index it says nothing about the forward linked concentration of economic activity throughout the economy. Impacts resulting from an increase in primary inputs for one sector may be concentrated in only few sectors or be dispersed throughout the economy. The following provides a measure of coefficient of variation of direct and indirect;

$$V_j = (1/(n-1)\Sigma_j (b^f_{ij} - (1/n\Sigma_j b^f_{ij}))^2 / 1/n\Sigma_j b^f_{ij})^{1/2}$$

A high coefficient of variation tells us that the direct and indirect economic activity resulting from changes in primary inputs is concentrated in a few sectors of the economy. While a low coefficient means that forward links for the sector are spread throughout the economy.

The above methods of forward linked analysis gloss over the serious drawbacks in the theoretical underpinnings of supply driven I/O (see Oosterhaven for a review). Alternatives to forward linked analyses have used a backward driven formulation (originally proposed by Rasmussen[6]) or arbitrary weighing schemes whose underlying foundation is still backward linked (Laumas). With the usual degree of caution and a warning to view the forward linkage analysis as a degree of market penetration rather than causal relationship between imports and sales, this supply driven view of the economy is the only readily available instrument we to examine forward links in the Pakistan economy.

## DATA SOURCE: I/O MODELS FOR THE PAKISTAN ECONOMY

In the early 1960's the first I/O tables were constructed for West Pakistan (Khan and MacEwan; Rasul and Jarret). These first studies have been replaced with most comprehensive model of the Pakistan economy to date: a 118 sector I/O model for the accounting year 1975-76 (Pakistan Institute for Development (PIDE) Saleem et al, 1985). An aggregated version of this model will serve as the baseline for the linkage analysis of the Pakistan economy. Aggregation was undertaken to provide an easily understandable picture of the Pakistan economy. The 118 sector PIDE model was aggregated into 11 sectors following the industry level aggregation provide for in the NIPA of Pakistan

1) Agriculture
2) Transportation and Communication
3) Wholesale and Retail Trade
4) Large Scale Manufacturing
5) Small Scale Manufacturing
6) Mining and Quarrying
7) Construction
8) Electric and Gas Distribution
9) Banking and Insurance
10) Owner Dwelling
11) Services

Since construction of I/O accounts is expensive, time consuming and lags between compilation and publication may be years, updates become necessary to monitor the economy. To monitor the linkage in the Pakistan economy we have compiled two updates of the 1975-76 PIDE I/O model. The first for 1984-85 and second for 1989-90. An I/O model is updated by utilizing

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[6] Bulmer-Thomas provides a review and implications of Rasmussen mistake. An example of Rasmussen's mistaken forward linkage analysis was on the Pakistan economy (Syed).

current marginal information on total flows instead of a complete resurvey to ascertain each interindustry transaction. Khan (1989) has updated the 1975-76 PIDE model for the accounting period 1984-85 using the "RAS" technique. We further condensed the Khan update model to the 11 above mentioned sectors for use in the proceeding linkage analysis. A second update was undertaken for 1989-90 (Appendix I) using the same RAS method as the Khan model to update the interindustry quadrant. Different in the 1989-90 update was the attempt in integrate fully the NIPA as controls on the totals in final payment and final demands quadrants to result in standardized procedure for future updates of Pakistan I/O accounts.

With three models available we can now measure intertemporal changes in linkages as well as make interindustry comparisons within each time period. The results of the linkage analysis is the focus of the next section. The gross flows or transactions matrix, technical coefficients matrix, and Leontief inverse for 11 sector 1975, 1985 and 1990 models are include as Appendix II.

## RESULTS OF LINKAGE ANALYSIS

The linkage analysis was conducted on the aggregated 1975-76 PIDE model, the 1984-85 Khan update, and the 1989-90 update. Specifically, the analysis was on models closed with respect to households so that linkages across household incomes will be captured in the analysis. In the 1989-90 update the household sector is defined as value added net of depreciation, direct taxes and savings. Thus household income is wage and salaries, self employment income and profits whereas the previous models defined payments to households as only wages and salaries. Discussion of the results will follow the order of analysis. First the linkage index followed by the coefficient of dispersions will be discussed, again with particular attention to the agriculture sector of the economy.

### Linkage Indexes

To briefly summarize the goal of linkage analysis is to identify above average sectors of the economy in both forward and backward links. The linkage indexes computed for the 1989-90, Pakistan I/O model are presented in table. To gain a visual representation of the linkage indexes, forward linkage indexes are plotted against the backward linked indexes for the 1989-90 I/O (Figure 4, 5 and 6 respectively). Recall that the index is standardized thus the mean of the index for any year is unity. Thus those sectors of the economy that exceed unity are the above average sectors for the Pakistan economy. When both forward and backward linkage indexes exceed unity those sectors appear (by number corresponding to the sector identification in the table) in the northeast quadrant of the Figures 4, 5, and 6.

### Coefficients of Dispersion

Whereas the goal of the linkage index is to maximize, the goal of the coefficient of variation is to minimize. A low coefficient of variation for both forward and backward linkage means that economic activity is spread throughout the economy instead of concentrated in a limited number

of sectors. The coefficients of variation for the 1975-76, 1984-85 and the 1989-90 I/O tables are in Table 2. To better illustrate, forward and backward coefficients are combine in a single plot, one for 1975-76, 1984-85 and 1989-90 in Figures 7, 8, and 9 respectively. Those industries with low coefficients of variation for both forward and backward links will be closer to the origin. For example, in 1975-76 the mining industry has the lowest coefficient of variation for both forward and backward links. This means that the mining's output supplies and input requirements are spread broadly across the economy and mining and has maintained this distinction into the 1989-90 economy.

The first comparison we can make between 1975-76, 1984/85 and 1989/90 coefficients is that there are a greater number of industries which are closer to the origin in 1989/90 over 1975-76. In other words, the Pakistan economy is becoming more diverse, with more industries buying and selling to a greater number of industries. The major disappointment in the performance of the agriculture sector is that it lacks of diversity in the economy of Pakistan. In 1975-76 agriculture ranked the lowest in diversity with only minor improvement into 1984-85 and no further improvement into 1989/90.

The above linkage analysis identifies key sectors of the Pakistan economy, however, the potential for economic growth as measured by the backward and forward linkages may not realized. Growth potential can absorbed as higher taxes, increased imports or under-utilized capacity. Constraints on available inputs or limits upon markets from a variety of sources not the least of which is government policy. Panchamuki found that for the Indian economy that sectors with greater linkages had higher under utilized capacity rather than growth.

TABLE 1. BACKWARD AND FORWARD LINKAGE MEASURES OF THE PAKISTAN ECONOMY FOR THE 1975-76, 1984/85, AND 1989/90 CLOSED I/O MODELS.

BACKWARD AND FORWARD LINKAGE MEASURES FOR CLOSED MODEL

| ROW | (BL) LINKAGE INDEX 1975-76 | (FL) LINKAGE INDEX 1975-76 | (BL) LINKAGE INDEX 1984-85 | (FL) LINKAGE INDEX 1984-85 | (BL) LINKAGE INDEX 1989-90 | (FL) LINKAGE INDEX 1989-90 |
|---|---|---|---|---|---|---|
| AGRICULTURE | 1.0617 | 1.3244 | 1.0424 | 1.0521 | 1.1446 | 1.1905 |
| MINE & QUARRYING | 1.0935 | 1.0911 | 1.0995 | 1.3053 | 1.0410 | 0.7058 |
| MFG-L.SCALE | 1.1846 | 1.2028 | 1.2665 | 1.1381 | 0.7782 | 0.9833 |
| MFG-S.SCALE | 1.3979 | 1.0090 | 1.6190 | 1.1598 | 1.0188 | 1.1031 |
| CONSTRUCTION | 1.2732 | 0.4326 | 1.3252 | 1.3116 | 0.9777 | 1.0146 |
| ELEC & GAS DISST | 0.9308 | 0.7749 | 0.6894 | 0.6281 | 0.9045 | 0.4757 |
| TRANS. COMMU. | 0.3664 | 1.0390 | 0.3853 | 1.0691 | 0.8557 | 1.0813 |
| W.R.TRADE | 0.6272 | 1.3382 | 0.5468 | 1.2016 | 1.0869 | 1.1990 |
| B & INSURANCE | 0.8336 | 1.2329 | 0.9062 | 1.1663 | 1.0942 | 1.2190 |
| OWNERSHIP & DW | 0.7990 | 0.9891 | 0.7344 | 0.6119 | 0.9639 | 0.8688 |
| SERVICE | 0.6930 | 0.9182 | 0.6124 | 0.7695 | 1.0533 | 0.9850 |
| H.HOLDS | 1.2391 | 0.6478 | 1.2728 | 0.5865 | 1.0813 | 1.1740 |
| MEAN | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |

TABLE 2. COEFFICIENT OF VARIATIONS OF THE PAKISTAN ECONOMY FOR THE 1975-76, 1984/85 AND 1989/90 CLOSED I/O MODELS.

COEFFICIENT OF VARIATION MEASURES FOR CLOSED MODEL

| ROW | (BL) COEF OF VARIATION 1975-76 | (FL) COEF OF VARIATION 1975-76 | (BL) COEF OF VARIATION 1984-85 | (FL) COEF OF VARIATION 1984-85 | (BL) COEF OF VARIATION 1989-90 | (FL) COEF OF VARIATION 1989-90 |
|---|---|---|---|---|---|---|
| AGRICULTURE | 0.0799 | 0.0756 | 0.0681 | 0.0704 | 0.0736 | 0.0777 |
| MINE & QUARRYING | 0.0542 | 0.0510 | 0.0499 | 0.0546 | 0.0549 | 0.0426 |
| MFG-L.SCALE | 0.0722 | 0.0727 | 0.0786 | 0.0806 | 0.0749 | 0.0723 |
| MFG-S.SCALE | 0.0611 | 0.0737 | 0.0714 | 0.0834 | 0.0635 | 0.0696 |
| CONSTRUCTION | 0.0507 | 0.0798 | 0.0507 | 0.0542 | 0.0544 | 0.0479 |
| ELEC & GAS DISST | 0.0583 | 0.0602 | 0.0600 | 0.0606 | 0.0512 | 0.0540 |
| TRANS. COMMU. | 0.0619 | 0.0601 | 0.0569 | 0.0608 | 0.0546 | 0.0599 |
| W.R.TRADE | 0.0720 | 0.0598 | 0.0697 | 0.0606 | 0.0658 | 0.0649 |
| B & INSURANCE | 0.0621 | 0.0601 | 0.0540 | 0.0595 | 0.0568 | 0.0599 |
| OWNERSHIP & DW | 0.0626 | 0.0719 | 0.0584 | 0.0652 | 0.0522 | 0.0583 |
| SERVICE | 0.0680 | 0.0570 | 0.0649 | 0.0560 | 0.0617 | 0.0528 |
| H.HOLDS | 0.0604 | 0.0752 | 0.0566 | 0.0721 | 0.0726 | 0.0761 |
| MEAN | 0.0636 | 0.0664 | 0.0616 | 0.0648 | 0.0613 | 0.0613 |

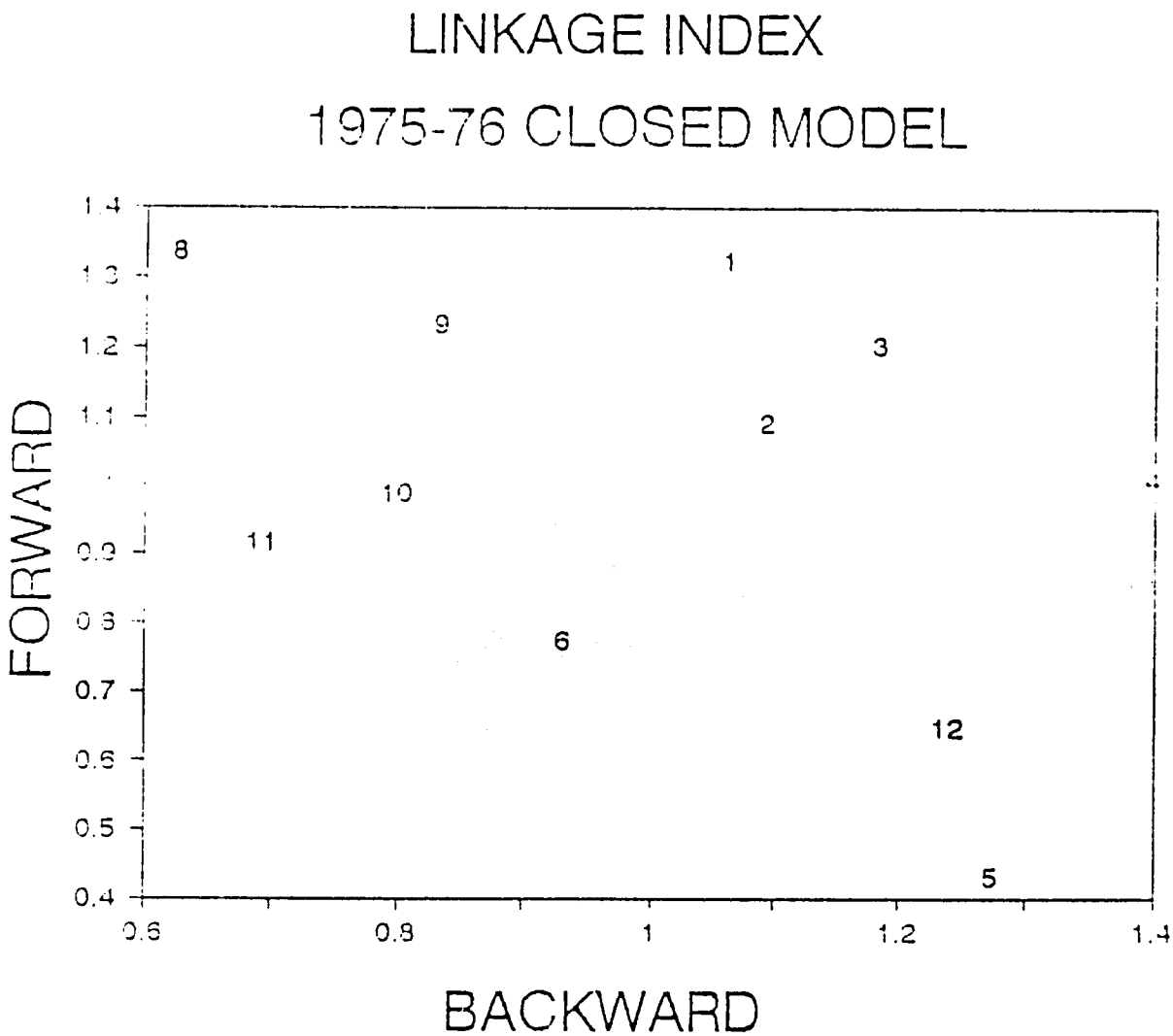


Figure 4. Forward verus backward linkage index for 1975-76

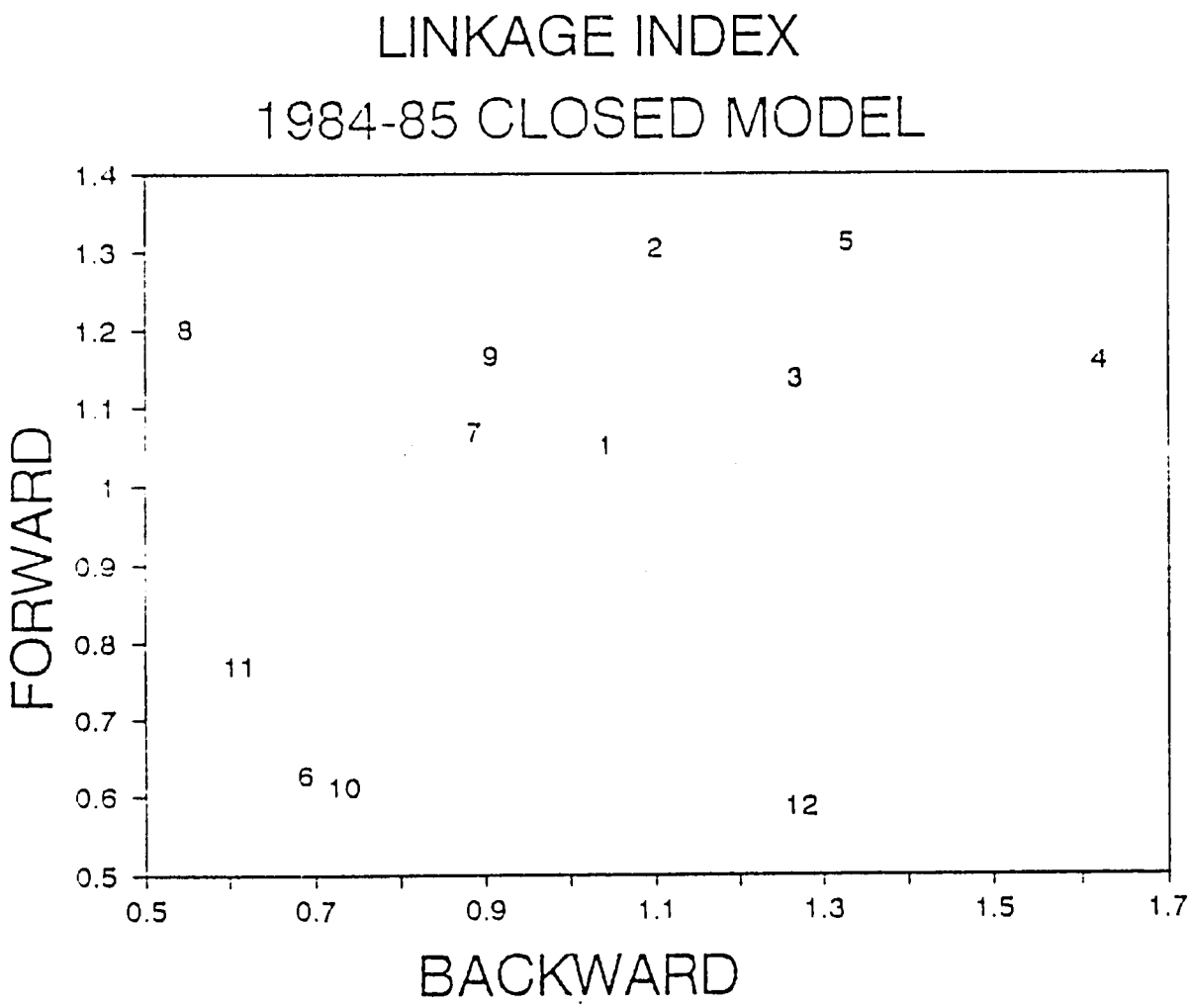


Figure 5. Forward verse backward linkage index 1984-85

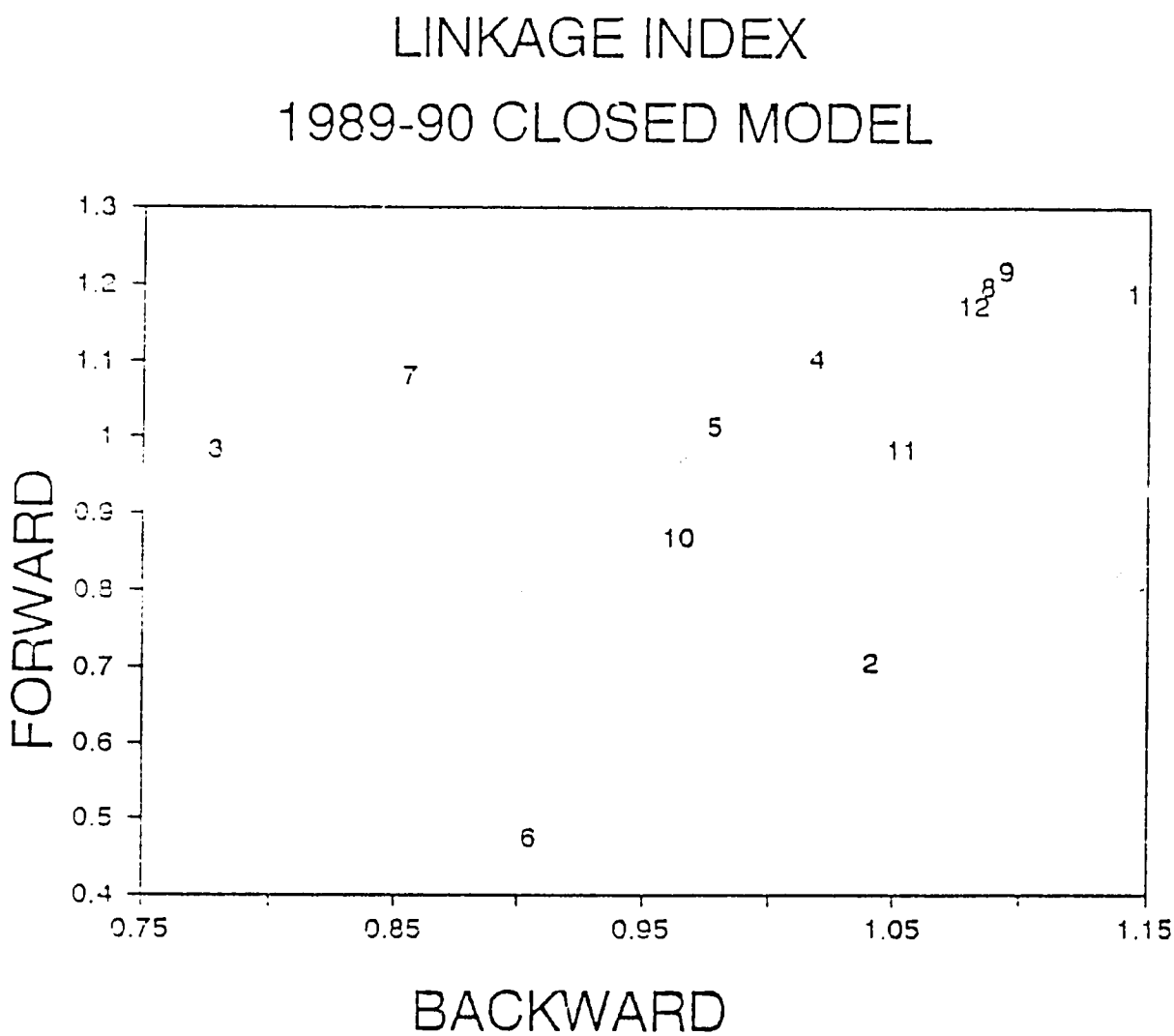


Figure 6. Forward verse backward linkage index for 1989-90

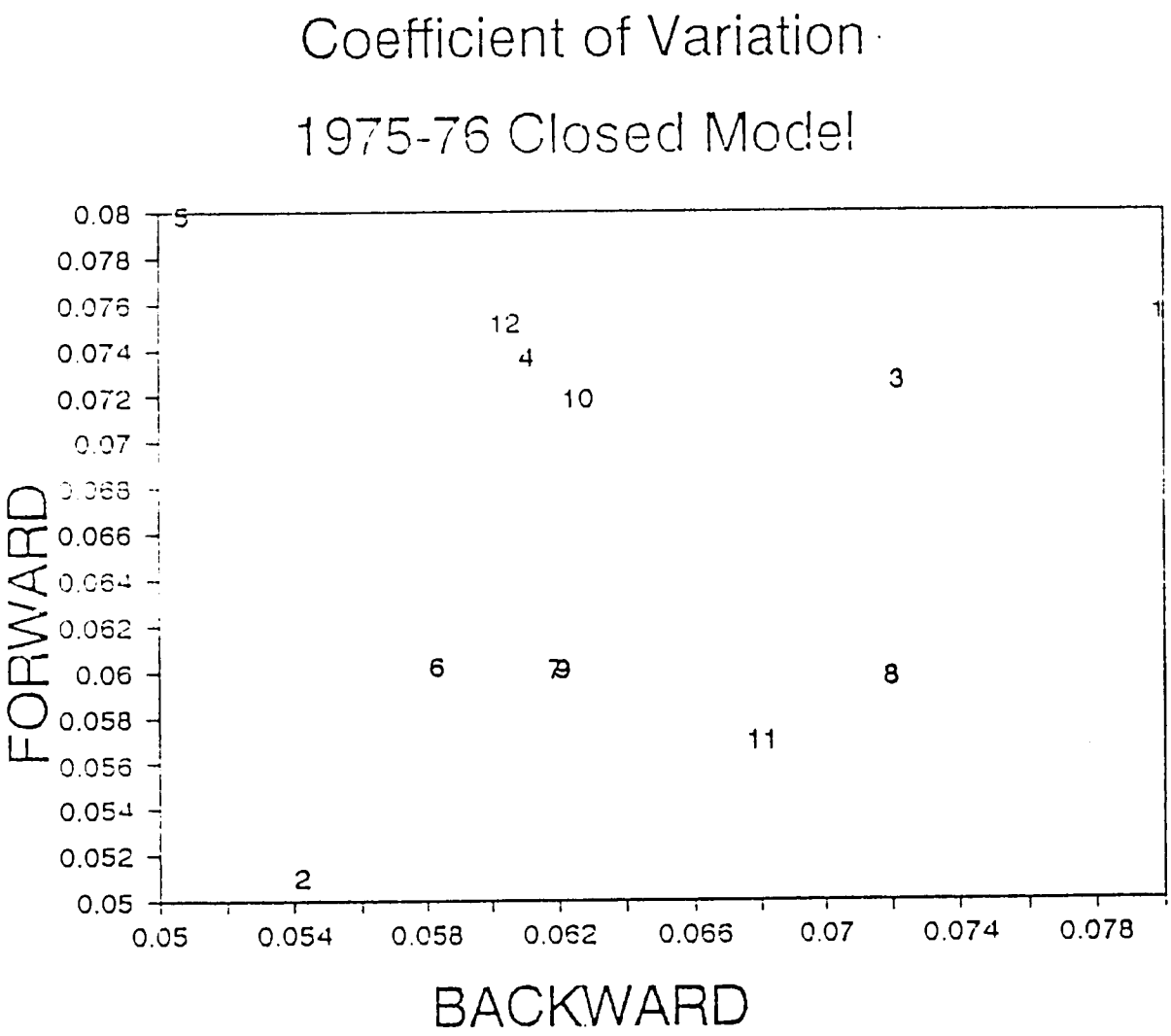


Figure 7. Forward versus backward coefficient of variation for 1975-76

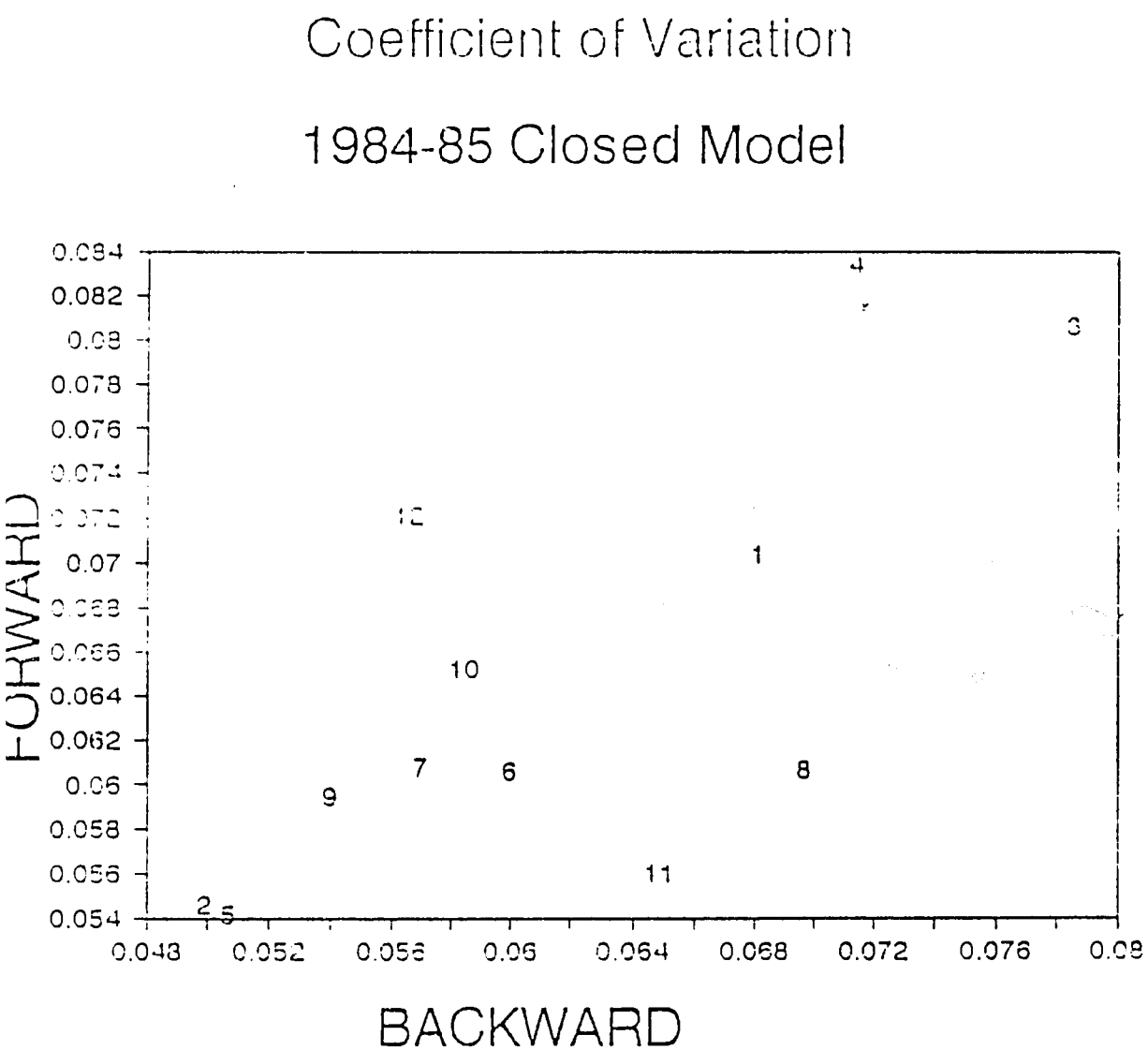


Figure 8. Forward versus backward coefficient of variation for 1984-85

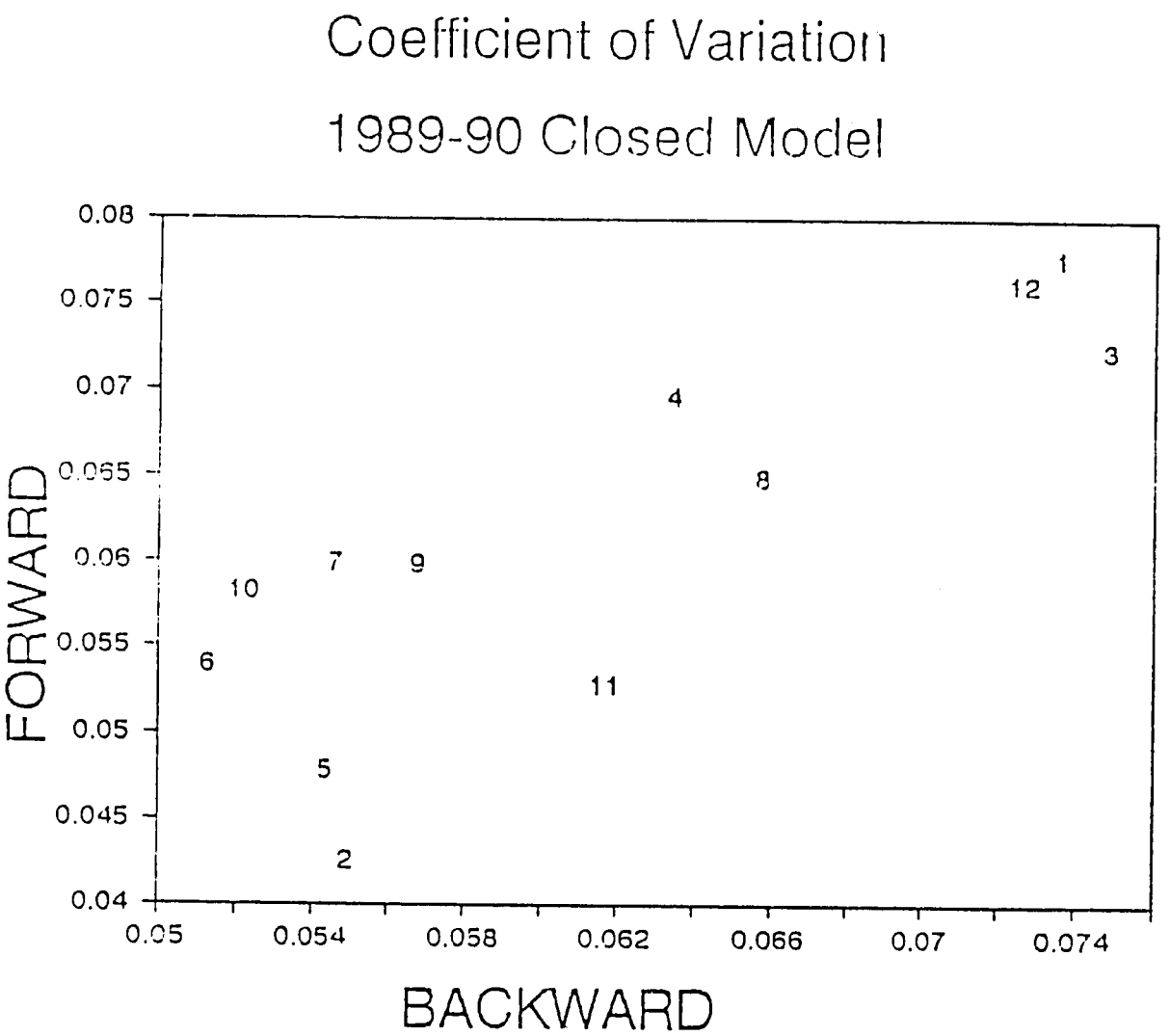


Figure 9. Forward versus backward coefficient of variation for 1989-90

## APPENDIX I.

## PROCEDURES FOR 1989/90 I/O UPDATE OF THE PAKISTAN ECONOMY

The goal of this update of the I/O model of Pakistan is to provide a uniform procedure to be used in this update as well as future updates of the I/O accounts of the Pakistan economy. By uniform we mean the methods and data sources proceed in a reproducable fashion.

The update proceeded in several steps. The first of the steps was establish control totals for a national I/O to projected year of 1989/90. This step is estenisally places the NIPA figures on the rim of quadrant four of the I/O and as total value added within quadrant three of the I/O model. Recall from Figure 2 that the totals on this quadrant are the respective NIPA accounts, which net intermediate purchase sum to the national income of Pakistan. These totals then establish the control total for primary inputs and total final demands in the economy. NIPA value added serve similarly as subtotals for further disaggregation of the row into its component values of wages and salaries, savings, depreciation and direct taxes.

The next step in construction is to desegregate each account control total among the various sectors in the respective row or column of the final demand or primary input quadrants of the I/O model. The intersectoral disaggregation, data sources, limitations and strengths and recommendations for future updates are discussed at length in the following section. Following the discussion of data, the final step in the estimation process is the updating of the interindustry matrix (quadrant one) trough the use of the RAS method. In summary, a general assessment of the procedure will be provided.

## SECTORAL DISAGGREGATION OF NIPA ACCOUNTS

Before proceeding into a discussion of the disaggregation of the control totals for the primary input and final demand accounts lets first discuss the derivation of the control totals for the interindustry accounts. Following that discussion each account in the national income and product account will be dealt with in turn.

## INTERINDUSTRY VALUE ADDED AND GROSS OUTPUTS

The input/output interindustry transaction matrix (quadrant 1) is based upon the eleven industrial sectors taken from the National Income and Product Accounts (NIPA) of Pakistan by the Federal Bureau of Statistics. The eleven sectors are:

1. Agriculture
2. Mining and Quarrying
3. Manufacturing - Large Scale
4. Manufacturing - Small Scale

5. Construction
6. Electric and Gas Distribution
7. Transportation, Storage and Communication
8. Wholesale and Retail Trade
9. Banking and Insurance
10. Owner Dwelling
11. Services

The agricultural sector was an aggregation of four sub-sectors, namely Crops (major and minor), Livestock, Fishing and Forestry. Gross output for each of the above industrial sectors serves as the key to obtain total interindustry flows for that sector. These sectors were purposely maintained at the highly aggregate level to directly correspond to the similar designation in the NIPA accounts. Disaggregation of the NIPA sectors can be achieved as was done in the Khan or Murbarik et al studies to emphasis agribusiness sectors of the Pakistan economy. NIPA sectors can then be used as control totals for this disaggregation.

Total primary inputs and total final demands are subtracted from gross output to estimated the value of interindustry output or input. Ideally, independent estimates of gross output need to be obtained for accurate updates. For example, in agriculture, crop and livestock production times prices could estimate gross output value. Such information has not been compiled for each sector in the economy, in particular for a developing county where much of the product in consumed as subsistence without entering the market. To estimate gross output we used the ratio of value added to gross output in the 1976 PIDE model and applied that ratio to the 1990 NIPA value added for each respective sector to estimate gross output for 1990. These estimates were then placed as the control total (i.e. X1 ... X11) as shown in Figure 2.

**RECOMMENDATION:** Independent estimates of gross output are the single most vital data needed for accurate updates. Considerable research needs to be made on an annual basis for each sector of an updated model. The Census of Manufacture, Agricultural Statistics, etc. needs to be compiled and indexed for gross output estimates for each sector or other more accurate methods need to be pioneered.

The gross domestic product is derived from gross output of the economy i.e. the total flow of goods and services which are produce during a period. Value of goods and services produced at market prices minus value of intermediate goods and services at market prices is the Gross Domestic Product at Market Price. Different methods have been developed to measure Gross Domestic Product of a nation during a given period of time. In Pakistan the value added is computed for the sectors of the economy by a combination of products, income and expenditure methods. The product method is applied to compute value added in agriculture, mining and quarrying, manufacturing, electricity and gas distribution services, wholesale and retail trade and ownership of dwelling. The income method is used to estimate income accruing from transport, storage & communication, banking & insurance, public administration & defence and services sectors. The expenditure method is used to estimate value added in construction.

Total value added per sector was placed as control totals from which value added could be disaggregated into its component parts of, household wages/salaries/profits/self employment income, depreciation, direct taxes and user fees, and savings. In other words, the column sum of the above accounts in that sector has to equal value added in that sector. Further, control totals are available on the row sums of several of the value added accounts. Control total on savings were published by the State Bank of Pakistan. We assumed that there is constant marginal propensity to consume between sector of the economy. Thus savings in each sector was allocated as a percent of the total value in that sector. Income taxes were allocated similarly among the sectors, to which the user fees paid by the various sectors were added.

## GOVERNMENT CONSUMPTION

Government is the twelveth sector in the NIPA, to sum to the total Gross Domestic Product (factor cost) for Pakistan, which in 198/90 was 129,955 million Rs. The government sector, however, was excluded from the interindustry accounts in the 1990 updated I/O model. This government sector was then include in the I/O model as government consumption, a final demand sector in quadrant 2. To match the government consumption final demand account the primary input accounts of indirect taxes, direct taxes and user fees were added. This accounting system for government revenues and expenditure departs from the previous PIDE's and Khan's models. In those models government was enclosed within the interindustry matrix, while taxes (net of subsidies) remained as a primary input account. This accounting system says that government consumption is endogenous to the production of the economy while payments to government for that consumption are exogenous. Ideally, those government activities that provide goods and services integral to the production of the economy and the associated taxes and fees to finance such should be within the interindustry matrix. Public goods (e.g. defence) and associated taxes should then be account for as primary inputs and final demands. Within the Pakistan economy, the principal government expenditures are for defence and interest payments which are outside the production of the economy and thus should be final demands. In the absence of a means to disaggregate government expenditure the minor amount of production goods and services from the public expenditures we have removed governemt from the interinsudry accounts entirely. This provides a distinct account in the I/O for government consumption and taxes, compatible with NIPA as control totals.

Government Consumption measures current expenditures by federal, provincial, and local bodies on wages, interest, and goods and services. Purchases of goods and services can, to a minor extent, be disaggregated by the sector based upon purchases information in Finance Division publications. However, interest payments (the purchase of debt by government which has its counterpart as savings in final payments) and a majority of other expenditures are lump sums and thus we are forced to distribute these expenditures as a percentage of those expenditures that can be allocated.

RECOMMENDATION: Government consumption data available from the federal budget, NIPA, and various other sources lack consistency. A far greater understanding of the various sources and discprencanies needs to be obtained for greater precision in the construction of this

account. Further, a review of developing county I/O accounting structures needs to be made to determine if better methods are available for the construction of the entries in this account.

## EXPORTS AND IMPORTS

Exports and Imports consist of goods and service transactions plus non-factor services with rest of the world. Imports and exports are principally commodities and the non-factor costs are transaction costs, such as freight, and insurance.

Exports and Imports trade data are available by commodity group in Foreign Trade Statistics of Pakistan for the year 1990. The classification in these statistics is by commodity not by industrial sector, as needed for the I/O model. With exports, the matching of commodity group to the respective industrial sector exporting that commodity was for the most part obvious. This was particularly true for the majority of the exports in raw agricultural products and large scale manufactured goods. The difference between the total value of exports from the Foreign Trade Statistics and total value of exports form the NIPA accounts is the value of the non-factor services. These non-factor services were allocated to each sectors' exports in proportion to the commodity exports from that sector. Total exports for 1989/90 were 126,583 million Rs.

Import data are available by commodity from the same Foreign Trade Statistics for the year 1990 (excluding the non-factor services like exports). Total imports were 173,293 million Rs. in 1989/90. However, imports cannot be disaggregated into importing industrial sectors as with exports. To illustrate, the principle import of Pakistan is petroleum, this commodity is then used across numerous sectors of the economy and cannot be disaggreagted into the sectors that acutully uses imported oil. For this reason, total imports from the 1975/76 PIDE model, on a percentage basis, were used to disaggregate the 1990 NIPA total import figure. In other words, we assume that the consumption pattern of imports remained equal to that of 1975-76.

**RECOMMENDATION:** Future updates can continue to use the Foreign Trade Statistics for Exports. However, import information must continue to rely on past I/O studies industry disaggregation. Attempts should also be made to capture in the import and export data those goods which are smuggled. These blackmarket goods are reflected, by their absence, in the interindustry production accounts. Import and export updates that do not account for such thus force blackmarket goods back into the interindustry accounts.

## INDIRECT TAXES AND SUBSIDIES

Indirect taxes comprise those taxes paid by enterprises which are chargeable as business expenses and taxes paid by the households on possession or use of goods and services. The Central Board of Revenue (CBR) provided tax data on Excise Duties, Sales Taxes and Other Taxes at the level at which industry disaggregation could be determined. However, the remainder of the indirect taxes in the NIPA total indirect taxes cannot be disaggregated by industry. Those remaining indirect taxes were divided among industries in the same percentages as Excise duties, Sales and "Other" taxes.

Subsidies are current grants made by federal and provincial governments to producers and are negative indirect taxes since they contribute to factor income but do not enter into market as other direct payments to producers. NIPA indicate the total subsidies which were disaggregate per the classification given in Budget In Brief for the year 1989/90. The Federal Government provides different subsidies to achieved various socio-economic objectiives. During 1989-90 the government provided Rs. 12,722 million as total subsidy. Out of the total subsidy about 83 % was provided to agriculture, 10 % to Steel Mill and 7 % to electricity and gas.

**Household Consumption**

Household consumption is the flow of final goods and services for consumption by households and non-profit institutions. In the NIPA accounts consumption is obtained as a residual. There are data on household consumption available from the "Household Income and Expenditure Survey", but the level of data disaggregation is not adequate for industry disaggregation. By default, we are forced to use the percentages of the household consumption from the 1975/76 PIDE model to disaggregate the 1990 NIPA total Private Final Consumption figure.

RECOMMENDATION: Using past consumption patterns from previous I/O models should be relatively accurate as consumption patterns do not usually radically change between goods consumed. The percentage of imports in this consumption pattern should however be carefully monitored. Imports to household consumption represents a large figure in the I/O model and thus represents a source of considerable error.

NON-GOOD TRADE

This account is the flows of royalities, foreign investment income and remittances which amounted to 32,262 million rs in 1989/90. For Pakistan this account, principally records remittances. Thus the positive figure for non-good trade in this sector of the I/O model is NIPA net remittances.

RECOMMENDATION: The data for this account seems to be reliable and consistent with other data sources. However, instead of the net figure shown in this model future update should disaggregate these data into the individual components in anticipation of policy question that may arise concerning those same components.

INVESTMENT AND STOCKS CHANGE

Investment in the I/O model is the Gross Fixed Capital Formation (GFCF) of the NIPA accounts. GFCF is the goods (including imports) that are used in further production and have a useful life greater than one year. Total investment in 1989/90 in the NIPA was 146,768 million rs and stocks change was 14,000 million. GFCF is further classified as private GFCF, Public GFCF and Government GFCF. Public GFCF is the investment the government makes in private sectors of the economy. NIPA estimates private and public for each of the above industrial sectors of the economy.

Obtaining data on GFCF is not the problem as such data is published in the NIPA accounts. Proper use of the available data in the I/O accounting framework remains a serious problem. The GFCF data from the NIPA estimates the use of investment not the source of that investment capital. In other words, NIPA accounts for the GFCF in each particular sector of the economy not which sector originates that capital. Origin of capital is needed for the Investment final demand account in the I/O model as this account represents industries payment to capital formation. There is a lack of any information as to the correspondence between use of capital and origin. Lack of information, forced us to assume that investment use equaled source and investment (including government GFCF) was allocated among industries as such.

The case is similar with stocks change. Changes in stock are an investment and the destination of stock changes are not equal to the origin.

**Recommendation:** The control total available from the NIPA on GFCF in the Pakistan economy should be disaggregated by industry by source not use. Considerable research should be applied to this account to formulate a better scheme for disaggregation. Investment is of considerable magnitude and correspondingly the source of large error.

## UPDATING THE INTERINDUSTRY MATRIX

There are three updating methods and they are Final Demand Method, Transactions Proportional to the Value Added and the RAS Method. All of these methods require different information and produce different results. We have used the RAS method to get the interindustry matrix. The RAS method was developed by Richard Stone in 1960s. It is widely used for updating input/output tables. The advantage of this method is that it changes the direct input coefficients and achieves a balanced model with a unique solutions. The information needed by the RAS method for updating the input/output table are i) base year input/output table ii) gross output for the later year iii) final demand for later year and iv) final payments for the later year. We made all the changes which took place during the two time periods and RAS changed the direct input coefficients matrix and achieved a balanced model. RAS changes these interindustrial coefficients bi proportional to the total demands and total payments. Balanced matrix data shows that row and column sums are equal for corresponding rows and columns of the processing sectors and the sum of final payments is equal to the sum of final demands.

### Summary and Conclusions

The first major problem was that the base period model (the 1976 PIDE) as well updates using that model (Khan; Walters et al) did not correspond completely with the NIPA. NIPA must be the basis for any update in order for the resulting model to yield a reproducible result for future updates. A national I/O should reflect and thus use all the information in the NIPAs.

The second problem relates to data availability. In the attempt to refer to the data source underlying the aggregate NIPA accounts to dissaggregate either expenditure or consumption among industrial sectors one is confronted with poorly defined data that do not correspond with

the aggregate NIPA figures. The result was that there is a compromise is what is attempted to be accounted for and what is actually accounted for in the updated I/O model. This problem was greatest in the government consumption and investment accounts. As mentioned above, a combination of research, clarification of account definitions and data correspondence are seriously needed.

The third major problem is the unavailability of data or a proven techniques to estimate the gross outputs by industry. The technique we used in this update is not proven and the search or investment in obtaining those totals should be made.

This is a first in the history of updating Pakistan I/O models, a direct correspondence is made between the NIPA accounts and an updated I/O model in every final demand and final payment account. Future updates can thus take the NIPA for any future year and an update can be made of final demands and primary inputs. The availability of the RAS technique in PC software make the update of the interindustry matrix more reliable and computationally tractable than past methods.

BEST AVAILABLE DOCUMENT

PAKISTAN INPUT OUTPUT ANALYSIS
TRANSACTIONS MATRIX (1979 80)
(MILLION RUPEES)

| ROW | AGRI CULTURE 1 | MINE QUARY 2 | MANUF. L SCALE 3 | MANUF. S SCALE 4 | CONST 5 | ELEC GAS DIST 6 | TRANS COMMUN. 7 | WHS RTL OTHER 8 | BANKING INSUR 9 | OWNER Dwelling 10 | SERVICE 11 | ROW TOTALS 12 | N.W CONSP 13 | GOVT CONSP 14 | EXPORT 15 | INVESTMT (GICF) 16 | STOCKS CHANGE 17 | NON-GOOD TRADE 18 | DIFFERENCE 19 | ROW TOTAL 20 | TOTAL SALES 21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AGRICULTURE | 51447 | 0 | 37322 | 11663 | 823 | 0 | 1051 | 0 | 0 | 0 | 0 | 139270 | 159356 | 13091 | 8216 | 16628 | 2592 | 0 | -80 | 199207 | 338515 |
| MINING QUARRYING | 231 | 0 | 311 | 162 | 1111 | 1561 | 111 | 0 | 0 | 0 | 0 | 1520 | 131 | 380 | 0 | 3038 | 31 | 0 | -2 | 3581 | 5101 |
| MANUF L SCALE | 13031 | 511 | 155712 | 13972 | 10365 | 9055 | 10321 | 88 | 221 | 16 | 121 | 266716 | 106225 | 8535 | 80921 | 28163 | 1581 | 0 | -110 | 225315 | 491950 |
| MANUF S SCALE | 0 | 0 | 1331 | 11295 | 12031 | 0 | 0 | 0 | 0 | 0 | 0 | 50282 | 127817 | 1168 | 37115 | 3890 | 691 | 0 | -55 | 171559 | 232211 |
| CONSTRUCTION | 0 | 0 | 0 | 0 | 0 | 0 | 31101 | 0 | 1132 | 19125 | 0 | 59368 | 0 | 5183 | 0 | 8195 | 361 | 0 | -11 | 11668 | 83972 |
| ELEC GAS DIST | 1521 | 1 0 | 3171 | 2097 | 0 | 1393 | 16 | 250 | 62 | 0 | 105 | 11080 | 1351 | 2135 | 0 | 33335 | 0 | 0 | -11 | 43828 | 58351 |
| TRA SID & COMM | 25123 | 322 | 21192 | 20033 | 0 | 5991 | 382 | 3581 | 123 | 0 | 1592 | 85786 | 15878 | 9138 | 0 | 19383 | 1133 | 0 | -38 | 35120 | 121206 |
| WHS RTL OTHER | 33721 | 692 | 27185 | 8551 | 0 | 6722 | 0 | 0 | 0 | 0 | 0 | 82261 | 16213 | 8612 | 0 | 1250 | 205 | 0 | -32 | 51287 | 133548 |
| BANKING INSUR | 1353 | 35 | 2332 | 1586 | 93 | 307 | 92 | 2209 | 18 | 1 | 205 | 15583 | 12338 | 1113 | 0 | 319 | 59 | 0 | -1 | 13151 | 28661 |
| OWNER DWELLING | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 38111 | 0 | 0 | 13579 | 3290 | 0 | -12 | 52269 | 52269 |
| SERVICE | 1311 | 233 | 3123 | 216 | 3362 | 1023 | 5310 | 1371 | 115 | 0 | 85 | 26173 | 11235 | 6655 | 0 | 7112 | 1062 | 0 | -11 | 32629 | 58802 |
| Sector I Total | 117523 | 2571 | 273139 | 103605 | 31333 | 26385 | 61022 | 7515 | 7701 | 19112 | 2113 | - | 503911 | 59320 | 126502 | 116768 | 11000 | 0 | -330 | 890199 | 1615650 |
| MANUFACTURES | 153262 | 1225 | 31217 | 25201 | 25555 | 16716 | 11330 | 101889 | 17513 | 20393 | 11330 | 189926 | 0 | 52681 | 0 | 0 | 0 | 0 | 0 | 52681 | 501701 |
| SERVICES | 22133 | 193 | 25121 | 5898 | 4651 | 3188 | 8152 | 18213 | 3111 | 1359 | 9251 | 101650 | 0 | 11333 | 0 | 0 | 0 | 0 | 0 | 11333 | 118833 |
| Transportation | 17229 | 251 | 3171 | 1339 | 821 | 1590 | 7111 | 2685 | 615 | 8081 | 2635 | 16015 | 0 | 3228 | 0 | 0 | 0 | 0 | 0 | 3228 | 19353 |
| Gas Fuel Fees | 1225 | 111 | 21511 | 5811 | 321 | 152 | 2326 | 2655 | 115 | 703 | 1111 | 18013 | 0 | 1123 | 0 | 0 | 0 | 0 | 0 | 1123 | 19166 |
| TOTAL GVA AT | 115711 | 5311 | 33133 | 35533 | 32152 | 21335 | 60315 | 129976 | 21615 | 31126 | 55939 | - | 0 | 69115 | 0 | 0 | 0 | 0 | 0 | 69115 | 159319 | GDP (Fc) 159319 |
| SUBSIDIES | -12115 | 0 | -1215 | 0 | 0 | -311 | 0 | 0 | 0 | 0 | 0 | -12722 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -12722 | Sub -12722 |
| TAXES | 3171 | 113 | 31535 | 1781 | 9752 | 12315 | 32671 | 0 | 318 | 0 | 10 | 11595 | 11912 | 115 | 0 | 0 | 0 | 0 | 0 | 15598 | 113293 | N 123293 |
| NON GOOD TRADE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 32262 | 0 | 32262 | 32262 | Pro 32262 |
| IMPORTS TAXES | 0 | 0 | 31531 | 11259 | 231 | 0 | 3655 | 0 | 0 | 0 | 0 | 115692 | 0 | 131 | 0 | 0 | 0 | 0 | 0 | 131 | -115526 | T 115526 |
| Sector II Totals | 183753 | 5769 | 217551 | 63836 | 12031 | 33319 | 93151 | 120976 | 21363 | 31126 | 55939 | 890199 | 11912 | 70035 | 0 | 0 | 0 | 32262 | 0 | 114211 | 1058008 | |
| TOTAL FOR ECONOMY | 335511 | 8111 | 531531 | 252211 | 33712 | 59351 | 161296 | 135491 | 29551 | 52238 | 55112 | 1615650 | 611831 | 129355 | 126502 | 116768 | 11000 | 32262 | -330 | 1058008 | T. C. O. |
| | | | | | | | | | | | | | C 611832 | G 129355 | E 126503 | I 116768 | S 11000 | X 32262 | | | |



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APPENDEX = II-1

PAKISTAN INPUT-OUTPUT ANALYSIS [1]
TRANSACTION MATRIX (1975-76)
(MILLION RUPEES)

| | AGRI-CULTURE | MINE QUARRY | MFG L.SCALE | MFG S.SCALE | CONST-RUCTION | ELEC-GAS DISST | TRANS COMMUN. | WHS-RTL OTHER | BANKING INSUR | OWNER DWELLING | SERVICE | HOUSE HOLDS | PA&DEF | EXPORT | INVENTOR | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROW | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| AGRICULTURE | 16877 | 0 | 8378 | 11947 | 535 | 0 | 495 | 0 | 0 | 0 | 0 | 27407 | 180 | 278 | 2101 | 68198 |
| MINE & QUARRYING | 100 | 0 | 233 | 154 | 811 | 225 | 76 | 0 | 0 | 0 | 0 | 86 | 0 | 86 | 8 | 1779 |
| MFG-L.SCALE | 1698 | 79 | 10481 | 4350 | 2664 | 340 | 2581 | 10 | 321 | 143 | 62 | 18502 | 1417 | 3392 | -6122 | 44918 |
| MFG-S.SCALE | 0 | 0 | 74 | 2257 | 1310 | 0 | 0 | 0 | 0 | 0 | 0 | 22263 | 0 | 0 | 2638 | 28542 |
| CONSTRUCTION | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 28 | 434 | 0 | 0 | 0 | 0 | 14570 | 15045 |
| ELEC & GAS DISST | 224 | 0 | 985 | 272 | 0 | 76 | 10 | 46 | 140 | 0 | 24 | 341 | 21 | 0 | 4017 | 6156 |
| TRANS. COMMU. | 2345 | 41 | 1843 | 1721 | 0 | 185 | 53 | 403 | 175 | 0 | 230 | 7991 | 306 | 0 | 5776 | 21070 |
| W.R.TRADE | 5595 | 138 | 2932 | 1219 | 0 | 407 | 0 | 0 | 0 | 0 | 0 | 7701 | 0 | 0 | 808 | 18800 |
| B & INSURANCE | 241 | 17 | 830 | 192 | 24 | 16 | 18 | 350 | 96 | 8 | 42 | 2149 | 122 | 0 | 218 | 4323 |
| OWNERSHIP & DW | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5297 | 0 | 0 | 537 | 5834 |
| SERVICE | 133 | 128 | 627 | 21 | 695 | 43 | 1547 | 174 | 187 | 0 | 14 | 3002 | 3668 | 0 | 303 | 10542 |
| H.HOLDS | 11246 | 631 | 3817 | 2017 | 4089 | 1314 | 2763 | 1652 | 519 | 938 | 1581 | 0 | 4143 | 16440 | 82862 | 134012 |
| PA & DEFENCE | 530 | 120 | 66 | 13 | 416 | 28 | 1031 | 52 | 152 | 0 | 52 | 11897 | 2561 | 10534 | -9329 | 18123 |
| IMPORT | 726 | 102 | 6531 | 1653 | 2071 | 2628 | 6924 | 0 | 74 | 0 | 17 | 15909 | 167 | 167 | 0 | 36969 |
| TAX-SUBSIDY | 0 | 19 | 3470 | 0 | 0 | -106 | 359 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3745 |
| SELF-EMP.& S. | 28482 | 504 | 4650 | 2726 | 2430 | 1000 | 5198 | 16112 | 2631 | 4311 | 8519 | 11464 | 5538 | 0 | 0 | 93565 |
| TOTAL = | 68197 | 1779 | 44917 | 28542 | 15045 | 6156 | 21068 | 18799 | 4323 | 5834 | 10541 | 134012 | 18123 | 35897 | 98387 | 511621 |

APPENDEX = II-2

TECHNICAL COEFFICIENTS (1975-76)

| ROW | AGRI-CULTURE 1 | MINE QUARRY 2 | MFG L.SCALE 3 | MFG S.SCALE 4 | CONST-RUCTION 5 | ELEC-GAS DISST 6 | TRANS COMMUN. 7 | WHS-RTL OTHER 8 | BANKING INSUR 9 | OWNER DWELLING 10 | SERVICE 11 | HOUSE HOLDS 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AGRICULTURE | 0.2475 | 0.0000 | 0.1865 | 0.4186 | 0.0356 | 0.0000 | 0.0235 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.2045 |
| MINE & QUARRYING | 0.0015 | 0.0000 | 0.0052 | 0.0054 | 0.0539 | 0.0365 | 0.0036 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0006 |
| MFG-L.SCALE | 0.0249 | 0.0444 | 0.2333 | 0.1524 | 0.1771 | 0.0552 | 0.1225 | 0.0005 | 0.0743 | 0.0245 | 0.0059 | 0.1381 |
| MFG-S.SCALE | 0.0000 | 0.0000 | 0.0016 | 0.0791 | 0.0871 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1661 |
| CONSTRUCTION | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0006 | 0.0000 | 0.0065 | 0.0744 | 0.0000 | 0.0000 |
| ELEC & GAS DISST | 0.0033 | 0.0000 | 0.0219 | 0.0095 | 0.0000 | 0.0123 | 0.0005 | 0.0024 | 0.0324 | 0.0000 | 0.0023 | 0.0025 |
| TRANS. COMMU. | 0.0344 | 0.0230 | 0.0410 | 0.0603 | 0.0000 | 0.0301 | 0.0025 | 0.0214 | 0.0405 | 0.0000 | 0.0218 | 0.0596 |
| W.R.TRADE | 0.0820 | 0.0776 | 0.0653 | 0.0427 | 0.0000 | 0.0661 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0575 |
| B & INSURANCE | 0.0035 | 0.0096 | 0.0185 | 0.0067 | 0.0016 | 0.0026 | 0.0009 | 0.0186 | 0.0222 | 0.0014 | 0.0040 | 0.0160 |
| OWNERSHIP & DW | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0395 |
| SERVICE | 0.0020 | 0.0720 | 0.0140 | 0.0007 | 0.0462 | 0.0070 | 0.0734 | 0.0093 | 0.0433 | 0.0000 | 0.0013 | 0.0224 |
| H.HOLDS | 0.1649 | 0.3547 | 0.0850 | 0.0707 | 0.2718 | 0.2135 | 0.1311 | 0.0879 | 0.1201 | 0.1608 | 0.1500 | 0.0000 |

APPENDEX = II-3

INVERSE OF (I-A) MATRIX (1975-76)

| ROW | AGRI-CULTURE 1 | MINE QUARRY 2 | MFG L.SCALE 3 | MFG S.SCALE 4 | CONST-RUCTION 5 | ELEC-GAS DISST 6 | TRANS COMMUN. 7 | WHS-RTL OTHER 8 | BANKING INSUR 9 | OWNER DWELLING 10 | SERVICE 11 | HOUSE HOLDS 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AGRICULTURE | 1.4716 | 0.2177 | 0.4404 | 0.7983 | 0.3559 | 0.1536 | 0.1640 | 0.0524 | 0.1148 | 0.1204 | 0.0845 | 0.5162 |
| MINE & QUARRYING | 0.0040 | 1.0027 | 0.0100 | 0.0106 | 0.0584 | 0.0391 | 0.0058 | 0.0008 | 0.0034 | 0.0055 | 0.0011 | 0.0054 |
| MFG-L.SCALE | 0.1271 | 0.1810 | 1.3944 | 0.3313 | 0.3738 | 0.1588 | 0.2188 | 0.0355 | 0.1618 | 0.1100 | 0.0587 | 0.2974 |
| MFG-S.SCALE | 0.0529 | 0.0829 | 0.0463 | 1.1387 | 0.1733 | 0.0546 | 0.0379 | 0.0207 | 0.0357 | 0.0484 | 0.0334 | 0.2133 |
| CONSTRUCTION | 0.0010 | 0.0016 | 0.0010 | 0.0011 | 1.0014 | 0.0010 | 0.0013 | 0.0005 | 0.0073 | 0.0751 | 0.0006 | 0.0037 |
| ELEC & GAS DISST | 0.0100 | 0.0081 | 0.0352 | 0.0231 | 0.0134 | 1.0187 | 0.0074 | 0.0048 | 0.0389 | 0.0043 | 0.0051 | 0.0149 |
| TRANS. COMMU. | 0.0813 | 0.0767 | 0.0965 | 0.1331 | 0.0701 | 0.0683 | 1.0354 | 0.0346 | 0.0694 | 0.0268 | 0.0415 | 0.1191 |
| W.R.TRADE | 0.1490 | 0.1378 | 0.1462 | 0.1547 | 0.0912 | 0.1130 | 0.0422 | 1.0144 | 0.0354 | 0.0329 | 0.0232 | 0.1399 |
| B & INSURANCE | 0.0159 | 0.0252 | 0.0355 | 0.0251 | 0.0210 | 0.0143 | 0.0105 | 0.0223 | 1.0307 | 0.0089 | 0.0093 | 0.0314 |
| OWNERSHIP & DW | 0.0115 | 0.0181 | 0.0096 | 0.0114 | 0.0171 | 0.0119 | 0.0082 | 0.0045 | 0.0076 | 1.0090 | 0.0073 | 0.0465 |
| SERVICE | 0.0197 | 0.0936 | 0.0368 | 0.0268 | 0.0733 | 0.0260 | 0.0856 | 0.0162 | 0.0578 | 0.0135 | 1.0103 | 0.0438 |
| H.HOLDS | 0.2915 | 0.4571 | 0.2425 | 0.2892 | 0.4319 | 0.3007 | 0.2072 | 0.1141 | 0.1925 | 0.2276 | 0.1842 | 1.1773 |
| BUS-MULTIPLIERS | 2.2355 | 2.3024 | 2.4944 | 2.9434 | 2.6809 | 1.9599 | 1.8244 | 1.3207 | 1.7552 | 1.6825 | 1.4592 | 2.6090 |

APPENDEX = III-1

PAKISTAN INPUT-OUTPUT ANALYSIS [1]
TRANSACTION MATRIX (1984-85)
(MILLION RUPEES)

| | AGRI-CULTURE | MINE QUARRY | MFG L.SCALE | MFG S.SCALE | CONST-RUCTION | ELEC-GAS DISST | TRANS COMMUN. | WHS-RTL OTHER | BANKING INSUR | OWNER DWELLING | SERVICE | HOUSE HOLDS | PA&DEF | EXPORT | INVENTOR | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROW | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | | |
| AGRICULTURE | 26120 | 0 | 25217 | 17445 | 1794 | 0 | 0 | 0 | 0 | 0 | 0 | 104402 | 832 | 5406 | 8377 | 189594 |
| MINE & QUARRYING | 149 | 0 | 5772 | 1500 | 2621 | 275 | 0 | 0 | 0 | 0 | 0 | 316 | 0 | 96 | 1637 | 12367 |
| MFG-L.SCALE | 52234 | 528 | 102058 | 21232 | 8849 | 354 | 0 | 28 | 0 | 0 | 218 | 64598 | 4861 | 32477 | 11379 | 298816 |
| MFG S.SCALE | 0 | 0 | 3403 | 47507 | 6552 | 0 | 0 | 0 | 0 | 0 | 0 | 64981 | 0 | 0 | 2461 | 124903 |
| CONSTRUCTION | 0 | 0 | 0 | 0 | 0 | 0 | 34915 | 0 | 7258 | 3671 | 0 | 0 | 0 | 0 | 2295 | 48139 |
| ELEC & GAS DISST | 61 | 0 | 2811 | 83 | 0 | 17 | 0 | 34 | 0 | 0 | 15 | 228 | 17 | 0 | 8047 | 11313 |
| TRANS. COMMU. | 2778 | 257 | 26281 | 8411 | 0 | 180 | 0 | 2149 | 0 | 0 | 643 | 41385 | 1082 | 0 | 10014 | 93181 |
| W.R.TRADE | 10177 | 1331 | 25614 | 5386 | 0 | 608 | 0 | 0 | 0 | 0 | 0 | 35014 | 0 | 0 | -690 | 77440 |
| B & INSURANCE | 347 | 130 | 6509 | 1316 | 75 | 19 | 0 | 1408 | 0 | 0 | 143 | 7618 | 525 | 0 | 499 | 18587 |
| OWNERSHIP & DW | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7156 | 0 | 0 | 6920 | 14076 |
| SERVICE | 171 | 872 | 5596 | 329 | 1936 | 45 | 0 | 521 | 0 | 0 | 42 | 9497 | 14076 | 0 | 3914 | 36999 |
| H.HOLDS | 17207 | 5118 | 36402 | 14283 | 13559 | 1650 | 0 | 6823 | 0 | 0 | 5706 | 0 | 18928 | 38311 | 260688 | 418675 |
| PA & DEFENCE | 457 | 548 | 330 | 54 | 777 | 20 | 0 | 104 | 0 | 0 | 106 | 25235 | 6590 | 19045 | 15960 | 69225 |
| IMPORT | 2113 | 715 | 20206 | 0 | 5352 | 871 | 34830 | 0 | 0 | 0 | 96 | 24431 | 1165 | 0 | 0 | 89779 |
| TAX-SUBSIDY | 0 | 0 | 12530 | 242 | 0 | 779 | 0 | 0 | 10 | 0 | 133 | 7001 | 0 | 0 | 0 | 20695 |
| SELF-EMP.& S. | 77780 | 2868 | 26087 | 7115 | 6623 | 6494 | 23436 | 66374 | 11319 | 10405 | 29898 | 26813 | 21149 | 0 | 0 | 316361 |
| TOTAL = | 189594 | 12367 | 298816 | 124903 | 48139 | 11313 | 93181 | 77440 | 18587 | 14076 | 36999 | 418675 | 69225 | 95335 | 331500 | 1840150 |



BEST AVAILABLE DOCUMENT

APPENDEX - III-2

TECHNICAL COEFFICIENTS (1984-85)

| ROW | AGRI-CULTURE 1 | MINE QUARRY 2 | MFG L.SCALE 3 | MFG S.SCALE 4 | CONST-RUCTION 5 | ELEC-GAS DISST 6 | TRANS COMMUN. 7 | WHS-RTL OTHER 8 | BANKING INSUR 9 | OWNER DWELLING 10 | SERVICE 11 | HOUSE HOLDS 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AGRICULTURE | 0.1378 | 0.0000 | 0.0844 | 0.1397 | 0.0373 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.2494 |
| MINE & QUARRYING | 0.0008 | 0.0000 | 0.0193 | 0.0120 | 0.0545 | 0.0243 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0008 |
| MFG-L.SCALE | 0.2755 | 0.0427 | 0.3415 | 0.1700 | 0.1838 | 0.0313 | 0.0000 | 0.0004 | 0.0000 | 0.0000 | 0.0059 | 0.1543 |
| MFG-S.SCALE | 0.0000 | 0.0000 | 0.0114 | 0.3803 | 0.1361 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1552 |
| CONSTRUCTION | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.3747 | 0.0000 | 0.3905 | 0.2608 | 0.0000 | 0.0000 |
| ELEC & GAS DISST | 0.0003 | 0.0000 | 0.0094 | 0.0007 | 0.0000 | 0.0015 | 0.0000 | 0.0004 | 0.0000 | 0.0000 | 0.0004 | 0.0005 |
| TRANS. COMMU. | 0.0147 | 0.0208 | 0.0880 | 0.0673 | 0.0000 | 0.0159 | 0.0000 | 0.0278 | 0.0000 | 0.0000 | 0.0174 | 0.0988 |
| W.R.TRADE | 0.0537 | 0.1076 | 0.0857 | 0.0431 | 0.0000 | 0.0537 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0836 |
| B & INSURANCE | 0.0018 | 0.0105 | 0.0218 | 0.0105 | 0.0016 | 0.0017 | 0.0000 | 0.0182 | 0.0000 | 0.0000 | 0.0039 | 0.0182 |
| OWNERSHIP & DW | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0171 |
| SERVICE | 0.0009 | 0.0705 | 0.0187 | 0.0026 | 0.0402 | 0.0040 | 0.0000 | 0.0067 | 0.0000 | 0.0000 | 0.0011 | 0.0227 |
| H.HOLDS | 0.0908 | 0.4138 | 0.1218 | 0.1144 | 0.2817 | 0.1459 | 0.0000 | 0.0881 | 0.0000 | 0.0000 | 0.1542 | 0.0000 |

APPENDEX = III-3

INVERSE OF (I-A) MATRIX (1984-85)

| ROW | AGRI-CULTURE 1 | MINE QUARRY 2 | MFG L.SCALE 3 | MFG S.SCALE 4 | CONST-RUCTION 5 | ELEC-GAS DISST 6 | TRANS COMMUN. 7 | WHS-RTL OTHER 8 | BANKING INSUR 9 | OWNER DWELLING 10 | SERVICE 11 | HOUSE HOLDS 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AGRICULTURE | 1.3105 | 0.2217 | 0.2995 | 0.4874 | 0.3180 | 0.0885 | 0.1192 | 0.0476 | 0.1242 | 0.0829 | 0.0769 | 0.4701 |
| MINE & QUARRYING | 0.0177 | 1.0128 | 0.0427 | 0.0434 | 0.0762 | 0.0300 | 0.0285 | 0.0034 | 0.0297 | 0.0199 | 0.0044 | 0.0226 |
| MFG-L.SCALE | 0.6448 | 0.3472 | 1.7913 | 0.7903 | 0.6535 | 0.1606 | 0.2449 | 0.0657 | 0.2552 | 0.1705 | 0.1085 | 0.5999 |
| MFG-S.SCALE | 0.0854 | 0.1583 | 0.1394 | 1.7574 | 0.3744 | 0.0623 | 0.1403 | 0.0368 | 0.1462 | 0.0976 | 0.0561 | 0.3382 |
| CONSTRUCTION | 0.0525 | 0.0636 | 0.1013 | 0.1122 | 1.0694 | 0.0282 | 0.4007 | 0.0278 | 0.4176 | 0.2789 | 0.0248 | 0.1011 |
| ELEC & GAS DISST | 0.0068 | 0.0039 | 0.0174 | 0.0091 | 0.0069 | 1.0032 | 0.0026 | 0.0012 | 0.0027 | 0.0018 | 0.0016 | 0.0068 |
| TRANS. COMMU. | 0.1112 | 0.1273 | 0.2124 | 0.2437 | 0.1445 | 0.0601 | 1.0542 | 0.0492 | 0.0564 | 0.0377 | 0.0522 | 0.2096 |
| W.R.TRADE | 0.1523 | 0.2037 | 0.2093 | 0.2097 | 0.1404 | 0.0961 | 0.0526 | 1.0201 | 0.0548 | 0.0366 | 0.0326 | 0.1959 |
| B & INSURANCE | 0.0250 | 0.0345 | 0.0518 | 0.0488 | 0.0333 | 0.0120 | 0.0125 | 0.0227 | 1.0130 | 0.0087 | 0.0112 | 0.0438 |
| OWNERSHIP & DW | 0.0042 | 0.0094 | 0.0057 | 0.0071 | 0.0087 | 0.0036 | 0.0033 | 0.0020 | 0.0034 | 1.0023 | 0.0033 | 0.0208 |
| SERVICE | 0.0235 | 0.0951 | 0.0504 | 0.0384 | 0.0745 | 0.0160 | 0.0279 | 0.0123 | 0.0291 | 0.0194 | 1.0093 | 0.0472 |
| H.HOLDS | 0.2474 | 0.5507 | 0.3363 | 0.4168 | 0.5089 | 0.2124 | 0.1907 | 0.1177 | 0.1987 | 0.1327 | 0.1942 | 1.2178 |
| BUS.MULTIPLIERS | 2.6813 | 2.8282 | 3.2575 | 4.1644 | 3.4087 | 1.7731 | 2.2772 | 1.4066 | 2.3310 | 1.8891 | 1.5751 | 3.2738 |

APPENDEX = IV-I

PAKISTAN INPUT-OUTPUT ANALYSIS
TRANSACTIONS MATRIX (1989-90)
(MILLION RUPEES)

| | AGRI-CULTURE | M & QUARRY | MFG L.S | MFG S.S | CONST | E-GAS DIST | TRANS COMMUN. | WHS-RTL OTHER | BANK INSUR | OWNER Dwel | SERVICE | H.H CONSP | GOVT CONSP | EXPORT | INVESTMT (GFCF) | STOCKS CHANGE | N-GOOD TRADE | DIS | TOTAL SALES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROW | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 21 |
| AGRI | 57447 | 0 | 37922 | 41469 | 873 | 0 | 1064 | 0 | 0 | 0 | 0 | 157350 | 13091 | 8216 | 16623 | 2592 | 0 | -77 | 336575 |
| M&QU | 294 | 0 | 911 | 462 | 1144 | 1567 | 141 | 0 | 0 | 0 | 0 | 494 | 360 | 0 | 3038 | 37 | 0 | -0 | 8448 |
| MFG-LS | 19091 | 611 | 156712 | 49872 | 14366 | 9055 | 18324 | 88 | 221 | 16 | 421 | 106225 | 8535 | 80921 | 28169 | 4581 | 0 | -121 | 497087 |
| MFG-SS | 0 | 0 | 1894 | 44295 | 12093 | 0 | 0 | 0 | 0 | 0 | 0 | 127817 | 4168 | 37445 | 3890 | 694 | 0 | -55 | 232241 |
| CONST | 0 | 0 | 0 | 0 | 0 | 0 | 34104 | 0 | 7132 | 18125 | 0 | 0 | 5783 | 0 | 8485 | 361 | 0 | -19 | 73971 |
| E&G D | 1621 | 0 | 9477 | 2007 | 0 | 1303 | 46 | 260 | 62 | 0 | 105 | 1958 | 2135 | 0 | 39395 | 0 | 0 | -14 | 58355 |
| TS&C | 26770 | 322 | 27980 | 20033 | 0 | 5003 | 382 | 3587 | 123 | 0 | 1587 | 45878 | 9138 | 0 | 19303 | 1139 | 0 | -38 | 161207 |
| W-RTO | 39006 | 662 | 27185 | 8667 | 0 | 6722 | 0 | 0 | 0 | 0 | 0 | 44213 | 8612 | 0 | 1250 | 205 | 0 | -31 | 136491 |
| BSIN | 1950 | 95 | 8930 | 1584 | 93 | 307 | 92 | 2209 | 48 | 1 | 205 | 12338 | 1443 | 0 | 319 | 59 | 0 | -8 | 29665 |
| OSOW | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30411 | 0 | 0 | 18579 | 3290 | 0 | -12 | 52268 |
| SERV | 1344 | 889 | 8425 | 216 | 3368 | 1029 | 9870 | 1371 | 116 | 0 | 85 | 17235 | 6655 | 0 | 7712 | 1042 | 0 | -14 | 59343 |
| H.HOL | 153242 | 4226 | 34247 | 25204 | 25866 | 16716 | 41990 | 104889 | 17533 | 20383 | 44730 | 0 | 52681 | 0 | 0 | 0 | 0 | 0 | 541707 |
| SAV | 28493 | 783 | 20401 | 5608 | 4658 | 3188 | 8852 | 18743 | 3141 | 4959 | 8263 | 0 | 11733 | 0 | 0 | 0 | 0 | -0 | 118823 |
| Depr | 10299 | 269 | 9478 | 1939 | 801 | 1580 | 7747 | 2689 | 496 | 8081 | 2696 | 0 | 3278 | 0 | 0 | 0 | 0 | 0 | 49353 |
| DT/f | 4036 | 111 | 29577 | 5841 | 727 | 452 | 2326 | 2655 | 445 | 703 | 1171 | 0 | 1423 | 0 | 0 | 0 | 0 | 0 | 49466 |
| SUBS | -10496 | 0 | -1285 | 0 | 0 | -941 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -12722 |
| IMP | 3477 | 480 | 30695 | 7784 | 9752 | 12375 | 32604 | 0 | 348 | 0 | 80 | 74912 | 786 | 0 | 0 | 0 | 0 | 0 | 173293 |
| NGTR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 32262 | 0 | 32262 |
| I TAXE | 0 | 0 | 94538 | 17259 | 230 | 0 | 3665 | 0 | 0 | 0 | 0 | 0 | 134 | 0 | 0 | 0 | 0 | 0 | 115826 |
| T EUPC | 336575 | 8448 | 497087 | 232241 | 73971 | 58355 | 161207 | 136491 | 29665 | 52268 | 59342 | 618831 | 129955 | 126582 | 146768 | 14000 | 32262 | -389 | 2713658 |

TECHNICAL COEFFICIENTS (1989-90)

| ROW | AGRI-CULTURE 1 | MINE QUARRY 2 | Manuf. L. SCALE 3 | Manuf. S. SCALE 4 | CONST 5 | ELEC-GAS DIST 6 | TRANS COMMUN. 7 | WHS-RTL OTHER 8 | BANKING INSUR 9 | OWNER Dwelling 10 | SERVICE 11 | H.H CONSP 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AGRICULTURE | 0.1707 | 0.0000 | 0.0763 | 0.1786 | 0.0118 | 0.0000 | 0.0066 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.2543 |
| MINING QUARRYING | 0.0009 | 0.0000 | 0.0018 | 0.0020 | 0.0155 | 0.0269 | 0.0009 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0008 |
| MANUF-L.SCALE | 0.0567 | 0.0723 | 0.3153 | 0.2147 | 0.1942 | 0.1552 | 0.1137 | 0.0006 | 0.0074 | 0.0003 | 0.0071 | 0.1717 |
| MANUF-S.SCALE | 0.0000 | 0.0000 | 0.0038 | 0.1907 | 0.1635 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.2065 |
| CONSTRUCTION | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.2116 | 0.0000 | 0.2404 | 0.3468 | 0.0000 | 0.0000 |
| ELEC-GAS DISTR | 0.0048 | 0.0000 | 0.0191 | 0.0086 | 0.0000 | 0.0223 | 0.0003 | 0.0019 | 0.0021 | 0.0000 | 0.0018 | 0.0032 |
| TRA.STO & COMM | 0.0795 | 0.0381 | 0.0563 | 0.0863 | 0.0000 | 0.0857 | 0.0024 | 0.0263 | 0.0041 | 0.0000 | 0.0267 | 0.0741 |
| WHS-RTL OTHER | 0.1159 | 0.0784 | 0.0547 | 0.0373 | 0.0000 | 0.1152 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0714 |
| BANKING INSUR | 0.0058 | 0.0112 | 0.0180 | 0.0068 | 0.0013 | 0.0053 | 0.0006 | 0.0162 | 0.0016 | 0.0000 | 0.0035 | 0.0199 |
| OWNER DWELLING | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0491 |
| SERVICE | 0.0040 | 0.0052 | 0.0169 | 0.0009 | 0.0455 | 0.0176 | 0.0612 | 0.0100 | 0.0039 | 0.0000 | 0.0014 | 0.0279 |
| HOUSEHOLDS | 0.4553 | 0.3002 | 0.0689 | 0.1085 | 0.3497 | 0.2865 | 0.2605 | 0.7685 | 0.5910 | 0.3900 | 0.7538 | 0.0000 |

APPENDEX = IV-3

INVERSE OF (I-A) MATRIX (1989-90)

| ROW | AGRI-CULTURE 1 | MINE QUARRY 2 | Manuf. L. SCALE 3 | Manuf. S. SCALE 4 | CONST 5 | ELEC-GAS DIST 6 | TRANS COMMUN. 7 | WHS-RTL OTHER 8 | BANKING INSUR 9 | OWNER Dwelling 10 | SERVICE 11 | H.H CONSP 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AGRICULTURE | 1.8318 | 0.5855 | 0.4259 | 0.7166 | 0.5484 | 0.4558 | 0.4322 | 0.6620 | 0.6280 | 0.5115 | 0.6393 | 0.8236 |
| MINING QUARRYING | 0.0080 | 1.0062 | 0.0070 | 0.0089 | 0.0216 | 0.0328 | 0.0088 | 0.0067 | 0.0101 | 0.0106 | 0.0064 | 0.0080 |
| MANUF-L.SCALE | 0.7613 | 0.7129 | 1.8017 | 0.8775 | 0.8417 | 0.7088 | 0.6530 | 0.6902 | 0.7253 | 0.6233 | 0.6745 | 0.8485 |
| MANUF-S.SCALE | 0.4122 | 0.3842 | 0.2010 | 1.5144 | 0.5087 | 0.2914 | 0.3031 | 0.4408 | 0.4515 | 0.3899 | 0.4247 | 0.5473 |
| CONSTRUCTION | 0.1159 | 0.0986 | 0.0708 | 0.0990 | 1.0800 | 0.0896 | 0.2758 | 0.1066 | 0.3337 | 0.4216 | 0.1003 | 0.1206 |
| ELEC-GAS DISTR | 0.0336 | 0.0259 | 0.0420 | 0.0381 | 0.0280 | 1.0458 | 0.0216 | 0.0287 | 0.0290 | 0.0226 | 0.0278 | 0.0331 |
| TRA.STO & COMM | 0.3528 | 0.2791 | 0.2165 | 0.3245 | 0.2308 | 0.2818 | 1.1813 | 0.2896 | 0.2570 | 0.2074 | 0.2810 | 0.3264 |
| WHS-RTL OTHER | 0.3816 | 0.3040 | 0.2107 | 0.2639 | 0.2137 | 0.3011 | 0.1687 | 1.2512 | 0.2400 | 0.1958 | 0.2429 | 0.3120 |
| BANKING INSUR | 0.0644 | 0.0644 | 0.0544 | 0.0554 | 0.0500 | 0.0499 | 0.0399 | 0.0730 | 1.0562 | 0.0448 | 0.0583 | 0.0704 |
| OWNER DWELLING | 0.0742 | 0.0695 | 0.0343 | 0.0490 | 0.0552 | 0.0520 | 0.0470 | 0.0801 | 0.0733 | 1.0581 | 0.0773 | 0.0999 |
| SERVICE | 0.0952 | 0.1856 | 0.0723 | 0.0759 | 0.1168 | 0.0901 | 0.1280 | 0.0969 | 0.0960 | 0.0816 | 1.0853 | 0.1053 |
| HOUSEHOLDS | 1.5092 | 1.4140 | 0.6984 | 0.9974 | 1.1228 | 1.0578 | 0.9574 | 1.6300 | 1.4916 | 1.1825 | 1.5724 | 2.0332 |
| BUS. MULTIPLIERS | 5.6401 | 5.1299 | 3.8350 | 5.0204 | 4.8177 | 4.4570 | 4.2168 | 5.3558 | 5.3918 | 4.7498 | 5.1902 | 5.3283 |

APPENDEX = V

BUS-MULTIPLIERS

| ROW | 1975-76 | 1984-85 | 1989-90 |
|---|---|---|---|
| AGRICULTURE | 2.2355 | 2.6813 | 5.6401 |
| MINE & QUARRYING | 2.3024 | 2.8282 | 5.1299 |
| MFG-L.SCALE | 2.4944 | 3.2575 | 3.8350 |
| MFG-S.SCALE | 2.9434 | 4.1644 | 5.0204 |
| CONSTRUCTION | 2.6809 | 3.4087 | 4.8177 |
| ELEC & GAS DISST | 1.9599 | 1.7731 | 4.4570 |
| TRANS. COMMU. | 1.8244 | 2.2772 | 4.2168 |
| W.R.TRADE | 1.3207 | 1.4066 | 5.3558 |
| B & INSURANCE | 1.7552 | 2.3310 | 5.3918 |
| OWNERSHIP & DW | 1.6825 | 1.8891 | 4.7498 |
| SERVICE | 1.4592 | 1.5751 | 5.1902 |
| H.HOLDS | 2.6090 | 3.2738 | 5.3283 |

## APPENDIX V

The following are a listing of the industries (by SIC) that were include in the Khan Pakistan I/O update.

### 1. AGRICULTURE

Wheat on small farms (001), Wheat on large farms (002), Rice on small farms (003), Rice on large farms (004), Cotton on small farms (005). Cotton on large farms (006), Sugarcane on small farms (007), sugarcane on large farms (008), Tobacco (009), Oilseeds and other cottonseeds (010), Pulses (011), Other Crops (012), Livestock (013), Fishing (014), Forestry (015).

### 2. LARGE SCALE AGRICULTURAL PROCESSING

Grain Milling (017), Rice Milling (018), sugar Refining (019), Edible Oils (020), Tea Blending (021), Fish and Fish Preparations (022), confectionery and Bakery (023), Other Food Industries (024), Beverages (025), Cigarettes and other tobacco Products (026), Cotton Yarn (027), cotton Fabrics (028), Silk and Synthetic Textiles (029), Woolen Textiles (030), Hosiery (031), Thread Ball Making (032), Carpets and Rugs (033), Other Textiles (034), footwear Other than Rubber Footwear (035), Wearing Apparel (036), Wood, cork and furniture (037), Paper, Paper Board and Paper Products (038), Leather and Leather Products (040), Soaps and Detergents (047), Matches (048), cotton Ginning (063).

### 3. SMALL SCALE AGRICULTURAL PROCESSING

Grain Milling (068), rice Husking (069), gur and Khandsari (070), edible Oils (071), Other Food Industries (072), Beverages (073), Tobacco (074), cotton Textiles (075), silk and ?artsilk Textiles (076), Carpets (077), Other Textiles (078), Shoe Making (079), wood (080), wooden Furniture (081), Leather Goods (084).

### 4. FARM INPUT MANUFACTURING

Fertilizer (044), Large Scale Machinery (057), Small Scale Agricultural Machinery (091).

### 5. TRANSPORT, STORAGE AND COMMUNICATIONS (FOOD AND FIBER)

Road Transportation (109), Rail Transportation (110), air Transportation (111), Water Transportation (112), Television (113), Radio (114), Telephone, Telegraph and Post (115).

### 6. WHOLESALE AND RETAIL TRADE (FOOD AND FIBER)

Wholesale and retail trade (108)

## 7. TRANSPORT, STORAGE AND COMMUNICATIONS OTHER THAN FOOD AND FIBER

Road Transportation (109), Rail Transportation (110), Air Transportation (111), Water Transportation (112), Television (113), Radio (114), Telephone, Telegraph and Post (115).

## 8. WHOLESALE AND RETAIL TRADE OTHER THAN FOOD AND FIBER

Wholesale and retail trade (108)

## 9. LARGE SCALE COMMODITY MANUFACTURING

Printing and Publishing (039), rubber Footwear (041), Other Rubber Products (042), Pharmaceutical and Medicinal Preparations (043), Perfumes and cosmetics (045), Paints and Varnishes (046), Other Chemicals (049), Plastic Products (050), Petroleum Products (051), Cement (052), Glass and Glass Products (053), Other Non Metallic Mineral Products (054), Basic Metals (055), Metal Products (056), Office Equipments (064) Sports Goods (065), Other Large Scale Manufacturing Industries (067).

## 10. SMALL SCALE COMMODITY MANUFACTURING

Steel Furniture (082), Printing and Publishing (083), rubber Products (085), Chemicals (086), Plastic Products (087), Non Metallic Mineral Products (088). Iron and Steel Remolding (089), Metal Products (090), sports Goods (095), Other Small-Scale Manufacturing Industries (097).

## 11. LARGE SCALE MACHINERY MANUFACTURING

Other Non-electrical Machinery (058), Electrical Machinery (059), Bicycles (060), auto-Assembly and Parts (061), ship Building (062), Surgical Instruments (066).

## 12. SMALL SCALE MACHINERY MANUFACTURING

Non-electrical Machinery (092), electrical Machinery (093), Transport Equipment (094), surgical Instruments (096).

## 13. MINING AND QUARRYING

Mining and quarrying (016)

## 14. CONSTRUCTION

Low-Cost Residential Buildings (098), Luxurious Residential Buildings (099), Rural Buildings (100), Factory Buildings (101), Public Buildings (102), Roads (103), Infrastructures (104).

## 15. ELECTRICITY AND GAS DISTRIBUTION

Electricity (106), Gas (107)

## 16. BANKING AND INSURANCE

Banking and Insurance (116).

## 17. OWNERSHIP OF DWELLINGS

Ownership of dwellings (105)

## 18. PUBLIC ADMINISTRATION AND DEFENCE

Public Administration and Defence (117)

## 19. SERVICES (NOT ELSEWHERE CITED)

Services not elsewhere cited (118)

## 20. HOUSEHOLD

# NATIONAL INCOME AND PRODUCT ACCOUNTS OF PAKISTAN - 1989-90

## GROSS FIXED CAPITAL FORMATION (GFCF) IN PUBLIC, PRIVATE AND GOVERNMENT SECTORS BY ECONOMIC ACTIVITY AT CURRENT MARKET PRICES

(Based on New Methodology adopted in 1985-86)

(Rs million)

| or | 1980-81 | 1981-82 | 1982-83 | 1983-84 | 1984-85 | 1985-86 | 1986-87 | 1987-88 | 1988-89 | 1989-90 | 1990-91 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F (A+B+C) | 47.707 | 54.559 | 61.761 | 69.212 | 77.925 | 87.545 | 100.040 | 111.266 | 133.170 | 146.768 | 170.737 |
| rivate Sector | 21.608 | 23.331 | 26.758 | 31.419 | 35.840 | 39.959 | 44.349 | 51.769 | 64.162 | 75.255 | 88.658 |
| blic Sector | 16.529 | 18.579 | 21.564 | 23.291 | 25.837 | 29.117 | 34.374 | 34.886 | 43.105 | 42.877 | 48.876 |
| eneral Govt. | 9.570 | 12.679 | 13.140 | 14.503 | 16.249 | 18.470 | 21.317 | 24.611 | 25.903 | 28.936 | 33.203 |
| te & Public B) | 38.137 | 41.910 | 48.621 | 54.710 | 61.677 | 69.076 | 78.723 | 86.655 | 107.267 | 117.832 | 137.534 |
| TOR-WISE: | | | | | | | | | | | |
| riculture | 5.170 | 5.704 | 7.292 | 8.718 | 9.590 | 9.970 | 10.873 | 12.274 | 13.537 | 15.537 | 16.862 |
| ining and rrying | 334 | 420 | 291 | 292 | 1.040 | 2.152 | 2.873 | 2.090 | 2.238 | 1.859 | 2.110 |
| nufacturing | 9.388 | 10.155 | 11.949 | 14.266 | 13.882 | 16.890 | 16.762 | 19.605 | 25.915 | 30.567 | 36.473 |
| rge Scale | 8.299 | 8.935 | 10.595 | 12.759 | 12.163 | 14.887 | 14.607 | 16.966 | 22.592 | 26.740 | 31.797 |
| all Scale | 1.090 | 1.219 | 1.354 | 1.507 | 1.719 | 2.002 | 2.155 | 2.639 | 3.323 | 3.827 | 4.681 |
| nstruction | 2.037 | 2.425 | 3.666 | 2.693 | 3.059 | 3.097 | 3.884 | 4.592 | 4.394 | 5.335 | 6.559 |
| ectricity Gas | 3.382 | 3.910 | 6.195 | 6.136 | 7.949 | 9.356 | 11.587 | 13.226 | 22.411 | 23.455 | 24.722 |
| nsport and mmunication | 6.338 | 7.152 | 6.412 | 7.758 | 10.720 | 11.289 | 13.308 | 12.461 | 13.434 | 13.969 | 18.422 |
| olesale and tail Trade | 429 | 419 | 445 | 500 | 339 | 656 | 713 | 935 | 1.028 | 1.189 | 1.431 |
| ancial stitutions | 3.259 | 3.695 | 9.245 | 10.207 | 11.219 | 12.263 | 13.304 | 15.054 | 16.418 | 18.579 | 21.534 |
| rvices | 2.752 | 3.031 | 3.127 | 3.429 | 3.599 | 4.467 | 5.318 | 6.419 | 6.244 | 6.812 | 9.266 |



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# NATIONAL INCOME AND PRODUCT ACCOUNTS OF PAKISTAN - 1989-90

## GROSS FIXED CAPITAL FORMATION (GFCF) IN PUBLIC, PRIVATE AND GOVERNMENT SECTORS BY ECONOMIC ACTIVITY AT CURRENT MARKET PRICES

(Based on New Methodology adopted in 1988-89)

(Rs million)

| | 1980-81 | 1981-82 | 1982-83 | 1983-84 | 1984-85 | 1985-86 | 1986-87 | 1987-88 | 1988-89 (F) | 1989-90 (R) | 1990-91 (P) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ATE SECTOR | 21,603 | 23,331 | 26,753 | 31,419 | 37,340 | 39,959 | 44,349 | 51,769 | 64,162 | 75,253 | 85,658 |
| riculture | 4,662 | 2,389 | 5,972 | 7,359 | 8,157 | 8,141 | 9,052 | 10,075 | 11,711 | 13,931 | 15,075 |
| ning and arrying | 53 | 61 | 69 | 78 | 87 | 102 | 113 | 137 | 174 | 198 | 224 |
| nufacturing | 4,553 | 5,471 | 6,806 | 8,266 | 10,011 | 12,267 | 13,573 | 16,338 | 23,292 | 28,372 | 33,734 |
| ge Scale | 3,484 | 4,286 | 5,478 | 7,073 | 8,346 | 10,322 | 11,445 | 13,936 | 20,032 | 24,637 | 29,186 |
| all Scale | 1,069 | 1,185 | 1,328 | 1,492 | 1,665 | 1,945 | 2,127 | 2,402 | 3,260 | 3,735 | 4,548 |
| istruction | 145 | 225 | 485 | 322 | 493 | 477 | 494 | 507 | 732 | 1,936 | 1,635 |
| ectricity | | | | | | | | | | | |
| as | 5 | - | - | - | - | - | - | - | - | - | - |
| nsport & mmunication | 1,550 | 1,776 | 1,936 | 2,390 | 3,157 | 3,676 | 4,373 | 5,197 | 5,365 | 6,120 | 3,718 |
| olesale and ail Trade | 201 | 246 | 392 | 448 | 509 | 585 | 656 | 776 | 951 | 1,099 | 1,226 |
| ncial tutions | 8,014 | 8,373 | 8,330 | 9,743 | 10,694 | 11,609 | 1,243 | 14,392 | 15,981 | 18,109 | 20,986 |
| Ownership of Dwellings | 7,983 | 8,263 | 8,706 | 9,643 | 10,566 | 11,446 | 12,469 | 141,198 | 15,700 | 17,790 | 20,700 |
| Real Estate | 3 | 9 | 9 | 10 | 11 | 12 | 14 | 15 | 17 | 19 | 23 |
| Banking & Insurance | 24 | 101 | 115 | 90 | 117 | 150 | 160 | 179 | 264 | 300 | 263 |
| ices | 2,025 | 2,153 | 2,253 | 2,513 | 2,733 | 3,104 | 3,447 | 4,147 | 4,906 | 5,490 | 6,957 |

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# NATIONAL INCOME AND PRODUCT ACCOUNTS OF PAKISTAN - 1989-90

## GROSS NATIONAL PRODUCT AT CURRENT FACTOR COST OF 1980-81

(Based on New Methodology adopted in 1988-89)

(Rs million)

| ctors | 1980-81 | 1981-82 | 1982-83 | 1983-84 | 1984-85 | 1985-86 | 1986-87 | 1987-88 | 1988-89 | 1989-90 (R) | 1990-91 (P) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Agriculture | 76.399 | 92.216 | 99.350 | 104.550 | 121.293 | 125.501 | 135.308 | 156.375 | 184.074 | 196.071 | 230.388 |
| Major Crops | 39.626 | 46.249 | 50.147 | 44.903 | 53.797 | 58.102 | 59.199 | 64.934 | 75.804 | 82.053 | 93.523 |
| Minor Crops | 13.162 | 19.515 | 18.410 | 23.742 | 25.329 | 24.723 | 24.162 | 27.864 | 35.938 | 32.216 | 44.072 |
| Livestock | 20.139 | 22.310 | 26.740 | 31.396 | 36.391 | 40.558 | 46.450 | 57.438 | 65.038 | 74.237 | 84.699 |
| Fishing | 2.695 | 2.304 | 3.111 | 3.347 | 2.524 | 3.793 | 3.960 | 4.492 | 5.442 | 5.662 | 5.792 |
| Forestry | 777 | 835 | 972 | 1.162 | 1.252 | 1.325 | 1.537 | 1.647 | 1.852 | 1.903 | 2.302 |
| Mining & Quarrying | 1.053 | 1.215 | 1.342 | 1.599 | 2.064 | 3.251 | 3.681 | 4.811 | 4.932 | 5.389 | 6.252 |
| Manufacturing | 37.446 | 44.197 | 50.200 | 60.398 | 67.596 | 75.851 | 85.850 | 100.917 | 113.317 | 132.296 | 154.091 |
| Large Scale | 27.451 | 33.098 | 37.357 | 45.518 | 49.856 | 54.823 | 61.826 | 73.248 | 80.745 | 93.703 | 108.660 |
| Small Scale | 9.995 | 11.099 | 12.843 | 14.880 | 17.740 | 21.058 | 24.024 | 27.669 | 32.572 | 38.593 | 45.431 |
| Construction | 11.586 | 13.172 | 13.696 | 14.716 | 17.116 | 19.052 | 22.508 | 25.109 | 27.706 | 32.052 | 36.790 |
| Electricity and Gas Distribution | 5.925 | 6.436 | 7.254 | 8.270 | 8.740 | 10.639 | 11.789 | 15.690 | 17.093 | 21.935 | 28.398 |
| Transport, Storage & Communication | 23.937 | 27.425 | 31.092 | 33.199 | 38.219 | 41.196 | 44.624 | 51.047 | 54.216 | 60.915 | 72.322 |
| Wholesale & Retail Trade | 37.330 | 44.165 | 49.957 | 53.221 | 67.632 | 72.742 | 80.386 | 100.585 | 115.810 | 128.976 | 152.416 |
| Banking & Insurance | 5.549 | 7.311 | 9.333 | 12.079 | 13.370 | 14.835 | 16.334 | 18.496 | 20.060 | 21.615 | 24.497 |
| Ownership of Dwellings | 11.237 | 13.094 | 15.754 | 18.836 | 21.535 | 23.462 | 25.472 | 27.776 | 30.243 | 34.126 | 38.961 |
| Public Admn. & Defence | 19.257 | 21.466 | 25.467 | 33.133 | 36.714 | 42.053 | 51.018 | 57.309 | 65.179 | 69.115 | 75.459 |
| Services | 18.119 | 21.436 | 23.907 | 27.348 | 30.735 | 34.357 | 67.961 | 42.910 | 50.208 | 56.859 | 67.223 |
| GDP (fc) | 247.331 | 292.153 | 328.412 | 374.349 | 425.064 | 466.319 | 515.431 | 601.025 | 683.138 | 759.349 | 887.507 |
| Indirect Taxes | 35.562 | 37.440 | 43.487 | 53.557 | 56.396 | 58.205 | 64.422 | 84.494 | 99.361 | 115.825 | 139.178 |
| Subsidies | 5.197 | 5.434 | 7.512 | 8.104 | 9.303 | 9.992 | 7.374 | 10.150 | 12.754 | 12.722 | 10.257 |
| GDP(mp) | 278.196 | 324.159 | 364.387 | 419.802 | 472.157 | 514.522 | 572.479 | 675.389 | | | |
| Net Factor Income from abroad | 22.692 | 25.349 | 39.395 | 39.595 | 38.311 | 41.359 | 36.378 | 29.095 | 28.005 | 32.262 | 32.144 |
| GNP(fc) | 270.523 | 317.502 | 367.507 | 413.944 | 463.375 | 507.678 | 551.809 | 630.120 | 711.143 | 791.611 | 919.951 |
| GNP (mp) | 300.888 | 349.508 | 403.732 | 459.397 | 510.468 | 555.591 | 608.857 | 704.484 | 797.750 | 894.714 | 1,048.572 |
| Population (in million) | 83.34 | 85.44 | 89.12 | 91.58 | 94.73 | 97.67 | 100.70 | 103.52 | 107.04 | 110.36 | 113.78 |
| Per Capita Income(fc-Rs) | 3.227 | 3.673 | 4.127 | 4.505 | 4.892 | 5.198 | 5.480 | 6.069 | 6.644 | 7.173 | 8.082 |
| Per Capita Income(mp-Rs) | 3.589 | 4.043 | 4.531 | 5.000 | 5.389 | 5.692 | 6.046 | 6.736 | 7.453 | 8.107 | 9.218 |

Source : Federal Bureau of Statistics

R: Revised

P: Provisional

BEST AVAILABLE DOCUMENT

# NATIONAL INCOME AND PRODUCT ACCOUNTS OF PAKISTAN - 1989-90

## INVESTMENT AND SAVINGS AT CURRENT PRICES

(Billion Rupees)

| | 1980-81 | 1981-82 | 1982-83 | 1983-84 | 1984-85 | 1985-86 | 1986-87 | 1987-88 | 1988-89 R | 1989-90 P |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 Gross Total Investment | 52.207 | 62.412 | 68.162 | 76.701 | 86.525 | 96.535 | 107.540 | 121.666 | 136.022 | 151.668 |
| 2 Changes in Stocks | 4.501 | 3.858 | 6.201 | 7.489 | 8.648 | 9.880 | 9.500 | 10.400 | 12.400 | 14.000 |
| 3 Gross Fixed Investment | 47.707 | 53.589 | 61.961 | 69.212 | 77.925 | 87.515 | 100.040 | 111.266 | 123.622 | 143.668 |
| (a) Public Sector | 26.077 | 31.258 | 35.101 | 37.793 | 42.095 | 47.186 | 55.671 | 59.477 | 62.225 | 70.054 |
| (b) Private Sector | 21.698 | 22.331 | 26.759 | 31.419 | 35.830 | 39.759 | 44.317 | 51.769 | 61.397 | 73.614 |
| 4 Net External Resource Inflow | 10.137 | 16.173 | 6.515 | 13.481 | 25.467 | 19.737 | 12.343 | 27.404 | 37.172 | 38.813 |
| 5 National Savings | 42.070 | 46.254 | 61.917 | 63.220 | 61.056 | 76.698 | 97.193 | 92.062 | 98.850 | 118.813 |
| (a) Public Savings | 11.557 | 10.275 | 1.630 | 8.500 | 1.810 | 8.810 | 2.823 | 9.012 | 1.497 | 1.689 |
| (i) General Government | 9.587 | 6.912 | 1.779 | 911 | -3.751 | 2.010 | -10.380 | -3.255 | -13.958 | -14.789 |
| (ii) Others | 1.970 | 3.863 | 3.511 | 7.567 | 7.373 | 11.610 | 13.203 | 12.267 | 15.457 | 16.478 |
| (b) Private Savings | 30.513 | 35.479 | 57.317 | 54.720 | 59.246 | 67.798 | 94.372 | 83.050 | 97.351 | 117.124 |
| (i) House Hold | 28.814 | 33.117 | 54.579 | 52.872 | 57.314 | 64.932 | 88.363 | 76.656 | 90.761 | 110.350 |
| (ii) Corporate | 1.677 | 2.362 | 2.718 | 1.818 | 1.912 | 2.866 | 6.009 | 6.394 | 6.587 | 6.784 |
| 6 Net Factor Income | 18.355 | 20.022 | 31.442 | 31.078 | 27.375 | 31.437 | 26.923 | 20.232 | 19.316 | 21.422 |
| 7 Domestic Savings | 23.715 | 26.232 | 30.505 | 32.122 | 31.664 | 45.171 | 70.272 | 71.330 | 77.534 | 97.371 |
| 8 GDP at Market Prices | 278.176 | 321.153 | 369.387 | 419.802 | 472.157 | 511.532 | 572.479 | 635.387 | 773.014 | 872.551 |
| 9 GDP at Market Prices | 300.858 | 337.508 | 403.282 | 457.377 | 510.468 | 555.871 | 608.857 | 701.451 | 810.283 | 903.850 |
| (A) ANNUAL CHANGE (OVER CENT) | | | | | | | | | | |
| 1 Gross Total Investment | | +17.6 | +9.6 | +12.0 | +12.8 | +11.6 | +11.5 | +11.1 | +11.8 | +15.9 |
| 2 Gross Fixed Investment | | +14.4 | +15.1 | +12.1 | +12.6 | +12.3 | +14.3 | +11.2 | +11.1 | +16.2 |
| (a) Public Sector | | +17.8 | +12.0 | +8.0 | +11.3 | +13.1 | +17.0 | +6.8 | +4.6 | +12.6 |
| (b) Private Sector | | +8.0 | +19.7 | +17.4 | +14.1 | +11.5 | +11.0 | +16.7 | +18.6 | +17.9 |
| 3 Net External Resource Inflow | | +59.7 | 57.8 | +106.9 | +98.9 | -21.7 | -38.1 | +119.8 | +75.6 | +4.5 |
| 4 National Savings | | +7.9 | +32.9 | +2.1 | -3.4 | +25.5 | +26.9 | -5.3 | +7.4 | +20.2 |
| (a) Public Savings | | -6.8 | -57.0 | +83.6 | -78.7 | +386.2 | -68.0 | +219.2 | -83.4 | +12.7 |
| (i) General Government | | -27.7 | -81.2 | -28.3 | -512.6 | +51.2 | -270.7 | +68.6 | -328.8 | -7.4 |
| (ii) Others | | +96.1 | -11.8 | +177.2 | +3.0 | +47.0 | +13.7 | -7.1 | +26.0 | +7.9 |
| (b) Private Savings | | +16.1 | +61.6 | -4.5 | +8.5 | +14.4 | +39.2 | -12.0 | +17.2 | +20.3 |
| (i) House Hold | | +16.0 | +63.4 | -3.2 | +8.5 | +13.2 | +36.1 | +13.2 | +18.7 | +21.6 |
| (ii) Corporate | | +21.4 | +31.8 | -32.0 | +2.9 | +50.7 | +107.7 | +6.4 | +3.0 | +3.0 |
| 5 Net Factor Income | | +7.4 | +56.6 | -1.1 | -5.5 | +6.9 | -14.4 | -23.0 | -6.8 | +10.9 |
| 6 Domestic Savings | | +10.4 | +16.5 | +3.3 | -1.4 | +42.7 | +55.6 | +1.5 | +11.5 | +22.5 |
| 7 GDP at Market Prices | | +16.5 | +12.4 | +13.2 | +12.5 | +7.0 | +11.3 | +17.98 | +14.5 | +12.9 |
| 8 GDP at Market Prices | | +16.2 | +15.5 | +13.8 | +11.1 | +8.9 | +9.5 | +15.21 | +11.6 | +11.0 |
| (B) AS PERCENTAGE OF GDP | | | | | | | | | | |
| 1 Gross Total Investment | 17.4 | 17.9 | 17.0 | 16.2 | 16.9 | 17.4 | 18.0 | 17.3 | 17.0 | 17.4 |
| 2 Gross Fixed Investment | 15.9 | 15.6 | 15.3 | 15.1 | 15.3 | 15.7 | 16.4 | 15.8 | 15.4 | 15.9 |
| (a) Public Sector | 8.7 | 8.9 | 8.7 | 8.2 | 8.2 | 8.6 | 9.2 | 8.4 | 7.8 | 7.8 |
| (b) Private Sector | 7.2 | 6.7 | 6.6 | 6.8 | 7.0 | 7.2 | 7.3 | 7.5 | 7.7 | 8.1 |
| 3 Net External Resource Inflow | 3.4 | 4.6 | 1.6 | 2.9 | 5.0 | 3.6 | 2.0 | 4.2 | 4.6 | 4.3 |
| 4 National Savings | 14.0 | 13.2 | 15.3 | 13.8 | 12.0 | 13.8 | 16.0 | 13.1 | 12.4 | 13.2 |
| (a) Public Savings | 3.8 | 3.1 | 1.2 | 1.9 | 0.4 | 1.6 | 0.5 | 1.3 | 0.2 | 0.2 |
| (i) General Government | 3.2 | 2.0 | 0.3 | 0.2 | -0.2 | 0.5 | -1.7 | -0.5 | -1.7 | -1.7 |
| (ii) Others | 0.7 | 1.1 | 0.8 | 1.6 | 1.5 | 2.1 | 2.2 | 1.7 | 1.9 | 1.9 |
| (b) Private Savings | 10.1 | 10.1 | 14.2 | 11.7 | 11.6 | 12.2 | 15.5 | 11.8 | 12.2 | 13.0 |
| (i) House Hold | 9.6 | 9.6 | 13.5 | 11.5 | 11.2 | 11.7 | 14.5 | 10.9 | 11.3 | 12.2 |
| (ii) Corporate | 0.6 | 0.6 | 0.7 | 0.4 | 0.4 | 0.5 | 1.0 | 0.9 | 0.8 | 0.8 |
| 5 Net Factor Income | 6.1 | 5.7 | 7.8 | 6.8 | 5.4 | 5.7 | 4.4 | 2.9 | 2.4 | 2.4 |
| (C) AS PERCENTAGE OF GDP | | | | | | | | | | |
| Domestic Savings | 8.5 | 8.1 | 8.1 | 7.7 | 6.7 | 8.8 | 12.5 | 10.6 | 10.1 | 11.7 |
| (D) AS PERCENTAGE OF GROSS TOTAL INVESTMENT | | | | | | | | | | |
| 1 Net External Resource Inflow | 19.4 | 25.9 | 9.5 | 17.6 | 27.4 | 20.6 | 11.3 | 24.3 | 27.3 | 24.6 |
| 2 National Savings | 80.6 | 74.1 | 90.5 | 82.4 | 70.6 | 79.4 | 88.7 | 75.7 | 72.7 | 75.4 |

R = Revised
P = Provisional

Source: Planning and Development Division



BEST AVAILABLE DOCUMENT

NATIONAL INCOME AND PRODUCT ACCOUNTS
OF PAKISTAN - 1989-90

## VALUE ADDED FROM THE REST OF THE WORLD

(AT CURRENT FACTOR COST)

( Million Rs.)

| I T E M S | 1986-87 | 1987-88 | 1988-89 (R) | 1989-90 (P) |
|---|---|---|---|---|
| 1. RECEIPTS | 49975 | 45062 | 47011 | 54010 |
| (i) Investment Income | 1581 | 1389 | 1864 | 2141 |
| (ii) Royalties | 25 | 14 | 24 | 28 |
| (iii) Remittances = | 48368 | 43159 | 45123 | 51841 |
| 2. PAYMENTS | 13597 | 15967 | 19742 | 22681 |
| (i) Investment Income | 13510 | 15863 | 19638 | 22562 |
| (ii) Royalties | 71 | 83 | 87 | 99 |
| (iii) Remittances = | 16 | 21 | 17 | 20 |
| 3. VALUE ADDED | 36378 | 29095 | 27259 | 31329 |

= Remittances in kind are included.



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