Statistical Estimation of the Demand for Jute Goods in Pakistan

by

K. A. T. M. HASAN IMAM*

The purpose of this study is to derive a demand function for jute goods in Pakistan. Such an exercise is necessary for several reasons; to provide a systematic analysis of the forces that govern the demand for jute goods in Pakistan and to make it possible to provide (assuming no serious structural changes within the economy) a reasonably probable basis for planning future production targets in jute goods, since internal demand together with export demand would determine such a target. At this date it is difficult to discern any significant time-trend for jute demand; there have been large year-to-year fluctuations. To indicate the nature of such fluctuations: the figure for internal demand in 1960-61 was 16.87 per cent lower than that of 1956-57 while the figure for 1961-62 was 0.11 per cent lower than the level of 1956-57 and 20.16 per cent above the level of 1960-61 (*see*, Appendix Table A-1). However, since demand for jute goods is a derived demand, such fluctuations could not have been primarily random, nor could they have been due to any odd factor such as the enigma of taste changes. Such fluctuations can then be sought to be traced to the fluctuations in the levels of its determinants and the purpose here, essentially, is to find whether these demand fluctuations can be systematically explained as being caused by changes in some of these determining variables.

The data to be used for this purpose are quarterly figures for the period, 1956-57/1963-64[1]. The choice of the period as well as the use of the quarterly data need to be explained. Any plan to frame the demand function using annual data had to be abandoned because of too few observations, as the data for the delimited territory of Pakistan do not go further than 1955-60. Secondly,

---

*The author is a Staff Economist at the Pakistan Institute of Development Economics. He gratefully acknowledges his deep sense of gratitude to Drs. Bruce Glassburner, Eric Gustafson, Ronald Soligo and Mr. Ghulam Mohammad, all of the Institute, for their many substantial comments on earlier drafts. He is also deeply grateful to Dr. Raquibuddin Ahmed of the East Pakistan Industrial Development Corporation (EPIDC), Dacca, for clarifications of different issues. The responsibility for any errors that remain are, however, the author's alone.

[1] The year is taken as running from July to June thus making July-September the first quarter, October-December the second quarter, *etc.*

the data in necessary detail are available only from 1956-57. Finally, the presence of seasonality in the internal demand for jute goods in Pakistan makes it desirable to study the problem in that perspective, thereby making it desirable to use data related to relatively shorter time-units. Such knowledge of the seasonal pattern is useful from the viewpoint of production programming throughout the year, inventory accumulation, and any price-stabilization measures that might conceivably be pursued by any regulatory agency. The use of annual data is thus precluded.

I : DESCRIPTION OF THE VARIABLES AND THE HYPOTHESES

Without an economy-wide input-output matrix it is difficult to specify the demand equation with respect to the independent variables. For example, when the relationship between income and demand is considered, ideally all sectors with input coefficients greater than zero should be specified in the equation. Similarly, with regard to the price relation *vis-a-vis* demand, the prices of all substitutes for jute goods should be specified in the equation. In the absence of any such detailed information, the author had to make do with whatever information was available in print, supplemented by interviews with knowledgeable persons in the appropriate fields. This might indeed lead to problems of over-specification or under-specification[2], but it is hoped that the magnitude of such uncertainty will not be such as to distort the expected findings of the study. Efforts were made to reduce the likelihood of any such happening. Ultimately, the significance of the estimated parameters in the alternative equations to be envisaged and the extent of the explained variance in each of those equations will provide a test for the accuracy of such specification.

The Dependent Variable

The dependent variable, the index of the amount of jute goods consumed in each quarter is denoted by the term D_{jt}, the subscripts j and t referring to jute goods and time respectively. The measure for D_{jt} is obtained from the quarterly figures for production (P_{jt}), exports (X_{jt}), imports (M), and the variation in stocks ($S_{jt} - S_{jt-1}$) of jute goods. The following accounting relationship is envisaged in this regard:

$$D_{jt} = P_{jt} - X_{jt} - (S_{jt} - S_{jt-1})$$

[2] In the present context, over-specification refers to the inclusion of those industries in the demand equation which have zero input-coefficients for jute goods. On the other hand, under-specification refers to exclusion of those industries from the demand equation which have input-coefficients for jute goods greater than zero. It is apparent that both refer to incorrect specification of the demand equation.

where the variables are as defined above. Since the imports are nil for the period under consideration we can then write

$$D_{jt} = P_{jt} - X_{jt} - (S_{jt} - S_{jt-1})$$
$$= P_{jt} - X_{jt} - \Delta S_{jt}$$

The basic data for obtaining this measure for D_{jt} were obtained from the Pakistan Jute Mills Association. The index for D_{jt} as it appears, shows quite large quarter-to-quarter changes (*see*, Appendix Table A-2).

Independent Variables

1) The quarterly index of freight carried (F_t): This variable has been designed to measure the positive income effect of the index of freight carried on the internal demand for jute goods. Since jute goods are mostly desired for distributive trade, an index of freight carried should then work as an excellent determinant of the variations in the demand for jute goods. Unfortunately, however, here we will have to be satisfied with a partial index, as data for the freight carried by the inland water transport system as well as the road transport system are not available so that the "freight carried" index refers to only the quantities carried by the railway system. The extent of under-coverage may not be very important because some of the freight carried by the inland water transport system and the road transport system may at one stage or the other, be expected to be carried by the railway system. A more serious defect, however, is that the goods which are transported under jute packing may be subjected to multiple counting depending on the number of intermediate trading agencies before it reaches the final consumers. There are no available means through which the F_t index can be corrected for this defect.

The relation envisaged between F_t and D_{jt} is one of positive variation, but for reasons as noted above it may not as yet be a very good determinant of the variations in D_{jt}. The basic data for the constructions of the F index are available in the *Monthly Statistical Bulletins* of Central Statistical Office (CSO), Pakistan, and the index as such is shown in the Statistical Appendix Table A-2.

2) The index of the quarterly production in selected industries and the marketed surplus of selected agricultural products (Y_t): This variable, like F_t, has also been designed to reflect the positive income effect of the production in selected agricultural crops and industries on D_{jt}. The framing of this composite index has been a little involved and needs to be explained in detail. The industries included in this index are cement, sugar, rock and sea salt, and chemicals such as urea, super-phosphate, ammonium sulphate, ammonium nitrate, soda ash, and jute goods themselves which are despatched in baled form with hessian wrapping. All these industries, except jute goods industry use jute sacks for packing. The possibility of a lagged relationship between the variations in production in these industries and their demand for jute sacks may be discounted for the reason that packing in these industries is a component element of their production processes so that there cannot be any time-lag between the two. It must, of course, be noted that the industry component of Y_t suffers from some under-coverage in the sense that new industries like manufacturing of the electric cables, carpets, *etc.*, have not been included. But data for such industries are not published by any agency in any form. The data for the industry component of Y_t were all derived from the *Monthly Statistical Bulletins* of the CSO [6].

The inclusion of major agricultural crops has been a little more involved. However, only an outline of the method followed will be stated here while the details have been given in the statistical appendix. Since the use of jute goods in agriculture is only with respect to the distributive trade then it is apparent that only that part of the agricultural produce is relevant for explaining variations in D_{jt}. In this regard use has been made of some recent information. Gutman [2; p. 7] derives the marketed proportions of foodgrains as 21 per cent of the total foodgrain output in East Pakistan and 32 per cent of the total foodgrain output in West Pakistan for the year 1964-65. In the absence of any such figures for the previous years the same proportions were used to derive the marketed quantities of foodgrains for the period covered in the study. The marketed quantities of other food-crops such as rapeseed and mustard, grams and pulses were also derived using the same proportions. The only non-food crop, cotton, was taken as wholly marketed. It is apparent, however, that such "stable proportion" assumption is questionable, since the marketed proportion of the agricultural output can be taken as a positive function of the level of farm output and a negative function of the farm family size. Since some rise in agricultural output has taken place, then this indicates some rise in the farm output thus indicating relatively lower marketed proportions of foodgrain output during the period covered in the study. But population during those earlier years was also lower which would indicate lower family size on the farm. It is probable that the interaction of these factors has left the marketed proportions relatively stable.

Now considering the question of distributing the various agricultural crops into different quarters of the month two principles were adopted. The first was related to the harvesting months and the second to the probable time-lag between harvesting and marketing. Generally, a time-lag of one month was assumed between harvesting and marketing. On the basis of these principles the various agricultural crops were assigned to different quarters of the year with respect to their impact on internal demand for jute goods. The details of this distribution are included in the statistical appendix. The basic data for this agricultural component of Y_t were obtained from the *Handbook of Agricultural Statistics*, published by the Planning Commission [8].

3) The quarterly index of the price of jute goods (P_{jt}): This variable has been designed to measure the price-effect on the internal demand for jute goods. P_{jt} is a weighted index of the quarterly averages of the internal wholesale prices of hessian and sacking. The *Monthly Statistical Bulletins* of the CSO [6], the source for the relevant price data, refer mainly to two particular varieties of hessian and one particular variety of sacking during the period covered in this study[3].

The hessian and sacking prices derived in the above manner were then used to compute the price index, P_{jt}, the weights being eighteen and eighty-two for hessian and sacking respectively which were their respective proportions in the total quantities of hessian and sacking consumed in the first quarter of 1956-57, *i.e.*, July-September [5]. The inclusion of only the hessian and sacking prices in the construction of P_{jt} was unavoidable since the CSO reports no other. However, hessian and sacking comprise together more than 88 per cent of the total jute goods consumed internally [5].

It must, however, be noticed that since the weights used are base-period weights, there might be an upward bias in the computed price index, P_{jt}. Since the weights do not change they might inflate the actual price increase caused through supply changes by concealing the fact that relatively more are bought of the goods whose prices fall as well as by concealing the fact that relatively less are bought of the goods whose prices rise. However, it appears that the relative proportions have not changed very much so that the influence of any such bias would be minimal. The constancy of weights, however, introduces yet another kind of bias in the price index. This refers to a demand shift as opposed to the case of supply shift noted before. With a given supply curve a rightward shift of the demand curve would cause relatively greater quantities bought of those goods whose prices might have risen. Again, if the demand curve shifts leftward with the supply curve as given, both its quantity bought

---

[3] For a few months between July 1956 and September 1959, the specification for hessian was 50 $\times 9\frac{1}{2}$oz. The two major hessian varieties referred to are 50″ × 10oz. till September 1959 and 45″ × 11oz. thereafter. The particular variety of sacking referred to is of the B-Twill variety. To permit comparability between these three different hessian prices, the prices per hundred yards of hessian (as reported by the CSO) were transformed into prices per ton on the basis of a weight measure per yard. Similarly, to permit comparability between the hessian and sacking prices per unit the latter were transformed from price per hundred bags (as reported by CSO) into price per ton on the basis of a weight measure per bag. These weight measures are referred to in the statistical appendix.

and price would fall. Constant weights in such cases would understate the price movements. The author is not aware of any means through which the method adopted for computing P_{jt} can be rectified of this effect.

The relation envisaged between P_{jt} and D_{jt} is one of inverse variation.

4) *The quarterly index of the prices of substitute for jute goods* (P_{st})*:* This variable, as opposed to P_{jt}, is designed to measure the effect of variations in substitute prices on D_{jt}. Ideally, this should refer to a weighted index of the prices of substitutes for jute goods such as coarse cotton sheeting and multiwalled paper bags. Coarse cotton sheeting is a substitute for hessian at the retail merchandise trade level while multiwalled paper bags can be used for any purpose for which jute sacks are used. In the present situation, however, P_{st} refers only to an index of the price of coarse cotton sheeting or 'grey long cloth' as it is called in the *Monthly Statistical Bulletins* of the CSO [6]. The author was constrained to make this choice because of the non-availability of a continuous price series for Kraft Paper which goes into the making of multiwalled paper bags. The country does not produce any Kraft Paper and whatever quantities were used previously were all imported. The error of omitting Kraft Paper from the construction of the price index, P_{st}, however, appears less when it is found that Pakistan Industrial Development Corporation, which mainly used it, has discontinued its use since 1960 so that for the subsequent period this omission should not greatly distort the price relationship to be envisaged here. The prices used in computing the price index, P_{st}, are the quarterly averages of the prices for grey long cloth (Habib Textiles), width 44", as reported in the *Monthly Statistical Bulletins* of the CSO [6].

The relation envisaged between D_{jt} and P_{st} is one of positive variation in D_{jt} since an increase in the price of the substitute would, *ceteris paribus,* lead to an increase in the consumption of jute goods. It seems appropriate, however, that instead of using two separate price variables they can be transformed into one by taking the ratio of P_{jt} to P_{st} and using it as a determining variable thus saving one degree of freedom. The resultant relative price index will then be derived as $\frac{P_{jt}}{P_{st}}K$, where K is a constant, 100.

The relationship envisaged between D_{jt} and $\frac{P_{jt}}{P_{st}}K$ is one of inverse variation. It is, however, possible that the relative price coefficient may be relatively small and it may not be significant at a reasonable error probability level. This is so due to several reasons. First, if both the price indices, P_{jt} and P_{st}, increase at the same rate, then there would not be any changes in their ratio so that $\frac{P_{jt}}{P_{st}}K$ may not show any relation with D_{jt}. Secondly, grey long cloth is a substitute for jute goods in some of its uses only at the retail merchandise trade level so that its price may not bear any significant correlation with D_{jt}. Secondly, the cost of jute goods as a packing material in relation to total costs of a unit of output in a jute-goods using industry may be so low that those industries may be fairly insensitive to such relative price changes. Moreover, a change-over from the use of jute goods to substitutes may necessitate ancillary capital equipment so that, in the short run, the use of jute goods may not be particularly sensitive to this variable.

II: NATURE OF THE EQUATIONS

On the basis of the functional relationships as described above two basic alternative equations will now be suggested. The first equation is as follows:

$$D_{jt} = a_0 + a_1 F_t + a_2 \frac{P_{jt}}{P_{st}} K + b_1 Q_{1t} + b_2 Q_{2t} + b_3 Q_{3t} + U_t \ldots\ldots\ldots (1)$$

The variables, D_{jt}, F_t, and $\frac{P_{jt}}{P_{st}} K$ are as defined before. The new set of variables, Q_{it}, are dummy variables designed to reflect the seasonal pattern in D_{jt}, assuming that the seasonal influences are linear and additive. A seasonally adjusted series could have been used but it was thought preferable to use explicit seasonal variables in the equation and thus use unadjusted data rather than use data which already have systematic computations built into them. The seasonal variables, Q_1, Q_2, and Q_3 are defined as follows:

$Q_1 = 1$, in the first quarter,
$\quad = 0$, in all other quarters,
$Q_2 = 1$, in the second quarter,
$\quad = 0$, in all other quarters; and
$Q_3 = 1$, in the third quarter,
$\quad = 0$, in all other quarters.

For the first three quarters of any year only one of the Q_{it} variables is not equal to zero in any given quarter and the coefficients, b_i, indicate the differential effect on D_{jt} in different seasons. In the fourth quarter, all the Q_{it} are zero and the differential effect of the fourth quarter on D_{jt} will be given by the intercept, a_0.

It must be noticed that the variable, Y_t, has not been used in association with F_t, in Equation (1). This has been done to avoid the obvious error of multi-collinearity. An alternative equation is then suggested:

$$D_{jt} = a_0 + a_1 Y_t + a_2 \frac{P_{jt}}{P_{st}} K + b_1 Q_{1t} + b_2 Q_{2t} + b_3 Q_{3t} + U_t \ldots\ldots\ldots (2)$$

The variables in Equation (2) are all as defined above.

In the estimation of the above two equations several things have to be guarded against. First, the presence of auto-correlation in the residuals. Application of simple least-squares technique to auto-correlated data will produce unbiased coefficients, but their sampling variances will be large compared to those achievable by a slightly different method of estimation. Moreover, inefficient predictions (*i.e.*, predictions with large sampling variances) will result [3]. The presence of auto-correlation is extremely likely when working with time-series data and the estimation of the Durbin-Watson statistic will indicate the presence of this phenomenon [1]. One of the techniques for getting rid of this problem, and thus of improving the efficiency of the estimation process, is to estimate the coefficients by using transformed variables, rather than the variables as they are. Assume that the residual term U_t follows a first-order auto-regressive scheme.

$$U_t = rU_{t-1} + e_t$$

where r is the auto-regression parameter which can be estimated from the residuals[4] and e_t is a truly stochastic residual term satisfying all the usual assumptions of the least-squares method about the residuals. With r known, Equation (1) can then be transformed as follows:

$$D_{jt} - rD_{jt-1} = a_0(1-r) + a_1(F_t - rF_{t-1}) + a_2\left(\frac{P_{jt}}{P_{st}}K - r\frac{P_{jt-1}}{P_{st-1}}K\right) +$$

$$b_1(Q_{1t} - rQ_{1t-1}) + b_2(Q_{2t} - rQ_{2t-1}) + b_3(Q_{3t} - rQ_{3t-1}) + e_t$$

$$\text{or } D'_{jt} = a'_0 + a'_1 F'_t + a'_2 \frac{P_{jt}}{P_{st}} K' + b'_1 Q'_{1t} + b'_2 Q'_{2t} + b'_3 Q'_{3t} + e_t \quad \ldots\ldots\ldots (1')$$

The primed variables in Equation (1′) are the transformed variables and the primed coefficients are those estimated by a regression using the transformed variables. Equation (1′) satisfies in full the assumptions of the simple linear system and the application of the least-squares method to the transformed

---

[4] The auto-regression coefficient, r, can be estimated as follows:

$$r = \frac{\sum_{t=2}^{n} U_t U_{t-1}}{\sum_{t=2}^{n} U_{t-1}^2}$$

variables will yield the best unbiased set of linear estimators. Equation (2) can also be similarly rewritten;

$$D_{jt} - rD_{jt-1} = a_o \ (1-r) + a_1 \ (Y_t - rY_{t-1}) + a_2 \left(\frac{P_{jt}}{P_{st}} K - r \frac{P_{jt-1}}{P_{st-1}} K \right) +$$

$$b_1 (Q_{1t} - rQ_{1t-1}) + b_2 \ (Q_{2t} - rQ_{2t-1}) + b_3 \ (Q_{3t} - rQ_{3t-1}) + e_t$$

$$D'_{jt} = a'_o + a'_1 \ Y'_t + a'_2 \frac{P_{jt}}{P_{st}} K' + b'_1 \ Q'_{1t} + b'_2 \ Q'_{2t} + b'_3 \ Q'_{3t} + e_t \ldots\ldots (2')$$

The next problem to guard against is the presence of multi-collinearity among the independent variables which would produce coefficients that would be unbiased but would have large sampling variances. To test for the presence of this problem we will examine the simple correlation coefficients between the independent variables[5]. Also the presence of large sampling variances for the estimated coefficients will be one such test. It seems, however, that the demand equations as they have been framed should avoid the problem of multi-collinearity since F_t and Y_t, the two income variables, have not been included in the same equation. Also, it is difficult to put forward a strong *a priori* reason why there should be any systematic relationship between the relative price variable and either of the income variables.

III: ESTIMATION OF THE EQUATIONS

Consider first, Equation (1) which, when estimated according to the least-squares technique, appears as follows:

$$D_{jt} = \underset{(5.1614)}{119.2434} + \underset{(.2635)}{.3631} F_t - \underset{(.4947)}{.5415} \frac{P_{jt}}{P_{st}} K - \underset{(11.7465)}{20.4883} Q_1 +$$

$$\underset{(13.2956)}{21.7473} Q_2 - \underset{(13.8015)}{40.3862} Q_3 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$R^2 = .48$; $S_u = 24.7467$; $d = 1.4668$; $r = .2654$

As judged from the value of R^2, slightly less than half of the variance in D_{jt} has been explained. This is not unexpected in a short-term model in which many random elements may be at play. The standard error of estimate, S_u, is also rather high at 24.7467. However, only two of the estimated coefficients, the constant

[5] Bunch-mapping has been avoided as a test. It is now considered to be extremely archaic since there is no definite way of judging the presence of multi-collinearity through it except by an intuitive feel about sprawling of the beams. *See* [12].

term and the coefficient for Q_3, *i.e.*, seasonal factor for the third quarter, are significant, both being so at 1 per cent error probability level. All other coefficients are not significant at the 5 per cent error probability level; in fact, except for the coefficient of Q_1, the other three coefficients are not significant even at 10 per cent probability level. The sampling errors are, however, nct the least sampling errors because of positive auto-correlation, the estimated value for the Durbin-Watson statistic, d, being such that it does not permit the rejection of the null hypothesis of auto-correlation either at 1 per cent or 5 per cent error probability levels. The auto-regression coefficient, r, is estimated as 0.2654 on the basis of which an auto-regressive transformation of the variables in Equation (1) is then effected. The transformed equation named Equation (1′) is then estimated as follows:

$$D'_{jt} = \underset{(3.9115)}{120.8473} + \underset{(.2795)}{.5262}F'_t - \underset{(.4631)}{.8967}\frac{P_{jt}}{P_{st}}K' - \underset{(11.6865)}{46.5958}Q'_1 -$$

$$\underset{(10.1095)}{3.7867}Q'_2 - \underset{(11.0428)}{72.3880}Q'_3 \quad \ldots\ldots (1')$$

$R^2 = .77$; $S_u = 18.6283$; $d = 2.1849$

The set of coefficients estimated in Equation (1′) are the best, unbiased least square estimators for the variables in that equation. Since the constant term is only an estimate of a (1—r), Equation (2′) can be expressed in terms of the original variables as

$$D_{jt} = 87.5962 + \underset{(.2795)}{.5262}F_t - \underset{(.4631)}{.8967}\frac{P_{jt}}{P_{st}}K - \underset{(11.6865)}{46.5958}Q_1 -$$

$$\underset{(10.1095)}{3.7867}Q_2 - \underset{(11.0428)}{72.3880}Q_3 \quad \ldots\ldots (1'')$$

As judged from the value of the Durbin-Watson statistic in Equation (1′) the auto-regressive transformation of Equation (1) has been effective in eliminating the problem of auto-correlation. There has been a substantial improvement in the value of the R^2 as a result of which the standard error of estimate, S_u, is lower at 18.6283 indicating that the auto-regressive transformation has been effective in reducing the sampling variances of the estimates. It appears, however, that the sampling variances for both income and relative price coefficients are still far too large to permit the use of Equation (1′) as an estimating equa-

TABLE I

LIST OF THE EQUATIONS ESTIMATED

No.	Equations	Coefficient of determination (R^2)	Standard error of estimate (S_u)	Durbin-Watson statistic (d)	Auto-regression coefficient (r)	Degrees of freedom
1.	$\underset{(5.1614)}{119.2434} + \underset{(.2635)}{.3631F_t} - \underset{(.4947)}{.5415}\frac{P_{jt}}{P_{st}}K - \underset{(11.7465)}{20.4883Q_1} + \underset{(13.2956)}{21.7473Q_2} - \underset{(13.8015)}{40.3862Q_3}$	.48	24.7467	1.4668	.2654	23
1′.	$\underset{(3.9115)}{120.8473} + \underset{(.2795)}{.5262F'_t} - \underset{(.4631)}{.8967}\frac{P_{jt}}{P_{st}}K' - \underset{(11.6865)}{46.5958Q'_1} - \underset{(10.1095)}{3.7867Q'_2} - \underset{(11.0428)}{72.3880Q'_3}$	.77	18.6283	2.1849	—	22
1″.	$87.5962 + \underset{(.2795)}{.5262F_t} - \underset{(.4631)}{.8967}\frac{P_{jt}}{P_{st}}K - \underset{(11.6865)}{46.5958Q_1} - \underset{(10.1095)}{3.7867Q_2} - \underset{(11.0428)}{72.3880Q'_3}$		—	—	—	22
2.	$\underset{(4.1212)}{123.2650} + \underset{(.1981)}{.3766Y_t} - \underset{(.4109)}{.9448}\frac{P_{jt}}{P_{st}}K + \underset{(36.5869)}{14.1240Q_1} - \underset{(15.4687)}{7.0589Q_2} - \underset{(28.2981)}{4.9076Q_3}$	.68	19.3271	1.7476	—	22
3.	$\underset{(3.8372)}{133.2088} + \underset{(.0894)}{.3462Y_t} - \underset{(.4056)}{.9402}\frac{P_{jt}}{P_{st}}K$	.63	19.5601	1.8208		25

Note : The figures in the parentheses indicate the sampling errors for the estimated regression coefficients.

tion for D'_{jt}. The presence of such large sampling errors despite the excellence of the fit is intriguing as they cannot also be traced to the presence of multi-collinearity among the explanatory variables which is minimal. Consider the correlation matrix for the transformed variables in Equation (1'):

$R_{ij}=$	D'_{jt}	F'_t	$\frac{P_{jt}}{P_{st}}K'$	Q'_1	Q'_2	Q'_3
D'_{jt}	1	.18	.05	—.52	.60	—.89
F'_t	.18	1	.10	—.37	.10	.27
$\frac{P_{jt}}{P_{st}}K'$	.05	.10	1	—.03	—.02	—.01
Q'_1	—.52	—.37	—.03	1	—.33	—.33
Q'_2	.60	.10	—.02	—.33	1	—.33
Q'_3	—.89	.27	—.01	—.33	—.33	1

As judged from the correlation coefficients between the explanatory variables, the correlation coefficients are low and very few of them are significantly different from zero at the 5 per cent error probability level. Notice, however, that the correlation coefficient between D'_{jt} and F'_t is + .18 so that in a bivariate framework only 3.2 per cent of the total variance in the former can be expected to be explained by the latter. Again, the correlation coefficient between D'_{jt} and $\frac{P_{jt}}{P_{st}}K'$ is not even consistent with the hypothesis in the sense that instead of the presumed negative price-quantity relationship it shows a positive relationship. In a bivariate framework this would be the classic case of the fallacy of statistically estimating a price-quantity relationship without a component income relationship. Changes in income may cause such shifts in the negative demand function that the positive income effect may very well swamp the negative price effect, a situation which would give a positive correlation between the price-quantity demanded relationship [11]. In the present situation, the income effect as judged from the correlation coefficient between D'_{jt} and F'_t is weak and it is doubtful whether such a weak positive income effect can swamp the negative price effect so much so that it would reduce by itself the presumed negative price-quantity demanded relation to an observed positive one. By dissociating the income effect from the observed positive price-quantity demanded relationship it would, therefore, be quite unlikely to discover a strong negative price-quantity demanded relationship.

The conclusion then is that the variations in the index of the railway freight carried does not serve well to explain the variations in the internal demand for jute goods in Pakistan, a conclusion which although contrary to expectation is understandable. In addition to the reasons already cited in Section I, it needs to be stated that the railway system carries a large variety of products some of which may have zero input coefficients for jute goods such as coal, petroleum, and iron and steel products. There is no detailed commodity breakdown available for the railway freight carried. But it is possible that the relative weights of such goods as compared to the goods which have input coefficients for jute goods greater than zero may be high enough to cause variations in the index of railway freight carried in such a way as to almost randomize the relation between such an index and the index of the internal demand for jute goods in Pakistan.

As it appears, there is also no significant relationship between the index of relative prices and the index of the internal demand for jute goods. But as we have noticed the income effect is so weak that it might not have explained to the fullest extent the shifts in the demand function for D'_{jt} a situation which could conceal the actual price effect on D'_{jt}. It might, of course, be true that D'_{jt} is not sensitive to relative price changes for the reasons already cited in Section I and thus confirm our hypothesis concerning the relative price variable. But it will be wiser to postpone the conclusion with regard to the relative price variable till the alternative equation, Equation (2), is estimated.

We can now consider Equation (2) which is different from Equation (1) in the sense that the variable designed to reflect the income effect is different. The least squares fit of Equation (2) appears as follows:

$$D_{jt} = \underset{(4.1212)}{123.2650} + \underset{(.1981)}{.3766}\, Y_t - \underset{(.4109)}{.9448}\, \frac{P_{jt}}{P_{st}} K + \underset{(36.5869)}{14.1240}\, Q_1 - \underset{(15.4687)}{7.0589}\, Q_2 - \underset{(28.2981)}{4.9076}\, Q_3 \quad \ldots\ldots\ldots \quad (2)$$

$R^2 = .68$; $S_u = 19.3271$; $d = 1.7476$

The signs of both the income and relative price coefficients are consistent with the hypothesis while the signs of the seasonal factors indicate how the level of the equation in each quarter has to be adjusted for its differential seasonal effect. It seems, however, that only the constant term and the relative price variable are significant at 1 per cent and 5 per cent error probability levels, respectively, while the coefficient for Y_t is significant only at 10 per cent error probability level. None of the other coefficients, the coefficients for the seasonal factors, are significant even at 20 per cent error probability level; in fact, their sampling errors are larger than themselves. The sampling errors of the coefficients are the least sampling errors since the value of the Durbin-Watson statistic, d , is such that it permits the rejection of the null hypothesis of auto-correlation at

1 per cent error probability level. As judged from the value of R^2 the fit is excellent which raises suspicions as to why the coefficient for Y_t is not significant at a lower error probability level, especially so when it appears from a bivariate regression framework that around half the total variance in D_{jt} is explained by Y_t. This can then be explained by the presence of a good deal of multi-collinearity between Y_t and Q_{it} variables. Consider the correlation matrix for Equation (2):

$R_{ij}=$

	D_{jt}	Y_t	$\frac{P_{jt}}{P_{st}}K$	Q_1	Q_2	Q_3
D_{jt}	1	.73	—.10	—.39	.43	—.49
Y_t	.73	1	.23	—.71	.46	—.38
$\frac{P_{jt}}{P_s}K$	—.10	.23	1	—.15	.10	—.05
Q_1	—.39	—.71	—.15	1	—.33	—.33
Q_2	.43	.46	.10	—.33	1	—.33
Q_3	—.49	—.38	—.05	—.33	—.33	1

As it appears, there is a good deal of correlation between Y and Q_{it} variables which would have the effect of increasing the sampling variance for Y_t. An alternative then is to frame a further equation omitting the seasonal variables assuming that the seasonality in Y_t itself would explain the seasonality in D_{jt}.

The new equation would then appear as follows:

$$D_{jt}=a_o+a_1Y_t+a_2\frac{P_{jt}}{P_{st}}K+U_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

The least-squares fit of Equation (3) is as below:

$$\underset{}{D_{jt}}=\underset{(3.8372)}{133.2088}+\underset{(.0894)}{.3462}\,Y_t-\underset{(.4056)}{.9402}\,\frac{P_{jt}}{P_{st}}K \ldots\ldots\ldots\ldots\ldots \quad (3)$$

$R^2=.63$; $S_u=19.5601$; $d=1.8208$

As it appears from the value of R^2, the fit is worse than in Equation (2), but an application of analysis of variance test to Equation (2) suggests that the two ratios of explained variance to total variance in the dependent variable are not significantly different from each other even at the 20 per cent error probability level. Both the income as well as the relative price coefficients are consistent with the hypotheses about them and are significantly different from zero at

1 per cent and 5 per cent error probability levels respectively. The two estimated coefficients can also be regarded as efficient, *i.e.*, they have least sampling errors, since the estimated value of the Durbin-Watson statistic, d, is such that it permits the rejection of the null hypothesis of auto-correlation at 1 per cent error probability level.

The foregoing discussion concerning Equation (2) and Equation (3) leads to two important findings. First, the variable Y_t is a good explanatory variable for explaining the variations in D_{jt}; in fact, in a bivariate framework it would explain around half the total variance in D_{jt}. The coefficient for Y_t with respect to D_{jt} is also significant at 1 per cent error probability level in Equation (3). To make the confidence statement in the analysis of variance framework, one would say that the inclusion of Y_t variable in Equation (3) adds significantly to the extent of variance explained in D_{jt} at 1 per cent error probability level. Thus as compared to F_t, the variable Y_t is a much better explanatory variable to explain the income shifts in the demand function. The income elasticity in Equation (3) is +.71 at the mean.

Secondly, the relative price effect as measured by the variable $\frac{P_{jt}}{P_{st}}K$ is also quite pronounced. The relative price elasticity of D_{jt} in Equation (3) is —.84 at the mean and the coefficient of D_{jt} with respect to $\frac{P_{jt}}{P_{st}}K$ is significantly different from zero at the 5 per cent error probability level. This is contrary to what was obtained as a result from Equation (1) and Equation (1′). This discrepancy between the results may be explained with reference to the income variable in the two cases. As shown in the correlation matrix for Equation (1′), the variable F_t, in a bivariate framework, would explain only 3.24 per cent of the variance in D_{jt}. The income shifts in D_{jt} as measured by F_t were then adjudged to be weak. It was shown, however, that in a similar framework the variance in D_{jt} as explained Y_t was considerably higher. The latter was then adjudged as relatively superior in explaining the income shifts in D_{jt}. Since F_t does not explain very well the income shifts in D_{jt} it would then have the effect of concealing the actual relative price effect. On the other hand, since Y_t is considerably superior in explaining the income shifts in D_{jt} it would then be proper to regard the relative price effect as measured in Equation (3) as the actual one.

As seen from the results of Equation (3) the relative price variable is, in fact, a significant determinant of D_{jt}. And the relative price elasticity of D_{jt}, although less than unity, is still far too large to be overlooked. This, incidentally, is contrary to our hypothesis of a fixed input coefficient for jute goods in its uses. This contrary result can possibly be explained by a too high level of aggregation adopted in this study in the sense that a disaggregated demand study for jute goods in its various uses would show their varying demand responses to relative price changes. That is, while some uses might show some sensitivity to such relative price changes, the other uses may not. The data problems are, however, so great that it is perhaps impossible to test these hypotheses about the differential price behaviours in the different uses of jute goods. Some of it can also be explained by the tendency on the users' part to accumulate stocks in times of price decreases and to run down stocks in times of price increases. It seems that, on the aggregate, such differential price behaviour patterns have interacted to show a not very strong, but definitely significant, relationship between D_{jt} and $\frac{P_{jt}}{P_{st}}K$. It must be noticed that this can indeed be termed a relationship between D_{jt} and P_{jt} since the latter has shown considerably greater variability than P_{st} during the period covered in this study. This opens up the possibility of manipulating the domestic prices of jute goods through excises to create greater exportable surplus in a situation of short-fall in production of jute goods, a situation all too likely when the jute crop is so much subject to natural factors.

IV: DEMAND FORECASTS FOR 1969-70

It appears from the trials of alternative estimating equations that only one of those equations, Equation (3), can be used with any reasonable assurance for forecasting purposes as this equation alone has both the income and the relative price coefficients significant at 5 per cent error probability level and above. With an exogenously determined value for Y_t and keeping $\frac{P_{jt}}{P_{st}}K$ at its mean, such a forecast will now be made.

The Planning Commission [9, pp. 97-98, 128, 135] has estimated certain annual production targets for agricultural and industrial products that are expected to be reached by 1969-70. It will be assumed that such production targets are plausible and it need not be stressed that the validity of the forecast here remains bound by the validity of those estimates. In case there is any subsequent revision of the magnitudes of such estimates, the forecast should be revised. Table II shows the estimated marketable surplus of selected agricultural crops and production figures for selected industrial products. There are indeed two sets of figures because of two different assumptions concerning the marketable surplus of the selected agricultural crop. While figures in Column (I) are based on the same set of assumptions as was used to frame the Y_t index, the figures in Column (II) are based on the assumption that 22 per cent of the East Pakistan food crop and 37 per cent of West Pakistan food crop will be marketed during 1969-70. These higher figures (as suggested by Gutman [2, p. 3] can be justified on the basis of greater than unit output-elasticity of marketable surplus [4, p. 364] and the growth in the agricultural sector as envisaged during 1969-70 [9; pp. 97-98]. The two column totals in Table I are 16,332 thousand tons and 16,999 thousand tons respectively. The quarterly figures then work out to be 4,083 thousand tons and 4,250 thousand tons. The sum of the marketed surplus of the agricultural crops and the production of the industries included in the Y_t index in the base quarter, July-September, 1956-57, stood at 740.18 thousand tons. The index value of Y_t in any given quarter of 1969-70 then works out to be 551.62 and 574.18 for the two sets of figures in Table I respectively, assuming that the figures for Y_t in all the quarters of 1969-70 are of equal magnitude. Substituting these values of Y_t in Equation (3) and holding $\frac{P_{jt}}{P_{st}}$–K at its mean, we then derive the two point estimates of 30.27 thousand tons and 31.29 thousand tons for D_{jt} for any given quarter of 1969-70. The two different annual figures for D_{jt} based on the two different Y_t figures then work out to be 121.08 thousand tons and 125.16 thousand tons respectively. The danger of making a point forecast, however, is too well known to require emphasis; in fact, seldom, if ever, are unique figures realised in actual cases.

TABLE II

ESTIMATED MARKETABLE SURPLUS OF SELECTED AGRICULTURAL CROPS AND THE PRODUCTION OF SELECTED INDUSTRIES IN PAKISTAN: 1969-70

Commodities	Column (I)	Column (II)
	(.............. *000 tons*	..............)
Agriculture		
1. Rice	3012	3218
2. Wheat	1692	1954
3. Minor food crops	496	572
4. Grams and pulses	390	440
5. Oilseeds	498	571
6. Cotton	32(2536)	322(536)
Industry		
1. White sugar	640	640
2. Cement	5000	5000
3. Fertilisers	3050	3050
4. Salt	650	650
5. Jute manufactures	432(720)	432(720)
6. Soda ash	150	150
Total	16332	16999

Source: See, Appendix Table A-3.

Notes:

a) The actual figures for cotton is 536 thousand tons or 3,000 thousand bales. But since a ton of baled cotton uses a lower quantity of jute goods relative to other commodities (*see* the Appendix for these input measures) the figure for cotton was weighted downwards to make it comparable to the figures for other commodities in terms of their jute input coefficients.

b) The actual figure for jute goods were also weighted downwards.

The very fact that the residuals, *i.e.*, U_t, are never zero point out the presence of forecasting errors. It is more appropriate, therefore, to make a range forecast which will give not a unique situation but a range of situations, any one of which can be expected to be realised at a given error probability level.

Table III shows the two point forecasts as well as their ranges, the latter being at two different error probability levels. While the point forecast under the stable proportion assumption about the agricultural component of Y_t is 121.08 thousand tons for 1969-70, the range is as wide as 91.98 thousand tons to 150.20 thousand tons at 5 per cent error probability level and 85.96 thousand tons to 156.20 tons at 1 per cent error probability level. As stated before, under the "increased proportion" assumption for the marketed surplus of the agricultural component of Y_t the point forecast is higher at 125.16 thousand tons and the range is as wide as 95.44 thousand tons to 154.88 thousand tons at 5 per cent error probability level and 89.28 thousand tons to 161.04 thousand tons at 1 per cent error probability level. It must be noticed that the difference between the two point forecasts as well as between the lower and upper limits of the two sets of range forecasts are small thereby indicating the insensitivity of the forecasts under the alternative assumptions for marketed surplus.

TABLE III

DEMAND FORECASTS FOR JUTE GOODS IN PAKISTAN, 1969-70

	Forecasts		Error probability level
	Point forecast	Range forecast	
	(......... *000 tons* ....)		
I	121.08	Ia. 91.98—150.20	5%
		Ib. 85.96—156.20	1%
II	125.16	IIa. 95.44—154.88	5%
		IIb. 89.28—161.04	1%

It was assumed in making the forecasts as in Table III that the index values for Y_t are of equal magnitude in all the quarters of 1969-70. This, however, is not a necessary assumption to obtain these forecasts. By changing the index values for Y_t in different quarters it is possible to come out with divergent point and range forecasts for different quarters of 1969-70, but their summations will result in the same point and range forecasts as in Table III, since only the distribution of the annual total for Y_t within different quarters has altered. The only reason this simplifying assumption of the quarterly Y_t values being of equal magnitude for all the quarters in a given year was made is that it is difficult to arrive at any seasonal pattern for Y_t so far ahead in future when the seasonal patterns might change. This, however, will not affect the statistical relationship as envisaged in Equation (3). It was proved that the seasonality in Y_t itself will explain the seasonality in D_{jt} so that any change in the seasonal pattern in Y_t will also cause concomitant change in the seasonal pattern for D_j.

The official estimate in this regard is, however, 120 thousand tons [9, p. 129]. How this estimate was arrived at has not been revealed, but it does not seem to be quite unwarranted in the face of the statistical evidence presented above. Inasmuch as it is only a point forecast and not a probabilistic range of forecasts its usefulness and reliability must be questioned. Policy decisions oriented towards such fixed figures, fixed situations and not towards alternative sets of figures and situations assumes away the necessity of flexibility in a plan, thereby subjecting the latter not only to academic criticism but more importantly, may lead to policy errors in actual cases. It is altogether appropriate to show the magnitude of such error in the present case. The annual production capacity was estimated at 720 thousand tons by 1969-70, which, after deducting the internal consumption of 120 thousand tons, would leave an exportable surplus of 600 thousand tons. To consider the lower limits of the two range forecasts made at 5 per cent error probability level in this study, it is possible that this exportable surplus has been underestimated by anywhere between 28.02 thousand and 24.56 thousand tons. Similarly, to consider the upper limits of those two range forecasts at the same error probability level, it is also possible that the exportable surplus has been overestimated by between 30.20 thousand to 34.88 thousand tons. In terms of percentages, the underestimation ranges between 4.67 per cent and 4.09 per cent while the overestimation ranges between 5.03 per cent and 5.81 per cent.

V: CONCLUSIONS

The conclusions from this study could be discerned at each stage of this study. However, it is better to restate so as to project them into better relief.

First, while the internal demand for jute goods in Pakistan seems to bear a very definite relationship to the marketed surplus of selected agricultural crops and the production of selected industries the same cannot be said about the relationship between the former and the volume of railway freight carried. The reason may be that the railway system carried a wide variety of products and not merely the products which use jute goods so that the variations between the two magnitudes may not be closely related. Also many products which use jute goods, at least a part of them, never show up in the railway system, which again would account for such a lack of definite relationship between the two.

Secondly, it seems that, on the aggregate, the uses of jute goods are influenced by relative price changes. The relative price elasticity at the mean is, however, less than unity (—.84).

Thirdly, the differences between the official forecast and the forecast made in this study for Pakistan's internal demand for jute goods in 1969-70, admittedly not much in relation to export surplus, suggest the need of some flexibility about the crucial figures for export surplus, if the predictions of production capacity are taken as given.

REFERENCES

1. Durbin, J. and Watson, G.S., "Testing For Serial Correlation in Least-Squares Regression", parts I and II, *Biometrika*, 1950 and 1951.

2. Gutman, G.O., *A Note on Marketable Surplus of Food Grains.* Mimeographed. (Karachi: 18-11-1964).

3. Johnston, J., *Econometric Methods*. (New York: McGraw-Hill Book Company Inc., 1963).

4. Khan, A.R. and Chowdhury, A.H.M.N., "Marketable Surplus Function: A Study of Behaviour of West Pakistan Farmers", *Pakistan Development Review*, Autumn 1962.

5. *Monthly Summary of Jute Goods Statistics.* (Dacca: Pakistan Jute Mills Association), July 1956 to September 1963.

6. Pakistan, Central Statistical Office, *Monthly Statistical Bulletins,* October 1956 to January 1964. (Karachi: Manager of Publications).

7. ——————, Ministry of Commerce. *Report of the Jute Enquiry Commission, 1960*. (Karachi: Manager of Publications).

8. ——————, Planning Commission, *Handbook of Agricultural Statistics.* (Karachi: Planning Commission, June 1964).

9. ——————, Planning Commission, *Outline of the Third Five Year Plan, 1965-70*. (Karachi: Planning Commission, August 1964).

10. Rabbani, A.K.M.G., "Demand Curves for Burlap in U.S.A.", *Pakistan Economic Journal,* June 1962.

11. Working, E.J., "What Do Statistical Demand Curves Show?", *Quarterly Journal of Economics*, Vol. XLI (1927). Also in American Economic Association, *Readings in Price Theory*. (Homewood, Illinois: Richard D. Irwin Inc., 1952).

12. Valavanis, S. *Econometrics, An Introduction to Maximum Likelihood Methods*. (New York: McGraw-Hill Book Company, Inc., 1959).

Appendix A

The present study certainly is dependent on the accuracy of the data gathered, the assumptions made to make them usable, and the adjustments made to improve on their plausibility. It is possible, however, that there may be very large errors of measurement in the variables used in this study and any policy decision that can be logically expected of this study should be made in full knowledge of that.

First, consider the construction of the index, F_t. It is possible that the data used for the construction of the F_t index are quite accurate since both Pakistan Eastern Railway and Pakistan Western Railway maintain detailed records about the volume of railway traffic. It appears, however, that such data as reported in the *Monthly Statistical Bulletins* of the CSO, Pakistan [6] contain certain discontinuities. The way this problem was overcome needs to be stated. In case data for a month in a given quarter were missing then an average of the figure for the other two months was taken as the figure for the missing month. In case figures were found missing for two months then the figure for the remaining one month multiplied by three was taken to represent the quarterly figure.

Secondly, consider the construction of the index, Y_t. As noted before, data for agricultural component of Y_t were obtained from the *Handbook of Agricultural Statistics*, published by the Planning Commission [8]. It is widely known, however, that data for agricultural production in Pakistan are somewhat unreliable. In fact, most of the work on agricultural supply in Pakistan have been in relation to acreage changes and not production changes. Secondly, the data were distributed into different quarters on the basis of the best available information with regard to their probable period of harvesting and marketing. While the information concerning their harvesting were accurate the same cannot be said with any great assurance about their period of marketing on which ultimately depends the distribution of these products into different quarters *vis-a-vis* their impact on the internal demand for jute goods in Pakistan. The distribution was as follows. To the first quarter, *i.e.*, July-September, the crops assigned were 10 per cent of the total cotton crop of West Pakistan and the whole of the *aus* rice crop of East Pakistan. To the second quarter, *i.e.*, October-December, the crops assigned were half of the cotton and rice crops and the whole of the maize, jowar, and bajra crops of West Pakistan, 70 per cent of the *aman* rice and the whole of the cotton crop of East Pakistan. Next, the crops assigned to the third quarter, *i.e.*, January-March, were 20 per cent of the cotton crop, half the rice crop and the whole of the oilseed crop of West Pakistan, and 30 per cent of the *aman* rice crop, and the whole of the wheat, pulses and grams crops of East Pakistan. Finally, to the fourth quarter *i.e.*, April-June, the crops assigned were 20 per cent of the cotton crop, and the whole of the wheat, barley, grams and pulses crops of West Pakistan, and the whole of the *boro* rice, barley, and oilseeds crops of East Pakistan. The framing of the Y_t, however, also involved weighting of the crops and industries according to their volume of the use of jute goods per unit of output. It appears that a bale of raw cotton uses around 22 yards of hessian of 45" × 11 oz. variety which would make 15 lbs. of hessian in volume. The use of hessian wrapping for a bale of jute goods is also similar. The transportation of foodgrains is generally in a bag of B-Twill variety, weight 2¼ lbs., and it contains around 2.5 maunds of foodgrain. This indicates that the transportation of a ton of foodgrain necessitates the use of around 25 lbs. of sacking. Thus, transportation of a ton of raw cotton and a ton of jute goods necessitate the use of around 40 per cent less jute goods than a ton of foodgrain. The figures of raw cotton and the production of jute goods in the construction of Y_t index were weighted accordingly. The weights of the figures for the remaining industries are the same as of foodgrains.

Concerning the weighted index of the prices for jute goods it was mentioned previously that this index represents only the hessian and sacking prices. The price quotations were, however, in relation to different quantity units such hessians of different width and weight per yard and per bag. These price quotations were then transformed into price per ton on the basis of the following weight measures:

(i) hessian:

(a) 45" × 11 oz.	per yard	3260 yards per ton
(b) 50" × 10 oz.	per yard	3580 yards per ton
(c) 50" × 9½ oz.	per yard	3770 yards per ton

(ii) sacking, B-Twill variety—1000 bags per ton

Considering the construction of the index of substitute prices, P_{st}, problem arose about many discontinuities in the monthly data for coarse cotton sheeting of grey long cloth, as it is called in the *Monthly Statistical Bulletins* of the CSO [6]. Discontinuities as wide as five months were observed and the method for treating such problems was as follows. In a situation of one month's gap, an average of the two remaining monthly price quotations was taken to be the average quarterly price while in a situation where only one price quotation was available, the average quarterly figure was taken to be represented by that. Finally, the figure for the quarter for which not even one month's quotation was available was obtained as an average of the figures for the immediately preceding and following quarters.

Finally comes the construction of the quarterly index for the construction of jute goods, D_{jt}. The general impression is that the data for the production, exports, and stocks of jute goods as given by Pakistan Jute Mills Association (PJMA) [5] are far more accurate than the data for the same provided by any other agency. These data were then taken as the basic data for obtaining a measure for D_{jt}. It must be noticed that the stock figures as reported by PJMA [5] are mill stocks and does not take into account the stocks at the users' level as well as the goods in transit. It is known that the mills manufacturing cement, sugar, and fertilizers keep large stocks, a tendency that might have become quite pronounced after 1959-60 and 1960-61 when the internal consumption of jute goods dipped substantially and the users had great difficulties in obtaining the necessary supplies. Goods in transit may also be another important element since the inter-wing and the intra-wing bottlenecks in transportation are far too well known to completely overlook this aspect of the problem. However, for the most part it was assumed that the influence of such factors was insignificant while only for a few quarters, the stock figures were slightly adjusted to bring the D_{jt} values for those quarters more in line with their general pattern.

TABLE A-2

QUARTERLY INDICES FOR THE RAILWAY FREIGHT CARRIED (F_t), PRODUCTION AND MARKETED SURPLUS OF SELECTED COMMODITIES (Y_t), PRICES OF JUTE GOODS RELATIVE TO THE PRICES OF SUBSTITUTES $\frac{P_{jt}}{P_{st}}K$ AND THE DEMAND FOR JUTE GOODS (D_{jt})

Quarters	F_t	Y_t	$\frac{P_{jt}}{P_{st}}K$	D_{jt}
July-September, 1956	100.00	100.00	100.00	100.00
October-December, 1956	133.39	250.56	99.92	118.22
January-March, 1957	145.04	147.99	93.38	103.69
April-June, 1957	120.24	264.64	99.86	132.52
July-September, 1957	115.40	115.11	96.83	96.40
October-December, 1957	132.41	228.73	96.39	130.94
January-March, 1958	166.53	144.30	85.15	90.50
April-June, 1958	137.84	261.97	91.41	123.81
July-September, 1958	129.83	95.20	86.35	124.24
October-December, 1958	145.86	224.68	96.30	126.37
January-March, 1959	166.53	141.86	91.24	67.59
April-June, 1959	179.48	271.22	91.10	110.89
July-September, 1959	123.25	109.15	90.33	62.83
October-December, 1959	144.78	252.46	99.98	121.10
January-March, 1960	161.13	158.45	96.94	86.34
April-June, 1960	148.15	279.94	105.89	134.69
July-September, 1960	127.70	126.34	98.10	100.24
October-December, 1960	162.70	269.92	113.33	145.94
January-March, 1961	172.39	161.43	130.49	57.55
April-June, 1961	147.89	276.72	118.81	95.48
July-September, 1961	146.61	122.94	106.56	74.03
October-December, 1961	164.40	290.28	101.03	115.97
January-March, 1962	170.16	175.62	93.20	79.06
April-June, 1962	185.21	291.76	102.87	164.99
July-September, 1962	131.53	136.15	97.05	69.66
October-December, 1962	168.92	294.85	97.63	172.03
January-March, 1963	184.46	162.51	94.86	106.84
April-June, 1963	161.85	300.78	91.85	169.43
July-September, 1963	139.22	—	88.99	109.16

Notes: Bases for

i) Y_t = 7,40,180 tons

ii) F_t = 30,57,000 tons

iii) D_{jt} = 13,090 tons

TABLE A-3

PROJECTED PRODUCTION TARGETS IN SELECTED AGRICULTURAL CROPS AND INDUSTRIES FOR PAKISTAN, 1969-70

Commodities	Targets		
	East Pakistan	West Pakistan	Total
	(.....................000 *tons*.......................)		
Agriculture			
1. Rice	11,600	1,800	13,400
2. Wheat	55	5,250	5,305
3. Miner food, grains	29	1,530	1,559
4. Grams and pulses	430	935	1,365
5. Oilseeds	221	1,412	1,633
6. Cotton	4.28	531.42	536
Industry			
1. White sugar	—	—	640
2. Cement	—	—	5,000
3. Fertilizers	—	—	3,050
4. Salt	—	—	650
5. Soda ash	—	—	150
6. Jute manufactures	—	—	720

Source: [9].