

## MONTHLY FLUCTUATIONS IN RAW JUTE PRICES

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The economic importance of the jute crop to the province of Bengal can hardly be exaggerated. The average value of this particular crop alone is about Rs. 44 crores which is about half the money income of the agricultural community in normal years. The enormous purchasing power thus annually secured by it to the agriculturists of the province provides the very sustenance of the economic activities of Bengal including the trade and industry of the province. Even a slight depression in the prices of raw jute means a great hardship on the agriculturists and has an adverse effect on the economic life of the province. It is therefore of considerable interest to study the factors influencing fluctuations in the monthly prices of raw jute.

Apart from the supply of raw jute, the prices of jute manufactures as also the general level of prices affect to a marked extent the raw jute prices. Relevant figures for the 132 months during the period from July 1927-28 to June 1937-38, on which the present analysis is based, are shown in Table 1. The supply series which represents the monthly imports of jute into Calcutta from 1927-28 to 1937-38 has been extracted from the annual reports of the Indian Jute Mills Association, while that relating to price represents the monthly index number of prices based on figures published in the *Indian Trade Journal* in connection with the official index numbers of wholesale prices at Calcutta.

### TRENDS OF THE FOUR SERIES

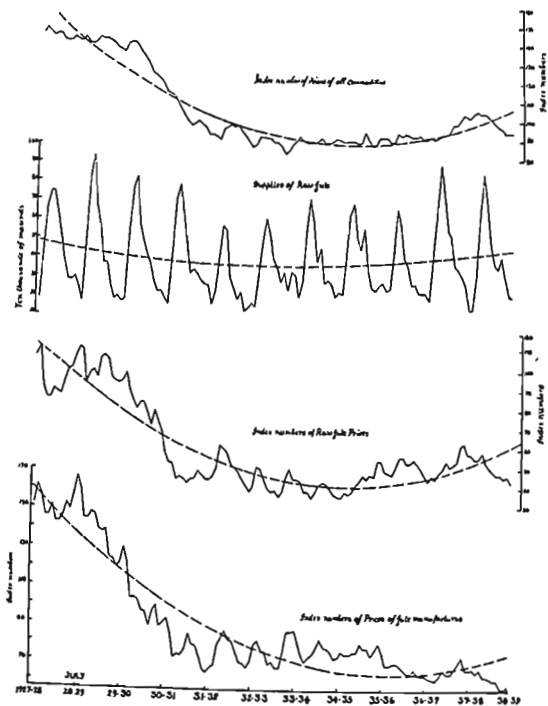
In order to study the causes of the monthly fluctuations in prices, first of all it is necessary to eliminate the trends from each of the series. For this purpose, mathematical expressions for the trends have been found by fitting straight lines and then parabolas of second and third degrees by the method of orthogonal polynomials. The equations giving the trends are given in Table 2.

In keeping with statistical requirements we have fitted all the trends to the same degree; and their significance has been tested term by term in Table 3. Since the third term is not significant except in one case and for the sake of simplicity we have taken the second degree parabola as representing the trends in all the four series.

The actual and the trend values for the four series are represented graphically in Chart (1). Prices of raw jute have a general tendency to decrease till July 1934-35 then become steady for some time, and finally continue to increase slowly. Prices of jute manufactures continue to decrease even up to July 1935-36 and afterwards become steady for some time and then continue to increase slowly. The general level of prices also continues to fall till July 1934-35, becomes steady and then finally begins to rise. This is in keeping with

broad economic facts; the period between 1927-28 and 1934-35 is one of depression after which there has been a tendency towards slow recovery. There is no marked trend in supplies of raw jute; there is a tendency of the supplies to diminish very slowly till July 1932-33, and to increase slowly afterwards.

CHART (1). TRENDS OF THE FOUR SERIES



FLUCTUATIONS IN JUTE PRICES

TABLE 1. MONTHLY SERIES OF PRICES AND SUPPLY OF RAW JUTE, PRICES OF JUTE MANUFACTURES AND GENERAL PRICE LEVELS, JULY 1927—JUNE 1934

Year and Month	Raw Jute		Index No. of Prices		Year and Month	Raw Jute		Index No. of Prices	
	Index No. of Prices (r <sub>1</sub> )	Supply in 10 <sup>3</sup> mds. (r <sub>2</sub> )	Jute Manufactures (r <sub>3</sub> )	All Commodities (r <sub>4</sub> )		Index No. of Prices (r <sub>1</sub> )	Supply in 10 <sup>3</sup> mds. (r <sub>2</sub> )	Jute Manufactures (r <sub>3</sub> )	All Commodities (r <sub>4</sub> )
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1927 July	108	183	152	149	July	44	152	85	93
Aug.	114	434	161	123	Aug.	46	216	68	92
Sept.	92	666	158	149	Sept.	51	375	68	91
Oct.	87	745	148	147	Oct.	62	557	80	96
Nov.	88	749	146	148	Nov.	60	530	83	97
Dec.	91	640	151	148	Dec.	58	283	87	98
1928 Jan.	89	499	143	145	1932 Jan.	52	238	82	97
Feb.	88	384	143	144	Feb.	51	172	82	97
March	95	281	147	144	March	40	211	70	94
April	101	287	152	146	April	43	115	71	92
May	102	298	149	145	May	42	133	70	80
June	108	248	157	144	June	38	150	68	86
July	112	172	166	146	July	41	138	71	87
Aug.	111	473	160	143	Aug.	51	303	80	91
Sept.	94	817	145	142	Sept.	50	493	82	91
Oct.	99	632	145	143	Oct.	45	588	77	91
Nov.	100	666	148	146	Nov.	40	515	76	90
Dec.	97	554	147	143	Dec.	38	380	70	88
1929 Jan.	107	309	139	145	1933 Jan.	39	332	71	88
Feb.	108	367	138	144	Feb.	36	263	68	86
March	106	546	139	143	March	38	313	68	82
April	97	182	125	140	April	46	219	76	84
May	95	195	124	139	May	50	335	87	87
June	94	157	120	138	June	45	323	87	89
July	95	182	122	142	July	43	188	88	91
Aug.	99	542	130	143	Aug.	43	276	81	89
Sept.	90	704	122	143	Sept.	38	643	75	88
Oct.	85	829	104	140	Oct.	38	691	71	88
Nov.	81	509	104	137	Nov.	35	571	74	88
Dec.	84	484	103	134	Dec.	38	309	75	89
1930 Jan.	84	418	97	131	1934 Jan.	42	432	79	90
Feb.	70	387	97	126	Feb.	43	260	83	89
March	72	375	86	125	March	42	269	79	88
April	80	221	97	123	April	46	250	78	89
May	75	229	100	121	May	37	194	76	90
June	69	185	89	110	June	36	214	73	90
July	58	157	91	115	July	35	203	74	89
Aug.	52	438	93	114	Aug.	38	379	77	89
Sept.	53	792	86	111	Sept.	37	816	75	89
Oct.	45	775	73	107	Oct.	38	673	75	89
Nov.	46	639	75	103	Nov.	12	689	76	88
Dec.	45	470	74	100	Dec.	44	433	76	88
1931 Jan.	43	319	77	98	1935 Jan.	47	547	81	94
Feb.	44	331	85	99	Feb.	45	335	78	90
March	45	306	80	100	March	47	233	78	87
April	49	265	79	98	April	46	226	74	88
May	47	257	73	97	May	54	254	77	91
June	45	253	67	93	June	54	264	81	91

TABLE 1 (Contd.) MONTHLY SERIES OF PRICES AND SUPPLY OF RAW JUTE, PRICES OF JUTE MANUFACTURES AND GENERAL PRICE LEVELS, JULY 1927—JUNE 1938

Year and Month.	Raw Jute		Index No. of Prices		Year and Month	Raw Jute		Index No. of Prices	
	Index No. of Prices (r.)	Supply in 10 <sup>3</sup> mds. (r.)	Jute Manufactures (r.)	All Commodities (r.)		Index No. of Prices (r.)	Supply in 10 <sup>3</sup> mds. (r.)	Jute Manufactures (r.)	All Commodities (r.)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
July	49	224	76	91	1937 Jan.	51	561	65	94
Aug.	48	227	69	89	Feb.	52	351	85	98
Sept.	47	300	60	89	March	54	232	67	100
Oct.	51	645	70	93	April	52	294	78	103
Nov.	56	551	70	92	May	53	253	73	105
Dec.	56	387	89	93	June	57	119	87	102
1938 Jan.	53	357	67	92	July	57	119	87	104
Feb.	53	249	65	91	Aug.	55	308	87	105
March	55	255	65	91	Sept.	56	625	65	104
April	53	213	67	92	Oct.	58	837	87	104
May	50	213	65	90	Nov.	53	877	83	103
June	47	214	64	90	Dec.	50	456	63	101
July	44	171	64	91	1938 Jan.	48	363	62	99
Aug.	46	350	63	90	Feb.	47	331	61	97
Sept.	45	861	62	91	March	47	392	61	96
Oct.	48	871	61	93	April	45	287	67	94
Nov.	50	707	64	93	May	46	192	67	94
Dec.	54	535	67	94	June	43	191	59	94

TABLE 2. EQUATIONS OF TRENDS

Series	Linear	Second degree	Third degree
(1)	(2)	(3)	(4)
Price of Raw Jute	$84.50 - 4.02t$	$105.80 - 19.06t + 1.41t^2$	$110.70 - 21.06t + 1.93t^2 - 0.0347t^3$
Supply of Raw Jute	$405.91 - 4.44t$	$463.81 - 43.04t + 3.80t^2$	$475.23 - 49.04t + 5.06t^2 - 0.0600t^3$
Price of Jute Manuf.	$127.00 - 7.74t$	$148.40 - 21.61t + 1.39t^2$	$180.08 - 41.40t + 5.35t^2 - 0.2639t^3$
General Level of Prices	$13^{\circ} - 58^{\circ} - 5.23t$	$184.08 - 10.56t + 1.43t^2$	$150.38 - 17.62t + 1.01t^2 - 0.0259t^3$

Unit of  $t$  is a year and  $t$  is zero in Jan. 1928

TABLE 3. VALUES OF VARIANCE DUE TO EACH TERM OF TREND AND DEVIATION FROM TREND

	D. F.	Price of Raw Jute	Supply of Raw Jute	Price of Jute Manufacture	Grand Level of Prices
(1)	(2)	(3)	(4)	(5)	(6)
First degree	1	2666.62**	2170.23	8588.60**	3004.33**
Second degree	1	1715.54**	12786.21	1654.74**	1763.05**
Third degree	1	7.45	41.18	430.40*	4.16
Deviation from trend	7	92.36	2318.83	63.95	45.49

Significantly bigger than residual variance on 5% level.

Significantly bigger than residual variance on 1% level.

## FLUCTUATIONS IN JUTE PRICES

The deviations from the respective trends were calculated for each of the four series and their mutual correlations were computed<sup>1</sup>. The multiple regression equation using deviation from trend of  $x_1$  as the dependent character comes as follows:

$$x_1 = -(0.009 \pm .003)x_2 + (0.294 \pm .061)x_3 + (0.073 \pm .099)x_4$$

where  $x_1, x_2, x_3, x_4$  are the deviations from their respective trends.

The multiple correlation coefficient is as high as 0.85 which shows that most of the relevant variables have been included in the analysis. The signs of the coefficients of  $x_2, x_3, x_4$  in the above equation shows that monthly prices of raw jute are negatively correlated with monthly supplies and positively correlated with prices of jute manufactures as also with prices of all commodities. This is in keeping with economic theory. The magnitudes of the above coefficients, however, do not give the relative importance of the three factors as they are expressed in different units.

Expressing each of the four series of deviations from trend in terms of respective standard deviation as unit, the regression equation is transformed into the following form:

$$x_1 = -(0.171 \pm .069)x_2 + (0.326 \pm .070)x_3 + (0.600 \pm .077)x_4$$

where the coefficients of  $x_2, x_3$  and  $x_4$  are known as 'beta' coefficients to distinguish them from ordinary partial regression coefficients.

The relative importance of the three factors may also be ascertained by means of coefficients of partial and part correlation whose values are given in Table 4.

TABLE 4. RELATIVE IMPORTANCE OF INDIVIDUAL FACTORS AFFECTING PRICES OF RAW JUTE AS INDICATED BY THREE DIFFERENT COEFFICIENTS

Independent factor	Factors held Constant	Coefficients of		Beta Coefficients
		Partial Correlation	Part Correlation	
(1)	(2)	(3)	(4)	(5)
Supply ( $x_2$ )	$x_1, x_3$	-.311 ± .080	-.313	-.171 ± .069
Price of jute manufactures ( $x_3$ )	$x_1, x_2$	.491 ± .067	.632	.326 ± .070
Prices of all Commodities ( $x_4$ )	$x_1, x_3$	.749 ± .039	.786	.600 ± .077

It is evident from this table that the rank of the three variables in order of importance is the same, and the relative sizes are comparable.

The part correlations naturally give the best picture as in determining these we keep intact all the original variations in the independent factor and adjust only the dependent factor for the other independent variables. Taking the squares of the part correlations we find that the coefficients of part determination are

$${}_{11}r_{22}^2 = 0.098, \quad {}_{22}r_{33}^2 = 0.283, \quad {}_{33}r_{44}^2 = 0.618$$

<sup>1</sup>  $r_{12} = +0.806$ ;  $r_{13} = +0.163$ ;  $r_{14} = +0.850$ ;  $r_{23} = +0.655$ ;  $r_{24} = -0.852$ ;  $r_{34} = +0.612$ ;  $r_{12} = +.7812$ ;  $r_{13} = +.0105$ ;  $r_{14} = +.01232$ ;  $r_{23} = +.4371$ ;  $r_{24} = +.8012$ ;  $r_{34} = +.7228$ ;  $r_{12} = +.1341$ ;  $r_{13} = +.4392$ ;  $r_{14} = -.1160$ ;  $r_{23} = +.6100$

Thus, 0.8 per cent of the variance in  $x_1$  (after removing the effects of  $x_2, x_3$  from it) is due to the additional factor  $x_4$ ; 24.3 per cent of the variance in  $x_1$  (after removing the effects of  $x_2, x_3$  from it) is due to the additional factor  $x_5$ ; and 61.8 per cent of the variance in  $x_1$  (after removing the effects of  $x_2, x_3$  from it) can be explained by the addition of the factor  $x_6$ . This clearly shows that the general level of prices exercises a dominating influence on the variations in the monthly prices of raw jute. Next in importance come prices of jute manufactures; while the influence exerted by the supply of raw jute is very limited as compared with the other two factors.

That the changes in supply affect the changes in the raw jute prices to such a small extent even during the short periods of one month is rather a disquieting fact. Although monthly fluctuations in the supply of raw jute within the same season are so great, prices are affected thereby only to a very small extent. This only points to the very low bargaining power of the cultivators. Supplies are usually large during the first few months of harvesting the crop. This is probably due to forced selling by cultivators who have no storage facilities and are pressed to pay up their old and present dues during these months which makes them powerless to adjust their supplies to demand. Another factor may be the holdings of stocks by the jute mills which puts the buyers in a very strong position and enables them to spread their purchasing operations to suit their own interests.

The effect of the fluctuations in the general level of prices on the monthly fluctuations of the raw jute prices is very large, but this is an external factor beyond control. Prices of jute manufactures, however, play quite an important part; raw jute prices increase to a considerable extent with the increase in prices of jute manufactures. New and extended uses for the jute fabrics may therefore be expected to induce an increase in the price of raw jute.

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