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Growth Rates of NNP,
1950-51 to 1975-76

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AGRICULTURAL SECTOR
AND
GROWTH RATES OF NNP, 1950-51 TO 1975-76

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Introduction

This paper focuses on the rates of growth of total net national product (NNP) and NNP originating from the agricultural sector vis-a-vis the non-agricultural sector.¹ It is based on time series of NNP at 1960-61 prices for the period from 1950-51 to 1975-76.

The growth performance of the two sectors affect the overall growth rate of NNP directly as well as indirectly. The indirect effects are through various linkages between the two sectors and through such factors as rates of saving and investment, price environment, foreign exchange availability and priorities in government policies. While the analysis in this paper is restricted to the direct impact of the growth performance of the agricultural vis-a-vis non-agricultural sector on the overall growth rate of NNP, it clearly indicates the crucial importance of the agricultural sector in influencing the growth performance of the total economy over time.

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1. The term "agricultural sector" includes agriculture, forestry and logging, fishing, mining and quarrying. Agriculture accounts for nearly 95 per cent of the NNP originating in the agricultural sector.

Relative Importance of the Agricultural and Non-Agricultural Sector in NNP

Appendix Table 1 (Cols. 2,3 and 4 presents data on total NNP (P) and NNP originating from the agricultural sector (P_a) and from the non-agricultural sector (P_b) at constant (1960-61) prices for the 26 years from 1950-51 to 1975-76. Columns 5 and 6 of the same table shows the relative importance of the two sectors in each year during the period.

In the early 1950s, when the First Five Year Plan was launched, about 55 to 56 per cent of total NNP originated from the agricultural sector (Sector A) while the non-agricultural sector (Sector B) accounted for about 44 to 45 per cent of total NNP. By mid-1970s, the relative importance of the two sectors as origins of NNP became just the opposite. Sector A was accounting for about 42 to 43 per cent while Sector B was accounting for about 57 to 58 per cent of total NNP at 1960-61 prices. A scrutiny of Columns 5 and 6 of the table also reveals that on an average Sector A became relatively less important by about 0.5 per cent per annum and Sector B became that much more important in accounting for NNP.

Growth of Total NNP and NNP Originating from the Two Sectors

Such a secular change in the relative importance of the two sectors imply that NNP originating in Sector B increased more rapidly than NNP originating in Sector A. This is confirmed by Columns 2,3 and 4 of the table which show that between 1950-51 and 1975-76 (i) NNP originating from Sector A increased from Rs. 5,150 crores to Rs. 9,417 crores (an increase of 83 per cent) and (ii) NNP originating from Sector B increased from Rs. 4,175 crores to Rs. 12,535 crores (by 200 per cent). This, in turn, means that in the growth of total NNP from Rs. 9,325 crores to Rs. 21,952

crores (i.e., by Rs. 12,627 crores), the relative direct contribution of Sector A and Sector B was 34 and 66 per cent respectively.²

Table 1, on the next page, shows the results of fitting a linear and a semi-log growth line to the time series of total NNP (P), NNP originating from Sector A (P_a) and NNP originating from Sector B (P_b) given in Appendix Table 1. It is clear from the estimated results both the growth lines fit equally well to the data. It also shows that the average annual growth rate (either in absolute terms or in percentage terms) of P_b was more than twice as much as that of P_a .

The above two findings (viz. the changing relative importance of the two sectors in favour of Sector B, and the substantially higher growth rate of P_b as compared to that of P_a) suggest that the non-agricultural sector must have exercised greater influence on the growth performance of the total economy than the agricultural sector. The rest of the paper examines if this was the case.

Year to Year Changes in the Growth Rates of Total NNP

A scrutiny of columns 2, 7 and 12 of the Appendix Table 1 reveals that between 1950-51 and 1975-76, total NNP (P) increased in all years except three (1957-58, 1965-66 and 1972-73). Even barring these three years, however, the annual growth in NNP, either in absolute (dp) or in relative terms (dp/p) was not uniform. The extreme variation in the rates of annual change in NNP, and the persistent wide fluctuations in these rates throughout the 25 year period are clearly brought out by Table 2 on the next page.

2: For year to year fluctuations in the relative direct contributions of the two sectors, see Appendix Table 1, Columns 10 and 11.

Table 1: Estimated Results of Growth Equations

Variable	Intercept (a)	Growth Coefficient (b)	R ²
<u>Linear Growth Equation</u>			
P	8,057	490	0.98
P _a	5,001	147	0.90
P _b	3,056	343	0.99
<u>Semi-log Growth Equation</u>			
Log P	9.102	0.034	0.99
Log P _a	8.553	0.021	0.91
Log P _b	8.261	0.046	0.99

Note: All estimated coefficients are significant at 1%

Table 2: Degree of Variation in the Annual Changes in NNP between 1950-51 and 1975-76

Size Class	No. of years	Average for the years in the Class	Identification of Years
<u>Annual Change in Absolute Terms (Rs. Crores at 1960-61 Prices)</u>			
-900 to -1	3	-415	1957-58, 65-66, 72-73
0 to 299	6	146	1951-52, 59-60, 62-63, 66-67, 71-72, 74-75
300 to 899	7	438	1952-53, 53-54, 54-55, 55-56, 56-57, 61-62, 68-69
800 to 1100	7	970	1958-59, 60-61, 63-64, 64-65, 69-70, 70-71, 73-74
Above 1200	2	1570	1967-68, 75-76
<u>Annual Change in Relative Terms (Per cent change over the previous year)</u>			
-5.70 to -0.01	3	-2.60	1957-58, 65-66, 72-73
0 to 1.99	5	0.83	1951-52, 59-60, 66-67, 71-72, 74-75
2 to 3.99	6	3.12	1952-53, 54-55, 55-56, 61-62, 62-63, 68-69
4 to 5.99	5	5.61	1953-54, 56-57, 63-64, 70-71, 73-74
6 to 7.99	4	6.90	1958-59, 60-61, 64-65, 69-70
Above 8	2	8.92	1967-68, 75-76

Sources: Derived from Appendix Table 1

To what extent was the above pattern in the rates of change in NNP influenced by the rates of change in NNP originating from Sector A as compared to Sector B?

Intuitively one may feel like taking one of the two positions. Since Sector B was becoming relatively more important than Sector A with respect to the origin of NNP (Cols. 5 and 6 in Appendix Table 1), and as income originating in Sector B was increasing at a substantially faster rate than income originating in Sector A (Table 1), one may feel that Sector B exercised greater influence on the rate of change in NNP than Sector A.

On the other hand, one may unhesitatingly attribute the observed pattern of the rates of growth of NNP to Sector A on the ground that because of weather and such other factors, the performance of this sector would be of a fluctuating nature.

Neither of the two intuitive positions can be taken at face value on a priori grounds because there is merit in the arguments behind both the positions. This indicates a need for systematic probing.

Direct Influence of the Two Sectors on the Year to Year Changes in the Growth Rates of Total NNP

We have examined the direct influence of the two sectors on the year to year changes in the growth rates of total NNP by relating such changes to year to year changes in the growth rates of NNP originating from the two sectors. The two measures of annual growth in P , P_a and P_b used for this purpose are (i) change in absolute terms (denoted as dp , dp_a and dp_b) and (ii) change in percentage terms (denoted as r_p , r_a and r_b). Appendix Table 1 (Cols. 7, 8, 9, 12, 13 and 14) gives the values of these measures.

Patterns of Changes in dp , dp_a and dp_b

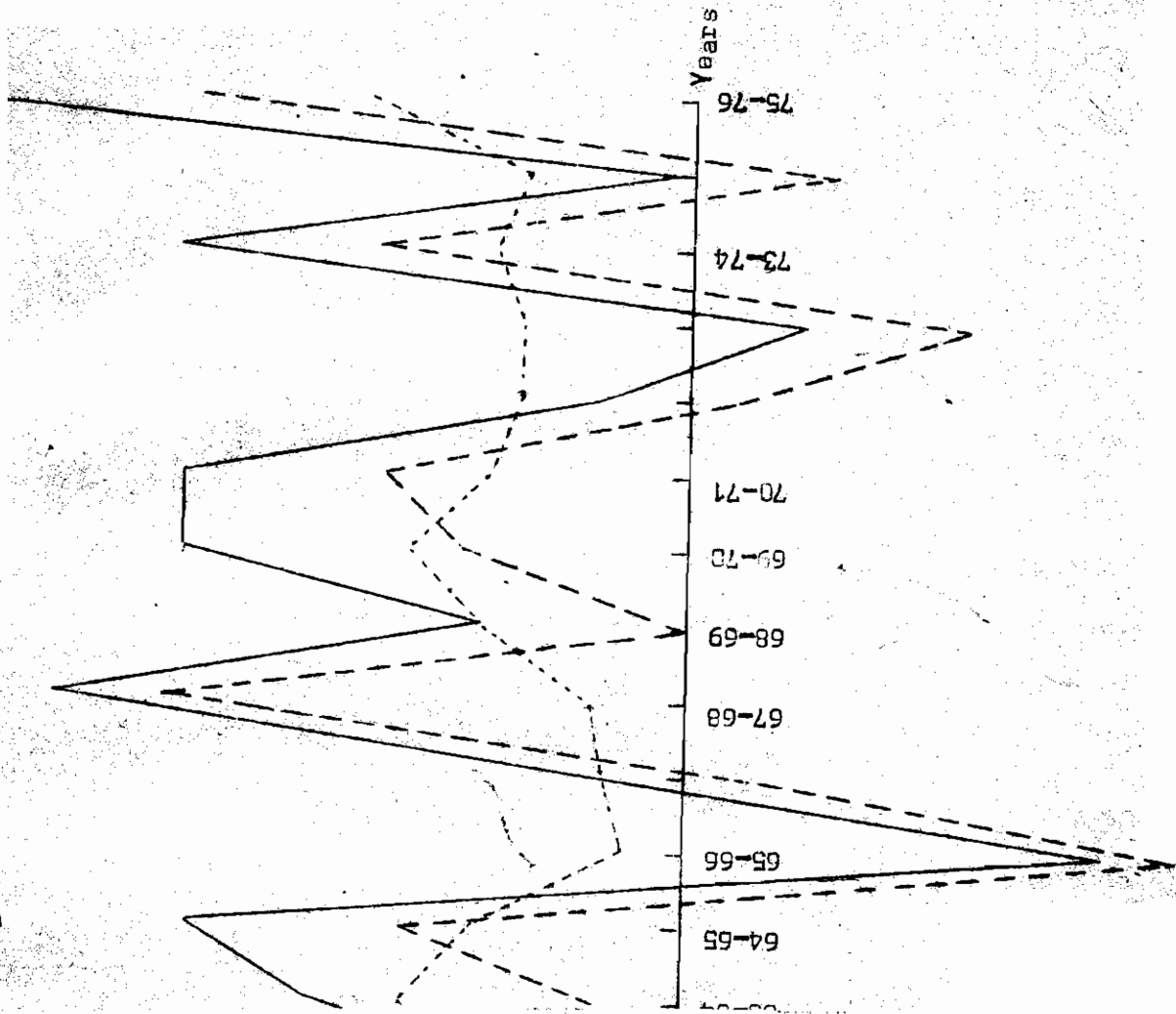
Figure 1 shows graphically the patterns of changes in dp , dp_a and dp_b during the period from 1951-52 to 1975-76. It reveals three most striking things: (i) very close association between dp and dp_a , (ii) relatively much weaker association between dp and dp_b , and (iii) still weaker association between dp_a and dp_b .

The visual impression given by figure 1 is supported by the values of Spearman's Rank Correlation Coefficients. The estimated coefficient between dp and dp_a is 0.95, between dp and dp_b is 0.51 and between dp_a and dp_b is 0.30.

A further scrutiny of Figure 1 reveals the following. Each of the three years of negative dp (1957-58, 1965-66 and 1972-73) was a year of negative dp_a . The converse, however, was not true. There were five years of negative dp_a when dp was positive. But in four out of these five years, dp was substantially lower than in the previous year.* Similarly each of the 11 years of decline in dp_a was also a year of decline in dp except one (1955-56). In six out of these years, dp_b also declined. But in the remaining four years there was a rise in dp_b . This indicates that the rise in dp_b was not sufficient to offset the impact of the decline in dp_a on dp . On the other hand in each of the three years (1953-54, 1964-65 and 1970-71) when dp_b declined but dp_a rose, the impact of decline in dp_b on dp was more than offset by the rise in dp_a . Finally, it is also clear from the figure that almost all years of substantial increase in dp were those when dp_a had risen substantially.

* The year of exception was 1966-67. In this year despite negative dp_a , dp was higher than in the previous year because of the exceptional decline in P resulting from decline in P_a during 1965-66.

Year Changes in dp , dp_a and b , 1950-51 to 1975-76



The above findings clearly establish that the year to year changes in total NNP, in absolute terms, were far more influenced by the annual changes in NNP originating in Sector A than in Sector B.

Does the above conclusion apply to early as well as to the later part of the 25 year period? It is important to ask such a question because the relative importance of Sector A had considerably declined over time as far as origin of NNP was concerned.

A look at Figure 1 suggests that no matter how one divides the period of 25 years, the conclusion about a very high degree of association between dp and dp_a remains unaltered. In fact, the estimates of Spearman's Rank Correlation Coefficients shown in Table 3 indicate that over time the association between dp and dp_a has become stronger while that between dp and dp_b has become weaker, particularly after 1967-68.

Patterns of Changes in r_p , r_a and r_b

Figure 2 shows graphically the patterns of changes in r_p , r_a , and r_b during the period from 1951-52 to 1975-76 and Table 4 presents the estimates of Spearman's Rank Correlation Coefficients between r_p and r_a , r_p and r_b and r_a and r_b . A scrutiny of Figure 2 and Table 4 reveals that none of the conclusions reached above, with respect to the relative influence of annual changes in NNP originating in the two sectors on year to year changes in NNP, needs modification even when the annual changes in P , P_a and P_b are considered in percentage terms.

Table 3: Spearman's Rank Correlation Coefficients between dp and dp_a ,
 dp and dp_b and dp_a and dp_b

Variables	Period	Rank Correlation Coefficients
dp and dp_a	1951-52 to 1975-76	0.95*
dp and dp_b	1951-52 to 1975-76	0.51*
dp and dp_a	1951-52 to 1961-62	0.86*
dp and dp_a	1962-63 to 1975-76	0.97*
dp and dp_b	1951-52 to 1961-62	0.50**
dp and dp_b	1962-63 to 1975-76	0.54**
dp and dp_a	1951-52 to 1966-67	0.91*
dp and dp_a	1967-68 to 1975-76	0.98*
dp and dp_b	1951-52 to 1966-67	0.59**
dp and dp_b	1967-68 to 1975-76	0.37
dp_a and dp_b	1951-52 to 1975-76	0.30
dp_a and dp_b	1951-52 to 1961-62	0.10
dp_a and dp_b	1962-63 to 1975-76	0.40
dp_a and dp_b	1951-52 to 1966-67	0.29
dp_a and dp_b	1967-68 to 1975-76	0.23

* Significant at 1%

** Significant at 5%

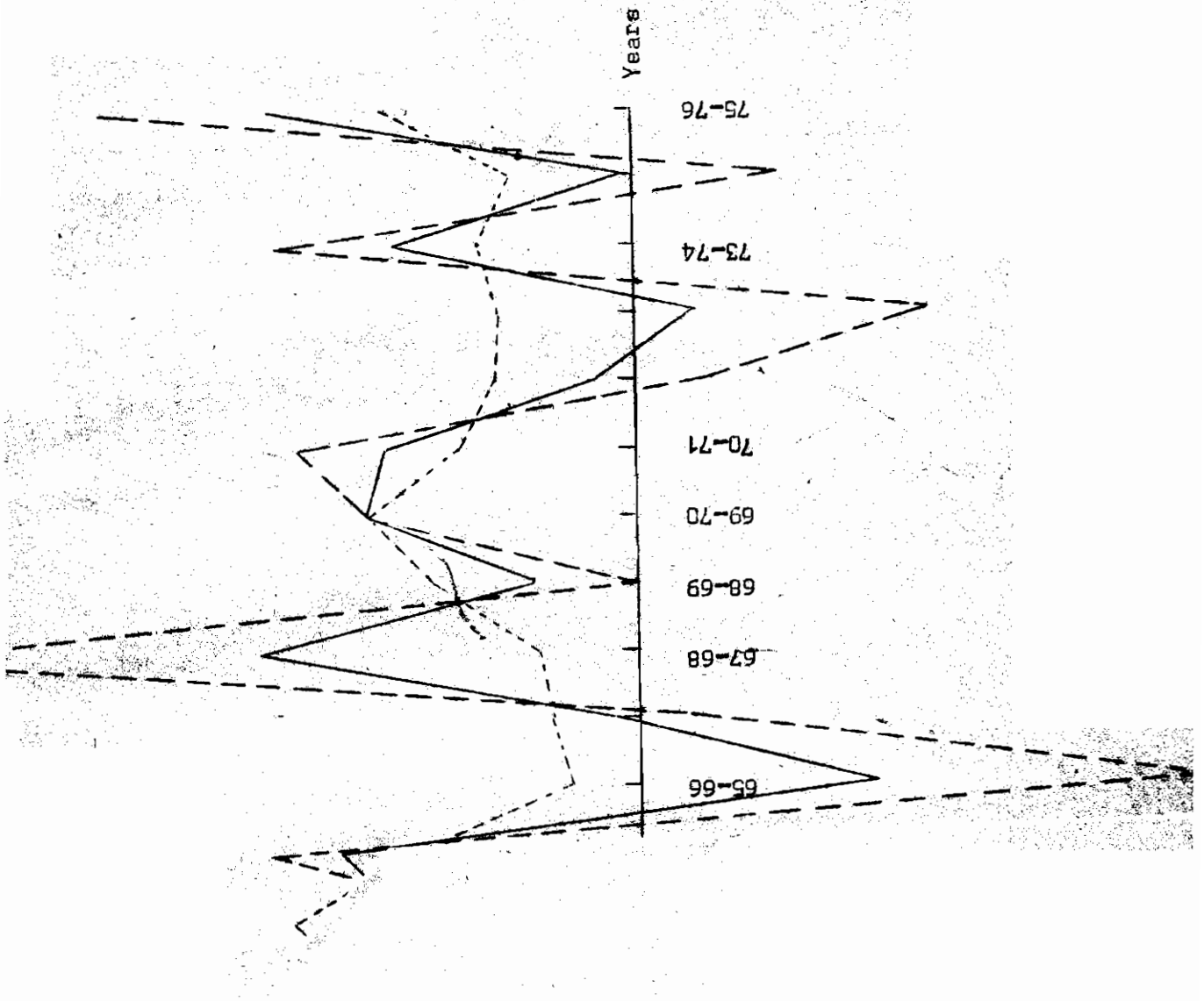


Table 4: Spearman's Rank Correlation Coefficients between r_p and r_a ,
 r_p and r_b and r_a and r_b

Variables	Period	Rank Correlation Coefficients
r_p and r_a	1951-52 to 1975-76	0.94*
r_p and r_b	1951-52 to 1975-76	0.48**
r_p and r_a	1951-52 to 1961-62	0.87*
r_p and r_a	1962-63 to 1975-76	0.96*
r_p and r_b	1951-52 to 1961-62	0.46
r_p and r_b	1962-63 to 1975-76	0.47**
r_p and r_a	1951-52 to 1966-67	0.92*
r_p and r_a	1967-68 to 1975-76	0.93*
r_p and r_b	1951-52 to 1966-67	0.57**
r_p and r_b	1967-68 to 1975-76	0.32
r_a and r_b	1951-52 to 1975-76	0.27
r_a and r_b	1951-52 to 1961-62	0.11
r_a and r_b	1962-63 to 1975-76	0.33
r_a and r_b	1951-52 to 1966-67	0.26
r_a and r_b	1967-68 to 1975-76	0.10

* Significant at 1%

** Significant at 5%

Summary and Conclusions

Between 1950-51 and 1975-76, net national product (NNP) of India at 1960-61 prices increased from Rs. 9,325 crores to Rs. 21,952 crores. NNP originating from the agricultural sector contributed about one third while that originating from the non-agricultural sector contributed the remaining two-third of the increment in total NNP.

Over the 25 year period, the relative importance of NNP originating from the agricultural sector declined significantly — from about 55 to 56 per cent of total NNP in the early 1950s to about 42 to 43 per cent by mid-1970s.

Between 1950-51 and 1975-76, total NNP (at 1960-61 prices) grew at a compound growth rate of 3.4 per cent per annum, NNP originating from the agricultural sector at 2.1 per cent per annum, and NNP originating from the non-agricultural sector at 4.7 per cent per annum. In other words, the annual growth rate of NNP originating from the non-agricultural sector was more than twice the annual growth rate of NNP originating from the agricultural sector.

During the 25 year period, there were three years (1957-58, 1965-66 and 1972-73) when NNP had a negative growth rate. Even barring those three years, the annual growth rate of NNP fluctuated between 0.2 and 9.1 per cent.

Despite the significant changes in the relative importance of NNP originating from the agricultural and non-agricultural sectors in favour of the latter, and more than twice as much growth rate of the latter as compared to the former, the annual rates of growth in NNP were far more closely associated with rates of growth in NNP originating from the

agricultural sector than rates of growth in NNP originating from the agricultural sector than rates of growth in NNP originating from the non-agricultural sector. Each of the three years of negative growth rate in NNP was a year of negative growth rate in NNP originating from the agricultural sector. Similarly 10 out of 11 years of decline in growth rate of NNP were years of decline in growth rates of NNP originating from the agricultural sector. In four of those 10 years, the rate of growth of NNP originating from the non-agricultural sector had increased over the previous year. But the increase was not sufficient to offset the impact of the decline in the growth rate of NNP originating from the agricultural sector on the growth rate of total NNP. On the other hand, in each of the three years when the growth rate of NNP originating from the non-agricultural sector declined but that of NNP originating from the agricultural sector rose, the upward impact of the former on the growth rate of total NNP was more than offset by the downward impact of the latter. Finally, almost all the years of exceptionally high (5 per cent or more) growth rates in total NNP were those when the growth rates of NNP originating from the agricultural sector were substantially high.

The close association between growth rates of total NNP and NNP originating from the agricultural sector holds good not only for the entire 25 year period but also for the period from 1962-63, or for that matter from 1967-68. In fact, the degree of association between these growth rates have increased while that between growth rates of total NNP and NNP originating from the non-agricultural sector has decreased after 1967-68.

While there was no systematic statistically significant association between the rates of growth in NNP originating from the agricultural and non-agricultural sectors, the various findings of this paper clearly indicate that the growth performance of the agricultural sector had a far reaching impact on the growth performance of the total economy. Intuitively this is obvious because of the influence of the agricultural sector on many crucial growth variables such as rates of saving and investment, price environment, availability of foreign exchange and priorities in government policies. What is, however, required is a systematic empirical investigation to decipher how the performance of agricultural sector has been "controlling" the growth of NNP during the last 25 years.

APPENDIX TABLE 1

IMPORTANCE OF AGRICULTURAL AND NON-AGRICULTURAL SECTORS IN THE GROWTH OF NET NATIONAL PRODUCT, 1950-51 TO 1975-76

(Cols. 2,3,4,7,8 and 9 Rs. Crores at 1960-61 Prices)

Year	P	P _a	P _b	(P _a /P) 100	(P _b /P) 100
1	2	3	4	5	6
1950-51	9325	5150	4175	55.2	44.8
1951-52	9400	5250	4150	55.9	44.1
1952-53	9775	5410	4365	55.3	44.7
1953-54	10325	5875	4450	56.9	43.1
1954-55	10625	5925	4700	55.8	44.2
1955-56	11000	5960	5040	54.2	45.8
1956-57	11550	6125	5425	53.0	47.0
1957-58	11450	5925	5525	51.7	48.3
1958-59	12300	6450	5850	52.4	47.6
1959-60	12475	6375	6100	51.1	48.9
1960-61	13294	6857	6437	51.6	48.4
1961-62	13763	6925	6838	50.3	49.7
1962-63	14045	6747	7298	48.0	52.0
1963-64	14845	6940	7905	46.7	53.3
1964-65	15917	7558	8359	47.5	52.5
1965-66	15021	6520	8501	43.4	56.6
1966-67	15123	6442	8681	42.6	57.4
1967-68	16494	7604	8890	46.1	53.9
1968-69	16939	7606	9333	44.9	55.1
1969-70	18016	8089	9927	44.9	55.1
1970-71 ^a	19096	8746	10350	45.8	54.2
1971-72 ^a	19298	8588	10710	44.5	55.5
1972-73 ^a	19048	7981	11067	41.9	58.1
1973-74 ^a	20143	8662	11481	43.0	57.0
1974-75 ^a	20183	8356	11827	41.4	58.6
1975-76 ^b	21952	9417	12535	42.9	57.1

^a = Provisional; ^b = Quick Estimates

Notes: Cols. 2,3 and 4 represent total Net National Product (NNP), NNP originating from the agricultural sector and NNP originating from non agricultural sector respectively. The term "agricultural sector" includes agriculture, forestry and logging, fishing, mining and quarrying. Agriculture alone accounts for nearly 95 per cent of the NNP originating in the "agricultural sector".

TABLE 1 : (Contd.)

Year	d_p	dp_a	dp_b	dp_a/d_p	dp_b/d_p	r_p	r_a	r_b
	7	8	9	10	11	12	13	14
1950-51								
1951-52	75	100	-25	1.33	-0.33	0.80	1.94	-0.60
1952-53	375	160	215	0.43	0.57	3.99	3.05	5.18
1953-54	550	465	85	0.85	0.15	5.63	8.60	1.95
1954-55	300	50	250	0.17	0.83	2.91	0.85	5.62
1955-56	375	35	340	0.09	0.91	3.53	0.59	7.23
1956-57	550	165	385	0.30	0.70	5.00	2.77	7.64
1957-58	-100	-200	100	2.00	-1.00	-0.87	-3.27	1.84
1958-59	850	525	325	0.62	0.38	7.42	8.86	5.88
1959-60	175	-75	250	-0.43	1.43	1.42	-1.16	4.27
1960-61	819	482	337	0.59	0.41	6.57	7.56	5.52
1961-62	469	68	401	0.14	0.86	3.53	0.99	6.23
1962-63	282	-178	460	-0.63	1.63	2.05	-2.57	6.73
1963-64	800	193	607	0.24	0.76	5.70	2.86	8.32
1964-65	1072	618	454	0.58	0.42	7.22	8.90	5.74
1965-66	-896	-1038	142	1.16	-0.16	-5.63	-13.73	1.70
1966-67	102	-78	180	-0.76	1.76	0.68	-1.20	2.12
1967-68	1371	1162	209	0.85	0.15	9.07	18.04	2.41
1968-69	445	2	443	0.01	0.99	2.70	0.03	4.98
1969-70	1077	483	594	0.45	0.55	6.36	6.35	6.36
1970-71	1080	657	423	0.61	0.39	5.99	8.12	4.26
1971-72	202	-158	360	-0.78	1.78	1.06	-1.81	3.48
1972-73	-250	-607	357	2.43	-1.43	-1.30	-7.07	3.33
1973-74	1095	681	414	0.62	0.38	5.75	8.53	3.74
1974-75	40	-306	346	-7.65	8.65	0.20	-3.53	3.01
1975-76	1769	1061	708	0.60	0.40	8.76	12.70	5.99

Notes: Cols. 7,8 and 9 represent annual changes in cols. 2,3, and 4 respectively in absolute terms.

Cols. 12,13 and 14 represent annual percentage changes in Cols. 2,3 and 4 respectively.

Sources: Data for cols. 2,3 and 4 from

1. Wilfred Malenbaum, Modern India's Economy, Charles E. Merrill Publishing Company, Columbus Ohio, 1971, P. 135.
2. Economic Survey, 1976-77, Government of India, Pp. 55-56