

4. Efficiency of Indian Postal Services

1. The Concept of Efficiency and Data for its Estimation

A commonly held belief is that the Indian Postal Department (IPD) has been operating inefficiently. In this chapter, we try to comment on this popularly held belief by making estimates of productivity of real resources used in the Postal Department during the period 1950-51 to 1983-84.

The IPD supplies a large number of services jointly comprising unregistered and registered mail items, and services like postal insurance, savings banks accounts and savings certificates. Suppose we have an estimate of the supply of various services by the postal department in a given year in homogeneous units; such as, post card equivalents. Given also an estimate of resource cost of IPD expressed, say, in rupees in a given year, we may obtain an estimate of productivity of a rupee spent in the postal department in that year. By comparing the productivity estimates so made for different years, we may be in a position to comment on productivity changes in IPD over a longer period of time.

The estimation of output of IPD in post card equivalent units requires data on the quantities of various services offered and their prices. For example, if postal services are supplied in the free market and market prices represent revealed preferences of users of these services, the post card equivalent units of postal services supplied can be estimated by taking post card as numeraire. But the postal services in India as

well as in many other countries are supplied by public utilities at regulated prices. If the regulated prices are any guide to revealed preferences of society for postal services, the post card equivalent units of supply of these services can be estimated by again taking post card as numeraire.

We have obtained from IPD data on the regulated prices for the various postal services in India during the period 1854-1987. A close look at this data shows that most of these prices have been changing quite infrequently. Table A.1 in the Appendix provides detailed data on traffic demands for various postal services in India during the period 1950-51 to 1983-84. The traffic demands data for the registered postal items give the actual demands while the traffic demand for unregistered postal items are the estimates. Given the highly exaggerated data about the traffic demands for unregistered mail which are obtained by a periodic enumeration of a selected number of post offices in the country, IPD has attempted to make realistic estimates of unregistered traffic by using the data on the actual revenue collected from various unregistered mail items.¹ Given these data, we may be in a position to estimate the supply of postal services in post card equivalent units during the period under study: 1950-51 to 1983-84. Since these estimates depend upon the structure of societal preferences as reflected in the regulated prices of postal services and regulated prices have been changing over time, they may not be comparable over time. However, if we rely on the estimates of productivity per rupee to comment on the efficiency of IPD during 1950-51 to 1983-84 we will need estimates of the supply of postal services in comparable units over time.

One method of arriving at comparable estimates over time for the supply of postal services is to have societal preferences

1. The actual revenue collected from the unregistered mail items constitutes approximately 35 per cent of revenue estimated from these items, using data from enumeration during the years 1980-81 to 1985-86.

for postal services (revealed through regulated prices) during a particular year as standards. Adopting, say, the regulated prices of the year 1950-51 as standards, and given the estimates of traffic demands for various services for all the years during 1950-51 to 1983-84, we may obtain comparable estimates of supply of postal services in post card equivalent units. But as mentioned earlier, the data on traffic demands for unregistered mail are not reliable. However, we have reliable data on the revenue realised by the IPD during the period 1950-51 to 1983-84 from Appropriation Accounts of Department of Post and Telegraph. These revenue figures may approximately represent output supplied by the Department of Posts if they are corrected for index numbers of regulated prices of postal services. Column (5) of Table 4.1 and Column (4) of Table 4.2 respectively provide information about the revenue of IPD and price index number of postal services. Using this information, we have estimated the revenue at constant prices and reported it in Column (3) of Table 4.3. The revenue at constant prices so estimated may approximately represent output of IPD in rupees at constant prices and be comparable over time. Now, by dividing the revenue at constant prices by the price of a post card in the year 1950-51, we have made estimates of postal services in post card equivalent units which are comparable over time. These estimates are provided in Column (4) of Table 4.3.

The resource cost of providing postal services in India during a given year can be estimated given the data about capital stock, labour employment, material inputs used, the price of capital services, wage rates and prices of material inputs for IPD. The Annual Reports and Appropriation Accounts published by IPD provide data about capital stock and annual expenditure on wages and salaries and material inputs for IPD, as given in Appendix Table A.3. Given an estimate of value of capital stock at constant prices (K_0^c) and the price of capital services of a rupee worth of capital at constant prices (p_1^c), the cost of capital services for IPD in a given

TABLE 4.1
Estimates of Total Economic Cost and Gross
Revenue at Current Prices of Indian
Postal Department

(Rs. in Million)

<i>Year</i>	<i>Cost of Capital Services</i>	<i>Other Costs</i>	<i>Total Cost</i>	<i>Total Revenue</i>
(1)	(2)	(3)	(4)	(5)
1950-51	0.94	230.0	230.94	210.4
1951-52	0.98	258.7	259.68	220.4
1952-53	0.96	279.1	280.06	241.4
1953-54	1.08	288.0	289.08	265.3
1954-55	1.28	305.3	306.58	279.3
1955-56	1.44	321.3	322.74	294.2
1956-57	1.61	335.2	336.81	327.4
1957-58	4.24	391.7	395.94	348.8
1958-59	2.31	394.7	397.01	378.7
1959-60	3.19	415.5	418.69	392.2
1960-61	2.93	452.4	455.33	407.8
1961-62	3.04	484.3	487.34	456.2
1962-63	3.38	558.8	562.18	509.5
1963-64	3.84	590.9	594.74	566.2
1964-65	3.75	670.1	673.85	593.2
1965-66	4.73	766.6	771.33	660.0
1966-67	4.90	865.8	870.70	701.5
1967-68	5.29	968.1	973.39	742.3
1968-69	5.85	1086.8	1092.65	939.8
1969-70	6.87	1124.0	1130.87	978.1
1970-71	7.59	1242.2	1249.79	1105.4
1971-72	10.40	1321.5	1331.90	1106.4
1972-73	11.21	1461.3	1472.60	1182.5

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<i>Year</i>	<i>Cost of Capital Services</i>	<i>Other Costs</i>	<i>Total Cost</i>	<i>Total Revenue</i>
(1)	(2)	(3)	(4)	(5)
1973-74	11.16	1639.1	1650.26	1342.5
1974-75	10.22	1973.3	1983.52	1420.7
1975-76	9.50	2344.6	2354.10	1678.5
1976-77	10.53	2476.8	2487.33	1939.6
1977-78	12.11	2334.5	2346.61	2069.0
1978-79	13.99	2631.8	2645.79	2391.7
1979-80	14.15	2527.6	2541.75	2592.2
1980-81	15.18	3794.9	3810.08	2708.4
1981-82	16.30	4433.7	4450.00	3094.1
1982-83	19.09	5169.2	5188.29	3780.1
1983-84	23.02	5705.2	5728.22	4345.4
1984-85	28.63	6351.2	6379.83	4414.1
1985-86	32.58	7252.0	7284.58	4768.4

TABLE 4.2

**Index Number of Wage Rate/Capital Cost
Postal Tariff**

<i>Year</i>	<i>Wage Rate</i>	<i>Capital Cost</i>	<i>Postal Tariff</i>
1950-51	100	100	100
1951-52	96.41	110	100
1952-53	97.91	117	100
1953-54	100.58	115	111
1954-55	97.63	114	111
1955-56	95.96	111	111
1956-57	91.44	108	116

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<i>Year</i>	<i>Wage Rate</i>	<i>Capital Cost</i>	<i>Postal Tariff</i>
1957-58	99.08	267	125
1958-59	98.69	127	125
1959-60	96.13	155	125
1960-61	101.84	133	125
1961-62	104.58	133	129
1962-63	111.13	138	129
1963-64	113.08	139	133
1964-65	129.02	134	138
1965-66	151.35	148	138
1966-67	166.36	152	138
1967-68	200.15	160	148
1968-69	200.92	152	171
1969-70	202.95	149	187
1970-71	212.27	151	204
1971-72	227.60	183	213
1972-73	249.67	154	217
1973-74	277.25	154	221
1974-75	334.28	178	250
1975-76	392.65	173	254
1976-77	390.53	173	303
1977-78	398.05	172	303
1978-79	465.41	177	332
1979-80	465.77	181	351
1980-81	521.63	191	371
1981-82	565.33	196	376
1982-83	660.31	209	381
1983-84	760.89	220	433

TABLE 4.3

**Estimates of Economic Cost and Revenue at
1950-51 Prices and Index of Economic Efficiency of
Entire Postal Services**

<i>Year</i>	<i>Total Economic Cost</i>	<i>Total Revenue</i>	<i>Post Card Equivalent of Total Revenue</i>	<i>Revised Productive Efficiency</i>	<i>Index of Economic Efficiency</i>
(1)	(2) (In Rs. million)	(3)	(4) (Nos.)	(5) (Nos.)	(6)
1950-51	230.94	210.4	4488.5	19.44	1.00
1951-52	264.89	220.4	4701.9	17.75	0.91
1952-53	288.52	241.4	5749.8	19.93	1.03
1953-54	289.06	239.1	5100.8	17.65	0.91
1954-55	312.62	251.6	5538.1	17.72	0.91
1955-56	328.20	265.0	5653.3	17.23	0.89
1956-57	353.29	282.2	6020.3	17.04	0.88
1957-58	381.89	279.0	5952.0	15.59	0.80
1958-59	388.82	303.0	6464.0	16.62	0.85
1959-60	417.56	313.8	6694.4	16.03	0.82
1960-61	433.10	326.2	6958.9	16.07	0.83
1961-62	454.89	353.6	7543.5	17.35	0.89
1962-63	467.05	395.0	8426.7	18.04	0.93
1963-64	512.16	425.7	9081.6	17.73	0.91
1964-65	522.30	429.9	9171.2	17.56	0.90
1965-66	517.70	478.3	10203.7	19.71	1.01
1966-67	534.40	508.3	10843.7	20.29	1.04
1967-68	507.51	501.6	10700.8	21.08	1.08
1968-69	564.05	549.6	11724.8	20.79	1.07
1969-70	575.21	523.0	11157.3	19.40	0.99

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Year	Total Economic Cost	Total Revenue	Post Card Equivalent of Total Revenue	Revised Productive Efficiency	Index of Economic Efficiency
(1)	(2) (In Rs. million)	(3)	(4) (Nos.)	(5) (Nos.)	(6)
1970-71	608.03	541.9	11560.5	19.01	0.98
1971-72	606.38	519.4	11080.5	18.27	0.94
1972-73	613.58	544.9	11624.5	18.95	0.97
1973-74	592.04	607.5	12960.0	21.89	1.13
1974-75	597.94	568.3	12123.7	20.28	1.04
1975-76	617.99	660.8	14097.1	22.81	1.17
1976-77	655.40	640.1	13653.3	20.83	1.07
1977-78	608.23	682.8	14139.7	23.25	1.20
1978-79	625.89	720.4	15368.5	24.56	1.26
1979-80	628.39	738.5	15754.7	25.07	1.29
1980-81	812.53	730.0	15573.3	19.17	0.98
1981-82	860.74	812.1	17324.8	20.13	1.04
1982-83	910.01	873.0	18624.0	20.47	1.05
1983-84	873.51	950.9	20285.8	23.22	1.19

year can be estimated as

$$C_k^t = K_0^t P_k^t \quad (1)$$

Following a method prescribed by Jorgenson and Griliches, the price of capital services can be estimated as

$$P_k^t = R_k^t + d_k^t - \frac{P_k}{P_k^t} \quad (2)$$

where R_k^t is the rate of return on capital in the year t ,

d_k^t is the rate of depreciation of capital in the year t , P_k/P_k^t is the rate of appreciation of value of capital, where P_k is dp_k/dt . We have used data on rates of return on long-term government bonds and securities during the period 1950-51 to 1986-87 as estimates of R_k^t . The annual reports of IPD provide data on depreciation. Using these data and the data on capital stock, we have obtained the estimates of d_k^t . Table 4.4 provides the estimates of R_k^t , d_k^t and p_k^t for IPD during the years 1950-51 to 1986-87. In the estimation of p_k^t we have not attempted the correction for the appreciation of the value of capital stock. Table 4.1 provides

TABLE 4.4

**Estimates of Average Rate of Return on Long Term
Government Securities and Rate of Depreciation
and Estimates of Price of Capital Services for IPD**

(in percentages)

<i>Year</i>	<i>Annual Average Rate of Return</i>	<i>Rate of Depreciation</i>	<i>Total</i>
(1)	(2)	(3)	(4)
1951-51	3.11	1.11	4.22
1951-52	3.56	1.10	4.66
1952-53	3.94	0.98	4.92
1953-54	4.00	0.86	4.86
1954-55	4.06	0.73	4.79
1955-56	4.07	0.63	4.70
1956-57	4.02	0.54	4.56
1957-58	3.96	0.97	4.93
1958-59	3.98	1.39	5.37
1959-60	4.13	2.39	6.52
1960-61	4.08	1.53	5.61
1961-62	4.07	1.53	5.60
1962-63	4.30	1.53	5.83

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<i>Year</i>	<i>Annual Average Rate of Return</i>	<i>Rate of Depreciation</i>	<i>Total</i>
(1)	(2)	(3)	(4)
1963-64	4.32	1.53	5.85
1964-65	4.48	1.18	5.66
1965-66	5.07	1.16	6.23
1966-67	5.28	1.14	6.42
1967-68	5.25	1.52	6.77
1968-69	5.04	1.39	6.43
1969-70	5.04	1.25	6.29
1970-71	5.15	1.22	6.37
1971-72	5.37	2.37	7.74
1972-73	5.37	1.12	6.49
1973-74	5.37	1.13	6.50
1974-75	6.16	1.24	7.40
1975-76	6.28	1.02	7.30
1976-77	6.24	1.07	7.31
1977-78	6.24	1.00	7.24
1978-79	6.42	1.05	7.47
1979-80	6.57	1.06	7.63
1980-81	6.96	1.10	8.06
1981-82	7.22	1.07	8.29
1982-83	7.73	1.09	8.82
1983-84	8.24	1.05	9.29
1984-85	9.22	0.96	10.18
1985-86	9.94	1.13	11.07
1986-87	10.19	1.29	11.48

estimates of cost of capital services, labour and other costs and total resource cost at current prices during the period 1950-51 to

1986-87 for IPD. The estimates of real resource cost of IPD have to be obtained by making the corrections in the estimates of cost at current prices for the index numbers of prices of capital services, wages and salaries and material inputs. Table 4.2 provides estimates of index numbers of price of capital services and wages and salaries for the postal department during the period 1950-51 to 1986-87 while the index numbers of prices of material inputs for IPD are assumed to be the wholesale price index numbers of paper and paper products in India. After making the corrections for these index numbers, the real resource cost estimates for IPD are obtained as given in Column (2) of Table 4.3.

2. Estimates of Efficiency

The estimates of output per rupee of resource cost spent by IPD are given in Column (5) of Table 4.3 while Column (6) of the same table provides the index numbers of productivity/efficiency of postal department. Before we comment on the estimates of productivity of IPD, we have to recognise that the supplies of postal services in India are demand constrained. Given the existence of joint costs and the increasing returns to scale in joint production in the provision of these services, there may be an excess capacity in the Department of Posts in a given situation. Therefore, falling productivity of IPD in the fifties may be a reflection of the increasing of excess capacity during this period. The fifties have witnessed the growth of both cost and output for IPD, but output growing at a lower rate than cost. Given the existence of excess capacity in early fifties, the growing demand for postal services in India might have been met efficiently during the later years of the fifties by increasing the expenditure of joint cost nature at a rate lower than the rate of growth of output. However, in the sixties and seventies, even though the costs of IPD and the demands for its services were increasing, it would appear that the demand-constrained supplies of postal services were such that the economies of scale of joint production were exploited beneficially. This phenomenon is reflected in a gradual increase in the output per rupee of resource cost incurred

by IPD during this period. Estimates of productivity of IPD show that the same development has been discerned during the early eighties.

Now, looking at the efficiency index of IPD which is estimated by taking the year 1950-51 as base, there is a fall in the efficiency index during the fifties followed by gradual rise during the sixties. During the sixties, IPD was more efficient than it was in 1950-51 during the four-year period 1965-66 to 1968-69. During the early seventies IPD was less efficient than it was in 1950-51. Since 1973-74, there was a gradual rise in the efficiency of IPD, culminating in the highest efficiency for all the time during the year 1978-79. In fact IPD is 29 per cent more efficient in 1978-79 than it was in 1950-51. After a sudden fall in the year 1980-81, the efficiency of IPD has registered a gradual increase in the eighties.

Thus, a properly computed index of efficiency of overall productivity clearly establishes the proposition that there has been a long-term improvement in the efficiency of the IPD. Once this is accepted it is important to identify the source(s) of this improvement. In order to do this we regressed log of total economic costs (C_t) against log of composite output in post card equivalent units (Q_t) and time (t). The results of that regression are given below. The time period covered is 1950-51 to 1983-84.

$$\ln C_t = 0.616 \ln Q_t + 0.0033 t$$

$$(0.253) \qquad (0.004)$$

$$R^2 = 0.942$$

(Figures in parentheses denote standard errors)

This regression presumes that the sources of improvement in efficiency can be traced to economies of scale and (neutral) technical progress.

We find that the elasticity of cost with respect to output is less than one and significant. Hence clearly there are economies of scale in the IPD. Moreover, the coefficient on time (t) is very small and insignificant. Hence technical progress cannot explain the improvement in efficiency.

We must also note the fact that the increase in efficiency has been fluctuating over the years. These vicissitudes have been ascribed to differences in the rate of growth of output as compared to the rate of growth of costs. These, in turn, are linked to two salient features of the IPD: (i) output is often demand-constrained and (ii) there has been an uneven expansion of capacity and, consequently, joint cost.

3. Conclusions

The commonly held belief that the efficiency of IPD has been falling over time does not find support from the estimates of productivity of the department for the period 1950-51 to 1983-84. The estimates of output of IPD (expressed in post card equivalent units) per rupee of resource cost show that there was a fall in the productivity of IPD during the fifties while it has been gradually rising since the beginning of the sixties. The index of productivity of IPD is 1.19 in 1983-84 with the year 1950-51 as base and the index in fact has become as high as 1.29 in the year 1979-80. There have been increasing returns to scale in IPD as indicated by an estimate of the elasticity of cost with respect to output (amounting to 0.616 during the period 1950-51 to 1983-84). We may therefore consider the inefficiency of IPD as one of scale inefficiency which increased in the fifties but has been followed by gradual decrease since the sixties.