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PAYMENTS FOR TECHNOLOGY BY INDIAN FIRMS : THEIR NATURE, AND
EFFECT ON TECHNOLOGY ACQUISITION AND TECHNOLOGY DEVELOPMENT

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One of the important functions of the Indian Government's technology policy is to regulate the payments for technology imports. To pursue this goal, the policy provides a broad guideline for the examination and approval of the payments in the proposed agreements. The Government's intervention is considered necessary to prevent the technology suppliers from charging "excessive" price for technology. There is, however, increasing criticism of the policy in the recent years as it is considered to limit the supply of technology to the Indian firms. The policy, it is suggested, has prevented Indian firms from importing sophisticated technology and has led to the technological stagnation of the Indian industry.

The debate on the merits and demerits of the controls on the payments is crucial for the formulation of an effective technology policy. Due to the paucity of information, however, it is largely based on impressions. This paper, based on the NCAER-ICRIER Technology Study, is an attempt to analyse the Indian technology payments. It is hoped that this would provide a better understanding of the nature and the extent of technology payments and would lead to a more informed debate on the subject. The paper is based on a study of more than two thousand agreements approved by the Indian Government during 1977 and early 1983.

Section I

Major trends in technology payments

The payments for technology imports are usually made in the form of lump-sum and royalties. The value of lump-sum payments is fixed at the time of the agreement and is paid during the initial stages of the collaboration. The value of the royalty, on the other hand, is linked to the value of production and, therefore, depends largely on the success of a project. In India both royalty and lump-sum payments are commonly used. The lump sum, however, is more common; 80% of the agreements approved during this period

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were found to include these payments. Compared to this, royalties are included only in 60% of the agreements. As is clear from these figures, not all the agreements include both lump-sum and royalties. In fact, more than half of the agreements include only one form of payments. While about 20% of the agreements included only royalties, about in 40% of the agreements the payment was only in the form of lump sum (Table 1).

Table 1

Distribution of collaborations according to modes of payments

	<u>Number of collaborations</u>	<u>%</u>
(i) Cases with Royalty and Lump-sum	1,042	44.4
(ii) Cases with only Royalty	417	17.8
(iii) Cases with only lump-sum	887	37.8
Total	<u>2,346</u>	<u>100.0</u>

The Indian Government closely regulate the amount of the lump sum and royalties. The lump sum payments are fixed at a value which is considered to take into account the current value of the technology, but which does not exceed a certain proportion of the production. The royalty payments are usually limited to 5% of the value of the production. Only in exceptional cases, where the technology being imported is difficult to get or where substantial exports are expected, a higher royalty^{rate} is permitted.³

In view of this policy, it is not surprising to find that the royalty payments in almost all the collaborations are fixed at 5% or less. Only in 1% of the collaborations the royalty rate is found to exceed 5%. However, within this limit, the royalty rates tend to be fixed around 5%, only in one third of the collaborations the rate is 3% or less (Table 2).

* The cases with royalty rates of more than 5% were never many. In the agreements approved during 1956-65, only 3.5% of the collaborations involved royalties of more than 5%.

Table 2Distribution of Collaborations According to Rate of Royalty

<u>Royalty</u>	<u>No. of Collaborations</u>	<u>%</u>
1. 1 - 3%	568	38.93
2. 3.1 - 5%	879	60.25
3. Greater than 5%	12	0.82
TOTAL	1459	100.00

It appears that in the 1980s a higher rate of royalty is being permitted more often than in the past. While in 57% of the agreements approved between 1977-1979 the royalty rate was higher than 3%, in the 1980s this proportion has increased to 63%. However, this increase may not necessarily indicate a definite trend for higher royalties in 1980s. Not only the increase is not very significant, we also find that the collaborations with royalty rates of more than 5% have come down during the 1980s (Table 3A and 3B).

Table 3AChange in the Proportion of Collaborations with Higher (More than 3 percent) Royalty Rate Between 1977-1979 and 1980-1985

<u>Year</u>	<u>Number of collaborations with greater than 3% royalty</u>	<u>Total</u>	<u>%</u>
1977-79	297	519	57
1980-83	594	938	63
Total	891	1457	

Table 3B

Yearly Distribution of Collaborations According to Royalty Rates

Year	1-3%	3.1% to 5%	Greater than 5%	Total
1977	64 (41.03) (11.31)	89 (57.05) (10.13)	3 (1.92) (25.00)	156 (100)
1978	77 (44) (13.60)	96 (54.86) (10.92)	2 (1.14) (16.67)	175 (100)
1979	81 (43.09) (14.31)	105 (55.85) (11.95)	2 (1.06) (16.67)	189 (100)
1980	124 (39.74) (21.91)	186 (59.62) (21.16)	2 (0.64) (16.67)	312 (100)
1981	65 (28.14) (11.48)	165 (71.43) (18.77)	1 (0.43) (8.33)	231 (100)
1982	112 (41.33) (19.79)	158 (58.30) (17.97)	1 (0.37) (8.33)	271 (100)
1983	43 (34.68) (7.60)	60 (64.52) (9.10)	1 (0.80) (8.33)	124 (100)
Total	566 (100)	879 (100)	12 (100)	1457

Figures in brackets indicate %.

A total lump sum of more than 500 crore rupees was approved during 1977-83. The agreements involving these payments, numbering about 1900, had an average lump sum payment of about 28 lakh rupees (Table 4).

Table 4Yearly Distribution of Average Lump Sum for All collaboration

(Rs. lakh)			
Year	No. of collaborations	Total lump sum	Average lump sum
1977	197	3160.98	16.04
1978	200	6210.43	31.05
1979	234	3621.56	15.47
1980	370	10242.29	27.68
1981	315	13252.29	30.36
1982	422	12823.37	22.11
1983	162	3581.96	22.11
TOTAL	1900	52892.93	27.84

However, a very large proportion of the total approved lump sum payments are accounted by a small number of agreements. For example, 73 agreements with lump sum payments exceeding one crore rupees were responsible for 40% of the total payments. If one excludes these 73 cases, the average lump sum payment of the rest of the collaborations significantly comes down to only 17 lakh rupees (Table 5).

Table 5Yearly Distribution of Average Lump sum of Collaborations
(cases with more than 1 crore rupees of lump sum excluded)

(Rs. lakh)			
Year	Number of collaboration	Total lump sum	Average lump sum
1977	193	3041.90	15.76
1978	194	4689.11	24.17
1979	228	2337.60	10.25
1980	356	4585.70	12.80
1981	297	6691.61	22.53
1982	405	7157.53	17.67
1983	154	2737.45	17.77
Total	1827	31240.93	17.09

As seen in the Table 6, the lump sum payments have seen a significant increase in the post 1980 period. While the average payment during 1977-79 was about 20 lakh rupees, during 1980-83 it increased to more than 30 lakh rupees (Table 6).

Table 6

Variation in Average Lump sum Between 1977-79 and 1980-82

Year	Number of collaborations	Total lump sum approved	(Rs. lakh)
			Average lump sum approved
1977-79	631	12993.02	20.59
1980-83	1269	39899.93	31.44
Total	1900	52892.95	27.83

This however, does not signify a general increase in the payments in the 1980s; most of it is due to an increase in the number of collaborations with very high lump sum payments in the 1980s. The number of agreements with lump sum payments of one crore or more, for example, has seen a significant increase in the 1980s. While there were only 16 such cases during 1977-79, their number increased to 57 during the next three and half years. Also, the value of payments in these collaborations is significantly higher in the 1980s; while the average lump sum payments in the 16 cases of 1977-1979 was less than 2 crore rupees, in the 57 cases of 1980-1983 this increased to more than 3 crore rupees. If these cases with very high lump sum payments are excluded, there is only a slight increase in the average lump sum payments ^{before} and after 1980s (from about 16 lakh rupees to about 17 lakh rupees) (Table 7).

Table 7

Variation in Average Lump sum between 1977-79 and 1980-83 after
Excluding Cases with lump sum Payments of more than one crore rupees.

Year	Number of collaborations	Total lump sum	(Rs. lakh)
			Average lump sum
1977-79	615	10060.61	16.30
1980-83	1212	21161.52	17.46
Total	1827	31230.13	17.09

The proportion of collaborations with payments exceeding 10 lakh rupees has also seen a slight increase in the 1980s. While in 33% of the collaborations approved in the pre-1980 period the payments were higher than 10 lakh rupees, in the 1980s 40% of the agreements were for payments greater than 10 lakh rupees (calculated from Table 8).

Table 8

Yearly Variation in Lump Sum Payments (1977-83)

Year	Lump sum ('000 Rs.)				Total
	Less than 50	50-99	100-1000	More than 1000	
1977	5 (2.54) (6.94)	13 (6.60) (16.25)	122 (61.93) (11.95)	57 (28.93) (8.01)	197
1978	7 (3.52) (9.72)	10 (5.03) (12.50)	103 (51.75) (10.10)	79 (39.70) (11.10)	199
1979	13 (5.60) (18.06)	14 (6.03) (17.50)	132 (55.90) (12.94)	73 (31.47) (10.25)	232
1980	14 (3.79) (19.44)	16 (4.34) (20.00)	195 (52.85) (19.12)	144 (39.02) (20.22)	369
1981	11 (3.51) (15.28)	12 (3.83) (15.00)	184 (58.79) (10.04)	106 (33.07) (14.89)	313
1982	17 (4.12) (23.61)	9 (2.18) (11.25)	201 (48.67) (19.71)	106 (45.03) (26.12)	413
1983	5 (3.15) (6.94)	6 (3.75) (7.50)	83 (51.75) (8.14)	67 (41.75) (9.41)	161
Total	72	80	1020	717	1884

Figures in bracket indicate %.

In short, our data shows that while the royalty rates approved during the late 1970s and early 1980s have not seen any significant change in the recent years, the lump sum payments have considerably increased in the 1980s. The trend of large lump sum payments, however, is limited to a small number of agreements. In the majority of collaborations, the increase in the lump sum, if any, is not very significant.

One of the important elements of the Indian Government's technology import policy is to encourage outright purchase of technology without royalty payments. This is considered necessary for reducing the dependence of the Indian firms on the technology suppliers. Our data shows that the policy has been very successful in this respect and outright purchase of technology (without royalty payments) are very common. In the collaborations approved during the late 1970s and 1980s, almost 49% of the agreements included only lump sum payments (See table 1).

The increasing trend for outright purchase of technology, common in the late sixties and early seventies, appears to have stabilised in the recent years*. We do not find any significant increase in the number of such agreements during 1977-1983 (Table 9).

* According to one study the proportion of such collaborations in the late sixties and seventies was as high as 70%.

Table 9Distribution of Collaborations According to Mode of Payments

Year	Royalty only	Lumpsum only	Both royalty and lumpsum	Total
1977	52 (20.6) (12.1)	94 (37.6) (10.7)	104 (41.6) (10.1)	250 (100)
1978	54 (12.6) (12.6)	80 (31.4) (9.2)	121 (47.4) (11.0)	255 (100)
1979	63 (21.1) (14.7)	110 (36.9) (12.5)	125 (42.0) (12.2)	298 (100)
1980	111 (23.1) (25.0)	169 (35.1) (19.3)	201 (41.8) (19.5)	481 (100)
1981	59 (15.0) (13.7)	143 (38.2) (16.3)	172 (46.0) (16.7)	374 (100)
1982	56 (11.7) (13.2)	209 (43.5) (23.0)	215 (44.8) (20.9)	480 (100)
1983	34 (17.3) (7.9)	72 (36.0) (8.20)	90 (45.9) (8.0)	196 (100)
Total	429 (100)	877 (100)	1020 (100)	2334

Figures in bracket indicate %.

It appears that royalty payments are now allowed only in those cases where outright purchase of technology is not possible or where long term association with the collaborator is necessary for the successful transfer and absorption of the technology. In these cases there is no possibility of substituting royalties with lump sum payments.

Our interviews with Indian technology importers suggest that, by and large, they prefer a long term relationship with the collaborator and see royalty arrangements as a guarantee of the collaborator's involvement in the projects. From our interviews we also know that most technology suppliers prefer to reduce their involvement and responsibility and prefer to transfer of technology without royalty payments. The government's preference for outright technology purchases has further helped the technology suppliers to limit their involvement in the project.

Theoretically, both the lump sum payments and royalties are interchangeable, and a low payment in one form can be compensated by higher payment in the other form. In other words, if the technology suppliers consider royalty payments to be insufficient, they may charge larger lump sum payments. The possible relationship between royalties and lump sum payments is particularly relevant in the case of India. As the Government's restrictions have consistently kept the royalty payments low, it may lead the technology supplier to:

- (i) prefer lump sum payments in lieu of or in addition to royalty payments; and
- (ii) charge higher lump sum payments to compensate for low royalty rates.

If such a tendency exists, we can expect that the collaborations with low royalty payments will have a higher incidence of lump sum payments and the latter will be of higher value. Interestingly, we do not find any relationship between the rate of royalty and the amount of lump sum payments (Table 10).

Table 10

Relationship between Royalty Rates and Lump sum Payments

Lump sum (000 Rs.)	Royalty Rates			Total
	1-3%	3.1-5%	More than 5%	
1. Less than 50	11 (3)	17 (3)	1 (12.5)	29
2. 50 - 99.9	13 (4)	25 (4)	0 (0)	38
3. 100 - 1000	198 (55)	300 (59)	3 (37.5)	501
4. Greater than 1000	130 (30)	226 (35)	4 (50)	360
Total	360 (35)	648 (64)	8 (1)	1016

Figures in bracket indicate %.

Even more surprisingly, we find that the low royalty rates are more often associated with the absence of lump sum payments. While 36% of the agreements with royalty rates upto 3% had no lump sum payments, 26% of the agreements with royalty rates of more than 3% were without lump sum payments. In other words the low royalty rates are not found to be associated with a greater reliance on lump-sum payments.

Section II

In Section I we have described the nature of the technology payments prevalent in India in the late seventies and the early eighties. How are these payments related to various aspects of the collaboration? The following section is mainly devoted to a discussion of these relationships and their implications.

II.1 Industrial Sector

The scale of production, the cost of technology transfer and the market of technology vary considerably between industrial sectors and can

be expected to affect the price of the technology. Also, the Indian technological capabilities differ from sector to sector and are likely to be reflected in the Indian technology payments. While the scale of production and the market for technology (in terms of the number of potential suppliers) is more likely to influence the rate of royalty, the cost of technology transfer and the Indian technology capabilities would largely influence the lump sum payments.

We do find significant and interesting differences in the rates of royalty between various sectors. The collaborations in the electronics and the mechanical sectors are found to have a greater incidence of higher royalty rates. In more than two third of the collaborations in both the sectors the royalty rate is higher than 3%. Compared to this, in metal products sectors, where the collaborations with low rate of royalty are most common, only 44% of the agreements the royalty rate is higher than 3%. Also, a majority of collaborations in all the sectors except electronics and mechanical engineering are found to have less than 3% royalty (Table 11).

Table 11
Relationship Between Industrial Sectors and Royalty Rates

Sectors	Royalty			Total
	1 - 3%	3.1 - 5%	Greater than 5%	
1. Chemical	93 (16.43) (53.45)	79 (9.81) (45.40)	2 (16.67) (1.15)	174 (100)
2. Mechanical	102 (32.16) (30.90)	403 (46.01) (60.42)	4 (33.34) (0.60)	509 (100)
3. Metal Products	54 (9.54) (55.67)	42 (4.79) (43.30)	1 (0.33) (1.03)	97 (100)
4. Electrical	130 (22.97) (50.19)	120 (14.61) (49.42)	1 (6.33) (0.39)	259 (100)
5. Electronics	23 (4.06) (29.87)	53 (6.05) (60.83)	1 (6.33) (1.30)	77 (100)
6. Miscellaneous	84 (14.84) (32.56)	171 (19.53) (66.26)	3 (25) (1.16)	258 (100)
Total	566 (100)	875 (100)	12 (100)	1453

The low royalty rates in these sectors are common because the technology in most cases is stabilised and also because the Indian markets for products in these sectors are comparatively large. On the other hand, the technology for electronics has seen rapid advances in the recent years and its availability is comparatively restricted. Also, the market for electronic products in India is small. The royalty rates in this sector, not surprisingly, are high.

The lump sum payments are more common in the chemicals and electronics. They are comparatively uncommon in mechanical and electricals (Table 12).

Table 12

Relationship Between Sector and Mode of Payment

Sector	Both royalty and lump sum	Only Royalty	Only Lump sum	Total
1. Chemical	118 (32.24) (11.47)	56 (15.30) (13.15)	192 (52.16) (22.07)	366 (100) (15.76)
2. Mechanical	397 (47.32) (38.66)	191 (22.77) (44.03)	251 (29.91) (20.05)	839 (100) (36.12)
3. Metal Products	71 (42.77) (6.94)	26 (15.66) (6.10)	69 (41.57) (7.93)	166 (100) (7.14)
4. Electrical	205 (56.32) (19.96)	54 (14.84) (12.60)	105 (28.85) (12.07)	364 (100) (15.66)
5. Electronics	66 (40.18) (6.48)	11 (6.03) (2.50)	60 (43.79) (6.90)	137 (100) (5.90)
6. Miscellaneous	170 (37.69) (16.55)	60 (19.52) (20.56)	193 (42.79) (22.10)	451 (100) (19.42)
Total	1927 (44.21) (100)	426 (10.34) (100)	670 (37.45) (100)	323 (100) (100)

we find significant sectoral differences in the average lump-sum payments. The average lump sum payment for the electrical sector is about 17 lakhs (compared to 29 lakh rupees, the average of all collaborations) and is the lowest. The collaborations in the mechanical engineering sector also shows a lower than average value of lump sum. In all other sectors (chemicals, electronics, metal products), average lump sums are higher (Table 13).

Table 13

Relationship between Sector and Average Lump Sum.

Sectors	(Rs. lakhs)							Average for 1977-83
	Year lump sum							
	1977	1978	1979	1980	1981	1982	1983	
Chemicals	23.42	36.41	3.05	36.35	39.96	84.05	27.40	43.16
Mechanical	15.17	19.51	0.77	24.98	51.07	20.98	27.09	25.05
Metal Product	15.50	67.14	23.15	50.52	2.72	48.70	13.79	32.07
Electricals	3.06	0.51	11.66	12.40	35.30	10.37	13.52	16.07
Electronics	44.48	06.47	12.94	42.09	42.07	34.51	15.11	37.70
Miscellaneous	14.09	23.50	11.55	24.62	55.01	17.22	22.58	24.44
Total	16.05	31.05	15.47	27.60	42.47	30.60	22.11	29.39

Have the payments in the various sectors changed over the years? And are there any differences in these changes? We find that the average lump sum payments have indeed changed in the 1980s. While the average payments have come down in the case of metal products and electronics, they have increased in chemicals, mechanical engineering and electricals (Table 14).

Table 14

Changes in the Sectorwise Average Lump Sum
Payments Between 1977-79 and 1980-83

Sector	Average Lump Sum (Rs. lakhs)		% change
	1977-79	1980-83	
Chemical	33.80	40.39	+ 46
Mechanical	14.33	30.72	+ 114
Metal Products	37.92	25.30	- 33
Electricals	9.60	21.20	+ 120
Electronics	50.06	33.04	- 32
Miscellaneous	15.72	29.09	+ 85
Total	28.59	31.44	+ 52

Similar changes are observed in royalty rates. While the proportion of collaborations with higher rates of royalty (more than 3%) has generally increased in the 1980s, this has seen a decline in the case of metal products and electronics. The decline is particularly interesting in the case of electronics where the proportion of such cases has come down from 40% to 36% (Table 15).

Table 15.

Changes in the Proportion of Collaborations with High Rate (more than 3%) of Royalty between 1977-79 and 1980-83

Sectors	Number of collaboration with royalty rate of more than 3 per cent		Percentage	
	1977-79	1980-83	1977-79	1980-83
Chemicals	21 (156)	60 (264)	15	23
Mechanical	136 (310)	271 (567)	43	40
Metal Products	73 (20)	111 (23)	27	20
Electricals	35 (126)	91 (256)	30	36
Electronics	15 (37)	39 (107)	40	36
Miscellaneous	67 (196)	107 (323)	34	33
Total	297 (879)	591 (1629)	31	36

Figures in brackets indicate total number of collaborations.

The decrease in the average lump sum and royalty rates for metal products in recent year is, to some extent, a reflection of greater Indian capabilities in this area. The Indian metal industry is relatively well developed and technology imports in the recent years are of limited nature to acquire specialized know-how. Also, the government's current policy of permitting purchase of designs (involving relatively small payments) have been particularly popular with the firms in this sector. The high incidence of such collaborations is partly responsible for the low lump sum value for the metal products in the 1980s.

The decrease in the payments in the electronics collaborations, however, is surprising. The average payments in this sector has come down from 50 lakh rupees in 1977-79 to 34 lakhs in 1980-83 (table 14). In view of the increased Indian emphasis on setting up a modern electronics industry, the decrease in the payments for technology in this sector is striking. Unless the international price for technology in this sector is undergoing a significant decline in the 1980s, our data suggests that the Indian electronics industry is importing smaller packages of out-dated technology than in the past.

11.2 Duration of the Agreement

Duration of an agreement can be expected to have an important influence on the technology payments. In the longer agreements, where the payments may be spread over a longer period, a lower initial payment and a lower rate of royalty may be acceptable to the technology supplier. On the other hand, collaboration for a limited duration can be expected to encourage higher initial payments and a higher royalty rate.

Our data shows that this is not true in the Indian collaborations of the late 1970s and early 1980s; in these collaborations shorter duration agreements, generally, involve smaller technology payments. While only in 37% of the shorter duration agreements (upto 5 years) the lump sum payments exceeded 10 lakh rupees, similar payments are found in 64% of the longer duration agreements (Table 16).

* This is possible as the industry today is more competitive and the technology is held less exclusively than it was in the 1970s. We, however, do not have any definite information on this.

Table 16.

Relationship Between Duration and Lump Sum Payments

Duration	Lump sum payments ('000 rupees)				Total
	Less than 50	51-100	101-1000	More than 1000	
1 - 5 years	35 (3)	41 (4)	601 (57)	400 (37)	1077 (100)
6 - 10 years	2 (1.5)	3 (32.5)	47 (32.5)	92 (64)	144 (100)
More than 10 years	0	0	0	1 (100)	1 (100)
Total	37	44	648	493	1224

Figures in brackets indicate %.

Also, while the average lump sum payments for collaborations with smaller duration is about 26 lakh rupees, the average of those with longer duration is 40 lakh rupees (Table 17).

Table 17.

Relationship Between Duration and Average Lump Sum

Duration	No. of collaborations	(Rs. lakh)
		Average lump sum
1. 1 - 5 years	1283	26.56
2. 6 - 10 years	145	40.75
3. More than 10 years	2	32.76
Total	1230	29.19

The incidence of higher royalties is also found to be greater in the longer duration agreements. While the rate of royalty is high (more than 3%) in 60% of the short duration collaborations, it is high in 60% of the longer duration collaborations (Table 10).

Table 10Relationship Between Duration and Royalty Rates

Duration	Royalty			Total
	1-3%	3.1-5%	Greater than 5%	
1. 1-5 years	491 (39.75)	734 (59.44)	10 (0.01)	1235 (100)
2. 6-10 years	42 (31.11)	92 (60.15)	1 (0.74)	135 (100)
3. Greater than 10 years	1 (100)	0 (0)	0 (0)	1 (100)
Total	534	826	11	1371

We also do not find evidence to suggest that the shorter duration of agreement lead^s to greater reliance on lump sum payments. In fact our data suggests that the longer duration agreements more often rely on lump-sum payments. While in only 21% of the short duration collaborations the payments are solely in the form of lump sum, the proportion of such cases in the longer duration agreements ^{is} much higher; in 36% of the long duration collaborations only lump sum payments are included.

This, however, does not suggest that the shorter duration of an agreement is itself responsible for less reliance on lump sum payments or lower lump sum values, or that the Indian Government's policy of reducing collaboration duration has been instrumental in bringing down the technology payment. The explanation perhaps lies in the fact that longer duration agreements are permitted only when the collaboration is for a bigger project, or when the technology purchase is for a large range of products or when the technology is fast changing and a long-term

association with the collaborator is necessary to receive new developments. In these instances the transfer cost is likely to be greater than in the cases involving transfer of stabilised technology for a narrow range of products. The price of the former, not surprising, is usually higher.

41.3 Indian Firm's Size

The size of the technology importer may influence both the mode and the amount of technology payments. The small firms may find it difficult to pay high initial payments and would prefer either small or no lump sum payments. On the other hand, as the small size would limit firm's sales and, therefore, the royalty payments, the technology supplier would prefer to increase its return through high lump sum. Also, when they agree to transfer technology to small firms on royalties, the technology suppliers would prefer higher rate of royalty than in their agreements with larger firms.

Our data shows that the lump sum payments are more frequent in the collaborations involving larger firms. While only 20% of the collaborations involving small firms involve only lump sum payments about 40% of the collaborations of larger firms do so (Table 19).

Table 19

Relationship Between the Size and Collaboration with lump sum only

Size (Rs. lakhs)	Number of collaborations with lump sum only	Total Collaboration	Percentage
Less than 50	35	176	20
50 - 99.9	7	33	21
100 - 499	22	60	37
500 - 999	8	20	40
1000 and more	9	23	39

We, however, find that there is no relationship between the size of the Indian firm and the rate of royalty (Table 20). The rate of royalties in collaborations involving smaller firms (paid up capital of less than one crore rupees) and larger firms (paid up capital of 1 crore rupees or more) is equally distributed. While 40% of collaborations of both sizes involve royalty rates upto 3%, the rest involve royalty rates greater than 3% (calculated from Table 20).

Table 20

Relationship Between the Firm's Size and Royalty Rates

Size (Rs. lakhs)	Royalty Rates			Total
	1 - 3%	3.1-5%	Greater than 5%	
Less than 50	40 (51.96) (37.30)	65 (59.63) (60.75)	2 (66.67) (1.07)	107 (100)
50 - 99.9	13 (16.00) (56.52)	10 (9.17) (43.40)	0 (0.00)	23 (100)
100 -	14 (13.10) (40.00)	20 (10.36) (57.14)	1 (33.33) (2.06)	35 (100)
500 - 999	4 (5.19) (36.36)	7 (6.42) (63.64)	0 (0.00) (0.00)	11 (100)
1000 and more	6 (7.32) (46.15)	7 (6.42) (53.05)	0 (0.00) (0.00)	13 (100)
Total	77 (100)	109 (100)	3 (100)	109

The value of lump sum payments, however, are closely related to the size of the Indian firm. The smaller firms are more often found to be involved with lower lump sum payments. While the average lump sum in the collaborations of small firms (firms with a paid up capital of less than one crore rupees) is about 10 lakh rupees, it increases to about 60 lakh rupees

in the case of larger firms (firms with paid up capital between 10 crore and 100 crore rupees). However, it is interesting to note that the average lump sum payments in collaborations involving very large firms (with paid up capital of more than 100 crores rupees) is also low. In fact it is even lower than the average lump sum in the agreements of medium size firms (paid up capital between 5 crore to 10 crore rupees) (Table 21).

Table 21

Relationship Between Size and Average Lump Sum

Size (Rs.)	No. of collaborations	(Rs. lakhs)
		Average lump sum
1. less than 50	114	10.41
2. 50-99.9	23	19.47
3. 100-499	44	40.79
4. 500-999	14	50.92
5. More than 1000	19	35.52
6. Total	214	27.37

The explanation for the comparatively low lump sum paid by very large firms lies in the fact that it is only in their cases that the market share had played a deciding role in determining the price of the technology. Their very large share of the Indian market has enabled these firms to get technology for relatively lower lump sum payments.

In short, we find that the small Indian firms are less often involved with "lump sum only" agreements, and their lump sum payments are often small. On the other hand, the larger firms more often purchase technology with lump sum and the value of lump sum payment is higher in their agreements.

The royalty payments, however, are not influenced by the size of the Indian technology importers.

These findings confirm our view, based on interviews with the Indian technology importers, that a majority of Indian firms (most of whom are small) are prevented from importing bigger and comprehensive packages of technology due to their inability to pay for them. As the study indicates, often these firms are expected to pay for their technology in the form of lump sum (the combined pressure of the technology supplier and the Indian government ensures this). As their financial resources do not allow them to afford high lump sums, they are forced to opt for smaller but cheaper technology imports. These firms require greater technological support from their collaborators to absorb technology, but such support is usually not available through the import of small and cheap technology packages. As a result, the possibility of technological upgradation of these firms are severely restricted. The current government policy of preferring lump sum payments to royalty payments clearly make it difficult for the small firms to import larger and more comprehensive technology packages. This, we feel, needs to be replaced by policy which encourages agreements with royalty payments, which will allow these small firms to import technology, at what could be considered, deferred payments.

II.4 Technology Supplier's Country

A number of factors such as the domestic industrial structure, the predominance of innovative firms and the industrial and the technological image of a country may influence the technology payments. Do such

* According to our data more than two third of the collaborations in India are undertaken by firms with a paid up capital of less than one crore rupees.

inter-country differences exist in the technology payments from India? Our data shows that these differences do exist and they are especially significant in the incidence and the value of lump sum payments.

While in the case of Belgium, Denmark and Japan a high proportion of collaborations only includes lump sum payments, in the case of US, Sweden, UK and France such collaborations are fewer (Table 22).

Table 22

Countrywise Distribution of Cases with Different Modes of Technology Payments in Selected Countries

Country	Cases with only royalty	Cases with only lumpsum	Case with both R & L	Total
Austria	5 (17.9)	13 (46.3)	10 (35.7)	12 (100)
Belgium	1 (9.1)	7 (63.6)	3 (26.3)	11 (100)
Denmark	4 (30.3)	7 (53.3)	2 (15.4)	13 (100)
France	27 (19.0)	52 (36.6)	63 (44.4)	142 (100)
West Germany	66 (14.9)	165 (37.1)	214 (48.1)	445 (100)
Holland	11 (23.9)	19 (41.3)	16 (34.3)	46 (100)
Italy	16 (15.0)	45 (41.7)	47 (43.5)	108 (100)
Japan	21 (11.5)	79 (43.2)	33 (45.4)	103 (100)
Sweden	11 (20.4)	19 (35.2)	24 (44.4)	54 (100)
Switzerland	22 (13.6)	65 (40.1)	75 (46.3)	162 (100)
UK	101 (21.9)	157 (34.0)	204 (44.2)	462 (100)
USA	115 (23.6)	141 (28.9)	232 (47.5)	488 (100)
Yugoslavia	2 (20.6)	1 (14.3)	4 (57.1)	7 (100)

Figures in brackets indicate %.

We also find large inter-country differences in the value of technology payments; while technology from Belgium has involved the lowest average lump sum payments, the technology from France, which is the most expensive, has cost 4 times more (Table 23).

Table 23

Average Lumpsum for Selected Countries

(Rs. lakh)

Country	No. of collaborations	Total lump sum	Average lumpsum
1. Austria	23	589.00	25.60
2. Belgium	10	103.27	10.32
3. Denmark		190.34	22.03
4. France	113	5035.15	46.33
5. FRG	314	9045	10.03
6. Holland	35	577	
7. Italy	90	234.56	26.01
8. Japan	159	4402.39	
9. Sweden	43		34.37
10. Switzerland	139	5019.77	36.11
11. UK	350	10709.24	29.91
12. USA	367	11301.79	31.01
13. Yugoslavia	5	155.02	31.00

The high averages lumpsum payments for a country, however, does not necessarily indicates that the technology purchases from that country are, in general, expensive. In many of these cases the higher average lump sums

are explained by a large number of big projects involving very high lump sum fees. Further analysis in fact shows that in a majority of the collaborations, irrespective of the country, the lump sum payments are comparable. Some countries (such as France), however, are disproportionately involved with very large projects in India and this has inflated their average lump sum payments significantly.

It has been suggested that some countries (particularly Japan) were earlier reluctant to transfer technology to India due to the Indian Government's rigid control of technology payment and are now showing greater interest in the Indian market. This, it is claimed, is the result of the relatively liberal technology policy being currently pursued. We, however, find that the average lump sum payments in the Indo-Japanese collaborations are not high and are comparable to payments for other countries. They have also not seen any significant increase in the recent years. In view of this we find it difficult to accept the view that the reluctance of the Japanese firms to enter the Indian market was influenced by the Indian government's technology payment policy, or that the present liberal policy has been responsible for attracting Japanese technology which previously could not be imported. It is more likely that the changed international economic environment, which has forced Japanese firms to look for new markets, is responsible for the increased Japanese interest in the Indian market.

Conclusions

A very large proportion of the technology imports to India include lump sum payments. While in more than 40% of the agreements the lump sum payments were approved along with royalties, in another 40% of the agreements, only lump sum payments were approved. The figures clearly suggest that

Indian government's preference for purchase of technology without royalty payments has been very successful. The influence of the government policy has been further strengthened by a similar preference for lump sum payments shown by the technology suppliers. As a result, it is very difficult for the Indian firms to import technology without lump sum payments. The need to pay lump sum payments obviously limit^s the size of the technology package which Indian firms (most of whom are small and cannot pay large lump sums) can import. In view of this, a suitable change in the government policy, which permit^s the Indian firms particularly of smaller size and resources, to import large technology packages, requires serious consideration.

Our analysis shows that while a very small number of collaborations involve very large technology payments, a great majority of the collaborations involve small payments. Also, while the number of agreements with very large payments, and their payment values, have significantly increased in the 1990s, the value of the payments in a majority of the collaborations has seen little change. It appears that, in spite of the relatively liberal government policy in the 1990s to permit higher payments, the technology importers, by and large, are not paying more for their technology.

As earlier reported, our research suggests that the technology imports by most Indian firms are of limited nature. The technology is usually imported for the limited purpose of setting up manufacturing facilities and for training of the Indian technicians in the operation and the maintenance of the plant. Very rarely the imports are undertaken by firms to become technologically dynamic and innovative. The limited purpose for which the technology is imported does not necessitate import of expensive and large packages of "know-why" technology and most Indian firms consider import of

small and cheaper packages of "know-how" technology sufficient. The tendency to import smaller technology packages is further strengthened by the inability of most Indian firms to pay more for their technology imports. A large number of the Indian technology importers are small, who perhaps cannot afford higher payments. They are particularly unable to make larger lump sum payments, and the lump sum payments which they ^{afford can} only buy small technological packages.

We feel that a more liberalisation in the government policy alone will not change the nature of the technology imports. As a very large sector of the Indian industry is either not willing to or not able to (or both) pay more for their technology, a liberalisation in the government policy can only be expected to have a marginal effect. While some firms, as shown by our study, will go for expensive and more comprehensive packages of technology, most firms will continue to buy cheaper and limited technology packages. It is more important to create conditions where most firms want to import and can afford to pay for, more comprehensive technology packages. In the absence of these conditions, a liberal policy would not only fail to improve the overall technological competence of the Indian industry, it would also increase the gap between a small minority of firms with advanced technological and manufacturing capabilities and the rest of the industry. The benefits of the import of expensive technology packages will be severely restricted because of the low technological competence of the rest of the industry. The process is already evident in a number of industries, where manufacturers of the product have imported very large and comprehensive technology packages, but the component and raw material suppliers have not able to update

* Their technology. The unavailability of suitable supply from local sources will either force the firms to bring down its quality standards (thereby defeating the purpose of the import of expensive and sophisticated technology) or to rely on imported components until local ancillaries update their technology. The latter, we feel, can be greatly assisted in this direction if they are permitted to import technology on royalty payments, with or, preferably, without, lump sum payments.

* For example automobiles.⁹

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