Measuring the Gains from Trade—A Case Study of Pakistan's Trade with India

by

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The recent literature on the theory of tariffs and trade restrictions has emphasized the optimality of free trade policies for both developed and developing countries. There are exceptional cases in which trade restrictions can be justified—when, for example, a country has monopoly power in trade or when certain "second-best" conditions are met.[1] In general, however, it is believed that a country which imposes restrictions on its trade suffers a decline in real income. A number of studies for both developed and developing countries have estimated the economic benefits that would accrue to these countries from the elimination of all trade restrictions.[2]

The purpose of this paper is to provide a method for measuring the economic benefits that a country would receive as the result of the elimination of a country-specific restriction while maintaining all restrictions applying to commodities. Methods of measuring the static gains to a country removing commodity restrictions are already well known and need no further elaboration. The elimination of a country-specific restriction on trade, however, presents a slightly different problem of measurement since the liberalization may affect only one portion of the country's trade and give rise to foreign exchange savings as well as the familiar gains from reduced producers' inefficiency and increased consumers' surplus.

Our interest in measuring the gains from the removal of one country's barriers to trade with another country is more than academic. Since 1965 no trade has taken place between India and Pakistan. There have been no estimates of economic losses to either country from the mutual ban on trade, though there are grounds for suspecting that these losses may be considerable.

[1]For a survey of the arguments for trade restrictions see Bhagwati [2]
[2]See, for example, Johnson [5] and Harberger [4].

Two large neighboring countries, and especially two sharing a long, densely populated border, have a natural basis for trade. The potential volume of trade between India and Pakistan is not apparent from the past trade statistics of either country. In the pre-Partition era, records were not kept on the trade between the two regions now forming India and Pakistan, but this trade is believed to have been extensive, based as it was on the natural complementarity of the agricultural Punjab and the Industrial southern states. After partition, trade statistics show only small amounts of trade because both countries placed quantitative restrictions on trade with one another. After 1965, of course, there was no recorded trade between India and Pakistan.

A recent study by one of the authors (M. Afzal [1]) found that the trade potential between the two countries was possibly quite important. Using unit price data for imports and exports and making allowances for transporation costs, he showed that many of Pakistans exports could be sold in India at prices below those paid by India for imports of similar products from third countries. Similarly, many of India's exports have a price advantage in the Pakistan market vis-a-vis the prices currently being paid to Pakistan's import suppliers. Perhaps not surprisingly, the exports of Pakistan that are price-competitive in India are primarily agricultural goods, while India's price competitive exports to Pakistan are principally industrial products. In spite of Pakistan's rapid industrialization, the historical complementarity of the two regions apparently still persists.

The objective of this paper is, therefore, to provide a method for measuring each country's gains from removing a country specific trade restriction and to provide some preliminary estimates of the level of gains which Pakistan might anticipate from a renewal of trade relations with India. In the first section of the paper, we set out the analytical basis for calculating Pakistan's gain from normal trade relations. The same analytical approach applies, a fortiori, to India's gains from trade with Pakistan. In the second section of the paper, we apply this analytical approach to some "representative" data based on Afzal's study. It would of course be desirable to use the most exact data available rather than approximate figures, but this would lead to spurious accuracy in our estimates. Studies which draw conclusions for hypothetical situations must inevitably base their estimates on assumptions about which no factual evidence is available. This study is no exception. Apart from the list of products that would be traded and their price advantages—data which must be inferred from present conditions and which therefore may not hold in the future—several other types of information and assumptions are needed:

1. Values of the elasticities of domestic supply and demand for the goods entering trade between the two countries.

2. The assumption that imports from, and exports to, the formerly prescribed country would be governed solely by market forces. It must be assumed, for example, that there are no barter arrangements with third countries which have a prior claim on import purchases or export sales.

3. All other commodity restrictions are continued at their previous levels.

4. The renewed trade does not affect the balance of payments of either country in a way requiring adjustments in the exchange rate.

While additional research might produce more precise factual information on some of these assumptions, it is unrealistic to believe that information on all these assumption can be known in advance. Some of the information, needed for the measurement of the welfare gain will be known only after agreement to re-open trade between the two countries has been reached. Thus for our purposes, we have preferred to use reasonable, but very approximate, data to estimate Pakistan's potential gains from trade. Our estimates should, therefore, be regarded as illustrative. While our estimates do indicate an order of magnitude of the gains from renewed trade with India, they should be considered as only that and not as predictions.

II. THE GAINS FROM TRADE

Following economic convention, the benefits arising from any reduction of trade barriers can be classified into the two categories of static and dynamic gains. Static gains occur when trade liberalization causes producers to reallocate their resources in a way that results in a higher level of real income and consumers to reallocate their consumption expenditures to reach a higher level of utility. When trade barriers against imports are relaxed, the prices of imports fall (assuming no terms-of-trade effects), and the consumers' surplus associated with those goods increases. While producers of import competing goods suffer a loss of income from the decline in prices, this is more than offset by the gain in consumers' surplus. In a similar fashion, if the lessening of trade restrictions, either in the home country or abroad, leads to a higher price for exports, incomes of the producers of exportables will rise. Domestic consumers of exportable items will register a welfare decline because of the higher local prices of these items. Because the production of exportables exceeds con sumption, the net welfare effect for the country of this price increase will be positive. The magnitude of the welfare gains from increased imports and exports can he measured if the magnitudes of the changes in both the prices and quantities of imports and exports are known.

Dynamic gains from free trade are much more diverse and difficult to measure.[3] The expansion of exports following a liberalization of trade may lead to increasing returns in the production of exportables, and the expansion of imports may be accompanied by price reductions arising from the attainment of scale economies in the import supplying country. Another dynamic effect involves the behaviour of producers with regard to changes in their profits.[4] If producers' efforts to maintain efficiency are inversely related to their earnings, then reduced profitability in the import-competing sector may result in greater efficiency in the use of resources in that sector. By the same token, increased earnings of exports may have a negative influence on efficiency. Whether such a behavioural relation exists between profits and effort is still conjectural; and if it exists, the net effect of trade liberalization on welfare via this effect may be either positive or negative, depending on the relative strength of the effort-profit relationship in the two sectors and the relative size of the two sectors. Other dynamic effects can be identified but their effects cannot be readily quantified. In view of the problems of measuring dynamic effects, they

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[3]Krauss [6] notes correctly that some "dynamic" effects are really static effects, but for the purposes of this discussion we employ the common, if misleading, meaning of the term.
[4]On this point see Corden [3]

will be excluded from this study with the caveat that any general assessment of the gains from trade liberalization would necessarily have to include them.

One point worth re-emphasizing at the outset of this study is that the type of trade liberalization considered here is a very special kind. If one country (the "home" country) lifts all restrictions on the import and export trade with another country (the "restricted" country), we are assuming that all other trade restrictions—i.e. tariffs, quotas and export taxes remain in effect. The principal gains from the elimination of geographical restrictions will be the diversion of some imports from high cost to lower cost (i.e. the restricted country) suppliers and the redirection of some exports to the more remunerative market of the restricted country. As a result, the question of whether this particular form of trade liberalization involves a movement away from, or towards, optimal trade restrictions can be to a large extent avoided.

The static gains from removing the barriers to trade with a specific country can be assessed using the following partial equilibrium analysis of supply and demand. As the removal of barriers is assumed to affect both exports and imports, the overall gains will consist of the separate gains arising from these two sectors. We first examine the welfare effects occurring through increased imports.

Diagram I portrays the supply and demand of a typical importable product for which the restricted country would have a price advantage in the home country. DD represents the constant utility demand curve for the importable product, while S_r and S_w are the supply curves of the restricted
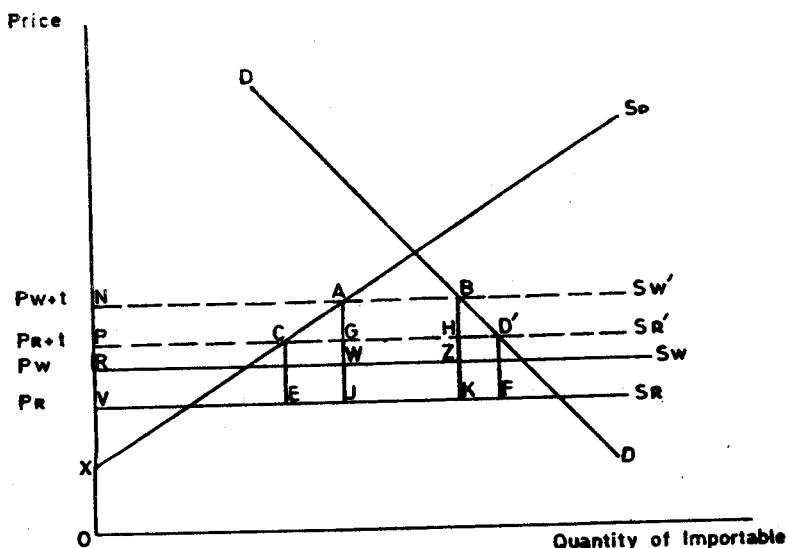

Diagram 1
Demand, Production and Imports
in the Home Country

country and the rest of the world, respectively. S_D is the domestic supply curve of the importable good. A specific tariff, t, is assessed on imports, making S'_w and S'_r the relevant supply curves for importables from the rest of the world and the restricted country. Because the country-specific restrictions are assumed initially, equilibrium is at B. The price of importables is P_w+t. Domestic suppliers account for NA of total consumption, while AB is imported.

Elimination of the country-specific restriction shifts the equilibrium to D'. The price falls by the amount of the cost advantage, NP (equal to RV)[5]. Total consumption and imports rise while domestic production declines. There are three types of welfare effects associated with this fall in the domestic price of importables:

1. Change in Consumers' Surplus—an increase equal to NBD'P
2. Change in Producers' Surplus—a decrease equal to NACP
3. Change in Tariff Revenue—a net gain equal to CGJE+HD'FK[6]

The total welfare gain is thus the sum of the areas of two trapezoids, CAJE and BD'FK, and the rectangle ABHG. If we let the cost advantage be represented by d, the combined area of these two trapezoids can be measured as the sum of their bases (d+t+t) multiplied by one half of their altitude, which is the change in imports (EJ+KF). The area of the rectangle is the original quantity of imports, AB, multiplied by d.

Thus the welfare gain in the import sector, W_m, is

1. $W_m = 1/2(d+t+t) \cdot \triangle M+d.M$, where M and $\triangle M$ are, respectively, the initial quanity of imports and the change in imports.

The change in imports is the result of changes in consumption and changes in domestic supply, whose values are determined by the elasticities of demand and supply and by the changes in domestic price. Writing C for the initial level of consumption (MB in Diagram 1) and S for initial domestic supply (NA).

2. $M = C-S$
3. $\triangle M = \triangle C-\triangle S$

Letting $n = \dfrac{\dfrac{\triangle C}{C}}{\dfrac{\triangle P}{P}}$ and $e = \dfrac{\dfrac{\triangle S}{S}}{\dfrac{\triangle P}{P}}$, then

[5]We assume here that the supply price of the restricted country remain unchanged. The consequences of the assumption are discussed below.

[6]The net change in revenues is equal to the revenues after the lifting of the ban (CD'FE) less the revenues before lifting the ban (ABZW) The net gain is the sum of the two rectangles, CGJE and HD'FK. This is so because GHZW is common to both large rectangles and ABHG is equal to WZKT. The two trapezoids are composed then of the net revenue gains (the two rectangles CGJE and HD'FK) and the net gains in reduced producers' inefficiency (the triangle AGC) and the increase in consumers' surplus (the triangle BD'H).

4. $\triangle M = n.C = \dfrac{-d}{P_w + t} - e\,S.\ \dfrac{-d}{P_w + t}$

letting $r = \dfrac{d}{P_w}$ and $T = \dfrac{P_w + t}{P_w} - 1$

5. $W_m = (1/2d + t)\ \left[\ \dfrac{e\,.S.r.}{1 + T} - \dfrac{n.C.r}{1 + T}\ \right]\ + r.P_w.M$

Since $P_w(1 + T) = P_w + t$

6. $W_m = (1/2.d + t)\dfrac{r}{1 + T}\ \dfrac{[\ e.S - n.C\ ]\ (P_w + t)\ + r.P_w\ .M}{P_w\ (1 + T)}$

Rearranging and simplifying,

7. $W_m = \dfrac{r.(\tfrac{1}{2}r + T)\ [\ e.Vs - n.Vc\ ]}{(1 + T)^2}\ + r.Vm$

where Vs and Vc are the values of domestic consumption and production at domestic prices and V'm is the value of imports at cif prices. Equation 7 can be further simplified by recognizing that $Vc - Vs + V' + Rm$ where V'm is the value of imports at cif prices and R is the value of tariff revenues. Thus,

8. $W_m = \dfrac{r.(\tfrac{1}{2}r + T)\ [(e - n)\ Vs - V'_m - n.R_m\ ]}{(1 + T)^2}\ + r.Vm$

The welfare effects of the elimination of the barriers on exports to the restricted country can be considered in an analogous fashion. Diagram 2 portrays the supply and demand conditions facing the home country's exports. DD and $S_D S_D$ are the domestic demand (constant utility) and supply curves. RD_R and MD_W are, respectively, the demand curves of the restricted country and the rest of the world for the home country's exports. A specific tax, t', is levied on exports in an amount equal to RS(=NV). Initially, with the country-specific restriction on exports, the effective demand curve for exportables is DFED'w. Total production is VE, domestic consumption is VF, and FE is exported. Relaxing the ban shifts the effective demand curve to DCQD'ᵣ. The domestic price rises by the amount of the cost differential (SV). Exports rise to CQ, while domestic consumption falls to SC.

The types of welfare effects from the elimination of the restriction on the destination of exports are identical to the case of importable goods.
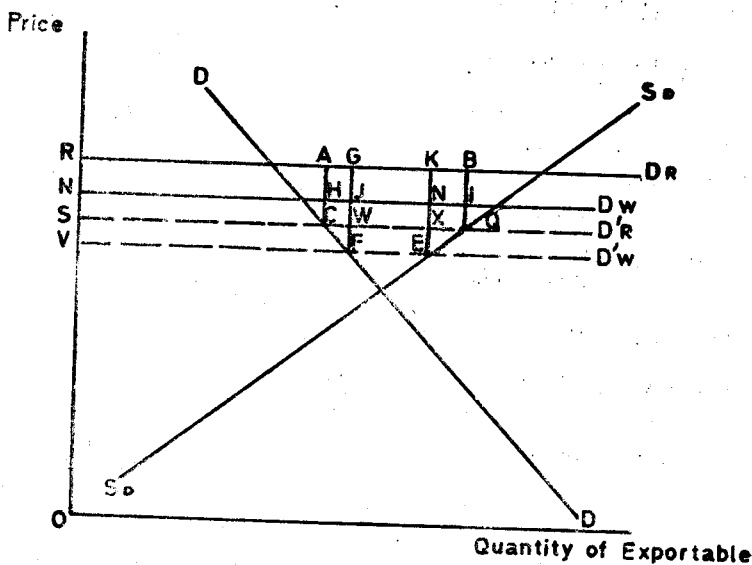
Diagram 2
Demand, Production and Exports
in the Home Country

1. The change in consumers' surplus—a loss equal to SCFV.
2. The change in producers' surplus—gain equal to SQEV.
3. The change in tax revenue—a gain equal to AGWC+KBQX.

The total gain is represented in the diagram by the sum of the two trapezoids, AGFC+KBQE, and the rectangle ABIH. The area of these trapezoids is measured by:

9. $We = 1/2 (d+t'+t')\triangle X+d.X$

where $\triangle X$ is the change in the quantity of goods exported.

10. $\triangle X = \triangle S - \triangle C$

11. $\triangle X = eS.\dfrac{d}{P_w-t'} - C.n\dfrac{d}{P_w-t'}$

where P_w-t' (equal to OV in Diagram II) is the domestic price of exportables.

Letting $r' = \dfrac{d}{P_w}$ and $\dfrac{P_w}{P_w-t'} = 1+T'$

12. $We = (1/2d + t') \cdot r' [e.S - n.C.] (1+T') + r'.P_w.X$

Using the fact that $\dfrac{P_w}{1+T'} = P_w - t'$, we can write

13. $We = (1/2r' + \dfrac{T'}{1+T'}) \cdot r' \cdot (1+T') [e.Vs - Vc.n] + r'.V'x$

where Vs and Vc are the domestic values of the production and consumption of exportables. Using the identity

$Vc = Vs - V'x + Rx$

Where V'x is the fob value of exports and Rx the export tax receipts, we can write.

14. $We = [1/2 (r')^2 (1+T') + T'r'] [(e-n)Vs + n.V'x - Rx.n] + r'.V'x$

II

Equations 8 and 14 can be used to measure the welfare effects of the removal of Pakistan's ban on trade with India.[7] The sum of Wm and We would then be a measure of the absolute gain and this gain can be compared to the total value of trade to obtain some idea of its relative importance. However, with every variable in the two equations there are problems in obtaining accurate information.

First, the exports of India with a price advantage in Pakistan and the exports of Pakistan with a price advantage in the Indian market are difficult to identify. Although based on the best data available, Afzal's study is still subject to certain limitations. The price differentials must be inferred from unit value statistics which, even if accurate, are likely to fluctuate overtime. Price comparisons of this type must assume that the qualities of products supplied by different countries are identical, which is rarely the case. An even more critical problem is that the full price differential can only rarely be appropriated by the home country. Once trade is resumed between the two countries, the equilibrium price of each traded product will settle somewhere in the gap measured by the price differential. Where in this gap the price will be established cannot be determined a priori unless very restrictive assumptions are made about supply and demand conditions, including the presence of monopoly power.

Thus, r and r' for the home country cannot be predicted with accuracy. Afzal's study provides an indication of the maximum value that these variables can take. If Pakistan were to resume trade with India, the values of r and r' would almost certainly be smaller than their maximum level and would most probably be different for each product.

Second, to estimate the gains, Pakistan's long term supply and demand elasticities for the importables and exportables that would enter into the trade

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[7]One must obviously assume, as well, that India relaxes its restrictions on trade with Pakistan.

with India would have to be known. As no empirical studies for either supply or demand elasticities have been carried out, values for these elasticities must be assumed.

An idea of the order of magnitude of the Pakistan's potential gains from trade can nevertheless be obtained if reasonable, but very rough, approximations of the variables in equations 8 and 14 are used. Table I presents the "representative" data we have selected. The basis for these approximations are as follow:

A.   The values of exports and imports: The values in column of Table I were based on Afzal's study of the trade potential between India and Pakistan [1]. Afzal made two types of price comaprisons: One between the estimated price of Pakistan's exports in the Indian market (the fob Pakistan price plus the estimated freight charges) and the actual cif prices of third country suppliers; and a second between the estimated prices of Indian exports in the Pakistan market and the observed cif prices of Pakistan's import suppliers. From these comparisons, two lists of products were drawn up—one list of the Pakistan export products with a price advantage in the Indian market and one list of the Indian export products with a price advantage in Pakistan. The row entries of Table I are the most important products from these two lists and Col. 5 shows the estimated price differentials measured as the percentage by which the Pakistan (or Indian) products sell below the price of the next most competitive supplier.

We have made three separate assumptions about how this price differential would be shared by the two countries.

(1)   Pakistan raises its export prices by the full amount of the differential, while the price of imports from India remains unchanged (i.e. the differential is appropriated fully by Pakistan). This is a maximum gain assumption which is unlikely to be achieved in practice but establishes an upper limit for Pakistan's potential gain.

(2)   Pakistan reaps the full benefit of the price differential on imports from India, but obtains no advantage from the export price differential.

(3)   The equilibrium price of the exportables and importables come to rest at the mid-point of the price differential. The price advantages are, therefore, divided equally for each product between India and Pakistan.

B.   Tax rates and tax revenues: the rates of import and export duty shown in Cols. 2 and 3 are very approximate, as the rates of duty of the sub-items for some of the row entries vary considerably.

C.   Value of production: Col. 4 contains the value added in Pakistan for these industries. Value added, rather than value of production, is used since the welfare costs from the misallocation of production is measured by the excess value of the primary factors in the industry.

D.   Elasticities of supply and demand: We have used two different sets and computed the welfare effects on the basis of each set.

TABLE I

Potential Exports of Pakistan to India (1971-72)

(All values in Rs. 000,000 unless otherwise specified)

Product	Value of exports V'_x	Tax rate T'	Tax Revenue R_x	Value added S	Cost differential r'	Welfare gains on Maximum "Price Assumption"	
						We $e=1$ $n=-1$	We $e=0$ $n=-2$
	1	2	3	4	5	6	7
Raw Cotton	600	.40	240	2800	.10	360	400
Rice	150	.20	30	1000	.10	75	80
Total:	750	—	270	3800	—	435	435

Potential Imports of Pakistan from India (1971-72)

Product	Value of Imports V'_m	Tariff Rate T	Tariff Revenue R_m	Value added S	Cost differential r	Wm $e=1$ $n=-1$	Wm $e=0$ $n=-2$
Tea	160	.20	32	0	.20	43	50
Machinery	500	.20	100	50	.20	131	150
Iron and Steel	300	.20	60	125	.20	79	90
Other non-competitive imports	100	.20	20	0	.20	27	30
Total:	1,060	—	212	175	—	260	319

Grand Total: (Wm+We)   695   900
Pakistan's Exports 1971-72 (approximate)   4000
Pakistan's GNP, 1971-72 (approximate)   50,000

RESULTS

The three different price assumptions and the two sets of supply and demand elasticities provide six different estimates of the total gain to Pakistan from removing the barriers to trade with India. These estimates are shown in Table II. We have shown both the gains which arise from the the foreign exchange saving and the gains which result from the price effects namely the changes in producers' and consumers' surpluses and the net revenue gain. The lowest estimate of the gain is 14 crores while the highest is 90 crores. These estimated gains range from .3 to 1.8 percent of GNP. It should be recalled, however, that we have measured only the static gains; inclusion of the dynamic gains, if these could be measured, would further increase the total welfare gain.

Two additional qualifications of these results deserve special mention. First, we have assumed that the market value of imports and domestic production reflect social costs of production. If there is a divergence between private and social costs of production, then the measurement of economic gains using private values will misstate the total change in social welfare.

Second, the major part of the welfare gains arise from the beneficial effects of price changes on the production and consumption decisions in the Pakistan economy. However, prices of the importable and exportable goods were included in this study because the volume of trade with India may simply be too small in relation to Pakistan's total trade in these items to cause any appreciable change in domestic prices. Admittedly, even if domestic prices of these importable and exportable goods did not change at all, there would still be a foreign exhcange savings of between 15 to 30 crores (depending on the price assumption used). But clearly, the major share of the benefits to be expected from the resumption of trade with India arise from price effects; and if these price effects are small, for whatever reason, the welfare gains will be small as well.

TABLE II
Pakistan's Gains from Resumed Trade with India

Price Assumption	e = 1 n = −1	e = 0 n = −2
1. Full advantage of price differential accrues to Pakistan:	(million Rupees)	
Price effect	408	613
Foreign exchange saving	287	287
Total:	695	900
2. Price advantage on imports only:		
Price effect	48	107
Foreign exchange saving	212	212
Total:	260	319
3. Equal sharing of price differential:		
Price effect	185	281
Foreign exchange saving	144	144
Total:	329	425

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CONCLUSION

In this paper we have provided an analytical basis for measuring the static welfare gain from the elimination of a country-specific ban on trade. The welfare gain from the elimination of this type of restriction differs from the gain associated with the elimination of commodity restrictions. When country-specific barriers are removed, increases in tariff revenues and foreign exchange savings must be added to the standard consumers' and producers' surplus effects to arrive at the correct measure of the total welfare gain.

If we had accurate information on the values of supply and demand elastiticities and the price differential of the goods which would be traded with India, *and* if we could predict the extent to which Pakistan would be able to exploit the price differential for each traded commodity, *and* if we knew the effect of renewed trade on the internal price level of the traded commodities, then we could provide an accurate measure of the static gains that would accrue to Pakistan following the resumption of trade with India. This information is not now available, but the model is nevertheless useful because the relative importance of various price and elasticity assumptions can be analysed.

To illustrate how the static gains might be measured, we have estimated the gain to Pakistan on the basis of representative data, and the results can be summarized as follows:

(*a*) Certain benefits: If trade were re-opened with India, both countries would benefit from increased export prices and reduced import prices on trade diverted from third countries. Data from a study by Afzal for 1971-72 suggest that the total gain to *both* the countries on this account alone might be of the order of Rs. 30 crores. Pakistan's share of the total gain would probably not be more than one half, or Rs. 15 crores. It should be emphasised, as well, that the estimate assumes both countries are free to divert trade from third countries. If, however, barter agreements or purchases under tied aid of either country prevent the diversion of imports or exports in favour of the other trading partner, the total gain would obviously be less than Rs. 30 crores. Also, the rapid inflation in both countries and the devaluation of the Pakistan rupee may have eroded the price differentials on which this estimate is based. Nevertheless, there would be a certain gain to Pakistan even though the value cannot be accurately predicted.

(*b*) Possible benefits: If renewed trade with India were to alter Pakistan's internal prices, raising those of exports and lowering those of imports, there would be additional gains in the form of a more efficient allocation of Pakistan's productive resources. On the basis of the data used in this paper, the benefits to Pakistan on this account could range from Rs. 5 crores to Rs. 61 crores. It is impossible to single out one estimate in this range as being more likely than the others, because some of the assumptions underlying the estimates depend on policy decisions and negotiated agreements, which cannot be easily predicted. It should be noted however, that some of the assumed price effects resulting from the elimination of the trade ban may not be tolerable, specifically the rise in the domestic price of exportables. If, therefore, the only effect on internal prices is a reduction in import prices, the gain on this account is likely to be Rs. 11 crores.

(c) Remotely possible benefits: If there are internal price effects, then some dynamic gains such as linkage effects and economies of scale might be forthcoming. We have not measured these, but they should be considered in any overall assessment of the gains from the opening of trade with India.

Summing up, it seems possible that the one time, static gains from resuming trade with India may be of the order of Rs. 30 crores or approximately .5 per cent of GNP. By comparison to the studies of Johnson and Harberger mentioned earlier, these gains are not insubstantial. We should emphasize caution, however, in drawing out of this comparison implications for Pakistan's foreign trade policy. There are many other "static" benefits and costs we have not taken into account. Some of these are imponderables like the political consequence of such trade—both internal and external—which affect social welfare but cannot be expressed nicely in the economic calculus. However, we have provided a framework for analysing some of the principal economic benefits, and this may be of some use to those policy makers who most ponder the imponderables of trade with India.

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