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RAIL AND ROAD TRASPORT IN PAKISTAN: COMPETITIVE OR COMPLEMENTARY?

By

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Introduction

To satisfy the need for basic services and demands, to exploit new resources, and stimulate agricultural and industrial productivity and exports, a fully functional, well-placed rail and road network with a hierarchy of linkages is essential. Although infrasturcture is commonly regarded in terms of its physical form--, railroad track, roads, bridges, ports, pipelines and the like--, the real output of infrastruture is a service: efficient movement of people and goods. Thus the efficacy of infrastructure depends not only on the investments made in infrastructure but on the quality of service provided. The contribution of infrastructure to an economy depends not only on the investments made in infrastructure but on the quality of service provided. As discussed in more detail below, in terms of provision of basic infrastructure, Pakistan does not lag behind other countries at a similar level of income and development. However, in terms of quality, reliability and efficiency, Pakistan's infrastructure could critically constrain the country's economic growth as well as improvenents in living standards.

The purpose of this paper is to indentify possible interdependencies between rail and road transport in Pakistan. Are these sectors in competition for traffic and freight or are they complementary in the sense that expanded facilities in one area stimulates follow on activity in the other? Put differently has the country emphasized complimentarity or is a substantial degree of competition encouraged among the various alternative modes?

The historical experiences of develped countries susggest that each of the models noted above has prevailed at one time or another. In North America and Western Europe competition among modes of transport, although constrained by regulation has been relatively free and open. The former Soviet Union and to lesser extent Japan have been

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primarily railway economies with a strong insistence by the authorities that alternative modes not duplicate railway services. Such insistence may well economize transport investment, but inevitably this economy is to some extent at the expense of consumers of transport services[1].

The Issue of Causation

The main questions we want to resolve involve the extent and manner in which road transport competes with rail activity. Specifically, has the expansion of the country's road network been competitive or complementary with increased rail passenger services and/or freight? Do these patterns hold over time or has some shift in the competitive nature of the transport sector changed in recent years? Has the interaction between rail services been the same for both high-type roads and low-type roads and if not what are the unique patterns associated with each?

A key element in assessing these issues involves the issue of causation. If roads and rail are in competition we would expect changes in one to produce a negative impact on the other over time. On the other hand if both systems complement each other an increase in one area of transport should provide a stimulus over time to the other type of service. Clearly then, one must resolve the issue of causation between road and rail activity before any definitive conclusions can be drawn as to the relationshop between these two key modes of transport. Ultimately any statistical test for causation will be based on a number of arbitrary assumptions. Still, using a number of alternative specifications for the key variables it is possible to make some credible inferences concerning the timing of road and rail activities.

The original and most widely used causality test was developed by Granger[2]. According to Granger (using rail and road activity), Rail (RAIL) affects the growth in road activity (ROAD) if this series can be predicted more accurately by past values of rail than by its past rates of growth. To be certain that causality runs from rail to road, the past growth rates in rail must be more accurate than past values of road in predicting increases in rail.

Granger Test

More formally, Granger defines causality such that X Granger causes (G-C) Y if Y can be predicted more accurately in the sense of mean square error, with the use of past values of X than without using past X. Based upon the definition of Granger causality, a simple bivariate autoregressive (AR) model for road activity (ROAD) and rail (RAIL) can be specified as follows:

$$(1) \qquad RAIL(t) = c + \sum_{i=1}^{p} a(i)\, RAIL(T\text{-}1) + \sum_{j=1}^{q} b(j)\, ROAD(t\text{-}j) + u(t)$$

$$(2) \qquad ROAD(t) = c + \sum_{i=1}^{r} d(i)\, ROAD(t\text{-}1) + \sum_{i=1}^{s} e(j)\, RAIL(T\text{-}j) + v(t)$$

where ROAD is the growth in the various types of highway transport and RAIL= the growth in railroad activities; p,q, r and s are lengths for each variable in the equation; and u and v are serially uncorrelated white noise residuals. By assuming that error terms (u,v) are "nice" ordinary least squares (OLS) becomes the appropriate estimation method[3].

Within the framework of unrestricted and restricted models, a joint F- test is appropriate for causal detection. Where:

$$(3) \qquad F = \frac{(RSS(r) - RSS(u))/(df(r) - df(u))}{RSS(u)/df(u)}$$

RSS (r) and RSS (u) are the residual sum of squares of restricted and unrestricted models, respectively; and df(r) and df(u) are, respectivly, the degrees of freedom in restricted and unrestricted models.

The Granger test detects causal directions in the following manner: first, Unidirectional causality from ROAD to RAIL if the F-test rejects the null hypothesis that past values of ROAD in equation (1) are insignificantly different from zero and if the F-test cannot reject the null hypothesis that past values of RAIL in equation (2) are insignificantly different from zero. That is, ROAD causes RAIL but DEBT does not cause EXP. Unidirectional causality runs from RAIL TO ROAD if reverse is true. Second, bi-directional causality runs between ROAD and Rail if both F-test statistics reject the null hypotheses in equations (I) and (2). Finally, no causality exists between ROAD and RAID if we can not reject both null hypotheses at the conventional significance level.

The results of Granger causality tests depend critically on the choice of lag length. If the chosen lag length is less than the true lag length, the omission of relevant lags can cause bias. If the chosen lag is greater than the true lag length, the inclusion of irrelevant lags causes estimates to be inefficient. While it is possible to choose lag lengths based on preliminary partial autocorrelation methods, there is no a priori reason to assume lag lengths equal for all types of deficits.

The Hsiao Procedure

To overcome the difficulties noted above, Hsiao[4] developed a systematic method for assigning lags. This method combines Granger Causality and akaike's final prediction error (FPE), the asymptotic) mean square prediction error, to determine the optimum lag for each variable. In a paper examining the problems encountered in choosing lag lengths, Thornton and Batten found Hsiao's method to be superior to both arbitrary lag length selection and several other systematic procedures for determining lag length.

The first step in Hsiao's procedure is to perform a series of autoregressive regressions on the dependent variable. In the first regression, the dependent variable has a lag of one. This increases by one in each succeeding regression. Here, we estimate M regressions of the form:

$$(4) \qquad G(t) = a + \sum_{i=1}^{m} b(t-l)\, G(t-l) + e(i)$$

Where the values of m range from 1 to M. For each regression, we compute the FPE in the following manner

$$(5) \qquad FPE(m) = \frac{T + m + 1}{T - m - 1} ESS(m)/T$$

Where: T is the sample size, and FPE (m) and ESS (m) are the final prediction error and the sum of squared errors, respectively. The optimal lag length, m*, is the lag length which produces the lowest FPE. Having determind m* additional regressions expand the equation with the lags on the other variable added sequentially in the same manner used to determine m*. Thus we estimate four regressions of the form:

$$(6) \qquad G(t) = a + \sum_{i=1}^{m*} b(t-l)\, G(t-l) + \sum_{i=1}^{n} c(t-l)\, D(t-l) + e(i)$$

with n ranging from one to four. computing the final prediction error for each regression as;

$$FPE\ (m^*,n) = \frac{T + m^* + n + 1}{T - m^* - n - 1} ESS\ (m^*,n)/T$$

we choose the optimal lag length for D, n* as the lag length which produces the lowest FPE. Using the final prediction error to determine lag length is equivalent to using a series of F tests with variable levels of significance[5].

The first term measures the estimation error and the second term measures the modeling error. The FPE criterion has a certain optimality property that "balances the risk due to bais when a lower order is selected and the risk due to increases in the variance when a higher order is selected[6]." As noted by Judge de.al[7], an intuitive reason for using the FPE criterion is that longer lags increase the first term but decrease the RSS of the second term, and thus the two opposing forces are optimally balanced when their product reaches its minimum.

Depending on the value of the final prediction errors, four cases are possible: (a) ROAD causes RAIL when the prediction error for rail activities decrease when road activities are included in the rail equation. In addition, when rail is added to the road equation the final prediction error should increase. (b) Rail causes Road when the prediction error for expenditures increases when expenditures are added to the regression equation for rail, and is reduced when debt is added to the regression equation for expenditures; (c) Feedback occurs when the final prediction error decreases then rail activities are added to the road equation; and (d) No Relationship exists when the final prediction error increases both when road activities are added to the rail equation and when rail activities are added to the road equation.

Operational Procedues

The data used to carry out the causation tests[8] were transformed into natural logarithms. Next, unit root tests were performed to assure that all series were stationary[9]. Relationships were considered valid if they were statistically significant at the ninety-five percent level of confidence. That is, if ninety-five percent of the time we could conclude that they had not occurred by pure chance, we considered them statistically significant.

As noted above, there is no theoretical reason to believe that rail and road activities have a set lag relationship-- that is they impact on one another over a fixed time period. To find the optimal adjustment period of impact, lag structure of up to four years were estimated. The lag structure with the highest level of significance was the one chosen best depict the relationshop under consideration (the optimal lag reported in Tables C- l-- C-6). To test for the stability of relationships, three time periods were examined: (1) the total time period for which data were available (1955 to 1993), (2) post-dissolution with Bangladesh (1972-1993), and (3) predissolution with Bangladesh (1955-1971).

Based on data availability, rail activities consisted of rail infrastructure (kilometer of rail lines) and three measures of rail serives (I) rail passengers, (2) rail freight in tons, and (3) rail freight in tons-kilometer. Road activities consisted of : (1(the length of the total road system (high-type plus low-type roads). (2) high type roads, (3) low-type roads, and (4) road vehicles.

Results

A number of statistically significant patterns were identified by the causation analysis. With regard to the relationship between rail and road infrastructure (Table1:)

- ñ The nation's stock of highway infrastructure (both high and low type roads) exhibited no statistically significant pattern for the period as a whole.
- ñ However, during each of the sub-periods, rail infrastructure appears to impact negatively on road extension. That is, certeris paribus, an increase in rail tracks tends to depress road expansion.
- ñ In the earlier period (1995-71) rail and highway interacted in a feedback mechanism with road expansion tending to result in a follow on expansion in rail tracks. In turn however rail expansion tended to depress further road consturction.
- ñ In the latter period(1972-1993) rail track expansion was no longer positively affected by increased highway penetration. On the other hand the nagetive impact of rail tracks on roads strengthened over the previous period.

- The relationship between rail lines and high-type roads was clearly defined. The dominant pattern was one whereby rail expansion resulted in a subsequent reduction in high type roads. Again, this pattern tended to strengthen over time.
- The most complex railroad/ highway interaction involved the low-type roads. For the period as a whole, expanded rail tended to suppress the development of this type of road.
- However, both sub-periods were characterized by a feedback machanism. Rail tracks again impacted negatively on road expansion during both sub periods, and again this impact strengthened overtime. For its part low-type road expansion during the first period tended to stimulate a further increase in rail tracks. By the most recent period, this impact had turned negative.

Table 1

Pakistan: Interaction of Railroad and Highway Infrastructure, 1995-1993

	Causation Patterns				Dominant
	Rail Rail	Rail Road	Road Road	Road Rail	Pattern
Rail Lines (Kilometers)/ Total Roads-High and Low (kilometers), 1955-1993					
Optimal Lag (year)	1	1	1	1	No
Final prediction Error	(0.22e-4)	(0.23e-4)	(0.66e-3)	(0.68e-3)	Relationship
Rail Lines (Kilometers)/ Total Roads-High and Low (kilometers), 1972-1993					
Optimal Lag(years)	1	3	1	3	RailÛRoad
Final prediction Error	(0.14e-5)	(0.15e-5)	(0.72e-3)	(0.38e-3)	m(-)
Rail Lines (Kilometers)/ Total Roads-High and Low (kilometers), 1955-1971					
Optimal Lag(years)	4	3	1	3	Feedback
Final prediction Error	(0.14e-5)	(0.15e-5)	(0.72e 3)	(0.38e-3)	w(+);w(-)
Rail Lines (kilometers)/High Type Roads (kilometers), 1955-1993					
Optimal Lag (years)	1	1	2	4	RailÛRoad
Final prediction Error	(0.22e-4)	(0.23e-4)	(0.68e 3)	(0.39e-3)	w(-)
Rail Lines (kilometers)/High Type Roads (kilometers), 1972-1993					
Optimal Lag (years)	1	1	1	3	RailÛRoad
Final prediction Error	(0.14e-5)	(0.15e-5)	(0.68e 3)	(0.39e-3)	w(-)
Rail Lines (kilometers)/High Type Roads (kilometers), 1955-1971					
Optimal Lag (years)	4	1	3	1	RailÛRoad
Final prediction Error	(0.90e-3)	(0.99e-34)	(0.69e 3)	(0.29e-3)	w(-)
Rail Lines (kilometers)/High Type Roads (kilometers), 1955-1993					
Optimal Lag (years)	1	1	2	2	RailÛRoad
Final prediction Error	(0.22e-2)	(0.23e-2)	(0.14e 2)	(0.15e-2)	w(-)

Rail Lines (kilometers)/High Type Roads (kilometers), 1972-1993					
Optimal Lag (years)	1	3	1	3	Feedback
Final prediction Error	(0.14e-5)	(0.13e-2)	(0.13e 2)	(0.11e-2)	w(-); w(-)
Rail Lines (kilometers)/High Type Roads (kilometers), 1955-1971					
Optimal Lag (years)	4	3	1	2	Feedback
Final prediction Error	(0.22e-4)	(0.23e-4)	(0.68 3)	(0.39e-3)	w(+); s(-)

Given that the highway sector has expanded retatively to the rail system, these results are somewhat surprising. They suggest that the commonly held view that highway expansion always comes at the expense of rail infrastructure, does not neccessarily hold for Pakistan. While speculative, a possible explanation is that even relatively modest increase in rail tracks puts such a strain on country's resources, that the authorities are forced, during periods of rail expansion, to divert both real and financial resources from the nation's highway program.

The examination of the linkages between rail passengers and the country's road infrastructure also produced several interesting findings more in line with the hypothesis that rail and road transport are competitive rather than mutually supportive. For total roads (Table 2).

- The genral pattern was an evolving one whereby during the earlier period (1955-1971) an increased number of rail passengers resulted in a subsequent expansion of the road network.
- Over time however a feedback machanism developed whereby expanded roads strongly cut into the number of passengers choosing to travel by rail.
- The strength of the negative effect of road expansion on rail passengers was strong enough to carry over to the period as a whole.
- Similarly, expanded numbers of rail passengers tended to retard the subsequent expansion in highways. This later effect was not nearly as strong however as the negative link between roads and rail transport.
- These patterns also characterized the linkages between rail passengers and high-type roads.
- The interaction between rail passengers and low type roads was not as complex as that associated with high type roads. Instead,

roads have generally had a fairly negative effect on passengers. Again this seems to have strengthened over time, with little interaction between the two during the first period.

Table 2

Pakistan: Interaction of Railroad Freight and Highway Infrastructure, 1955 -1993.

	Causation Patterns				Dominant
	Rail Rail	Rail Road	Road Road	Road Rail	Pattern
Rail Passengers (millions)/ Total Roads(kilometers), 1955-1993					
Optimal Lag (years)	2	4	1	1	RoadÛRail
Final Prediction Error	(0.50e -2)	(0.40e -2)	(0.66e-3)	(0.70e -3)	s(-)
Rail Passengers (millions)/ Total Roads(kilometers), 1972-1993					
Optimal Lag (years)	2	1	1	4	Feedback
Final Prediction Error	(0.75e-2)	(0.51e-2)	(0.72e-3)	(0.64e-3)	s(-) ;w(-)
Rail Passengers (millions)/ Total Roads(kilometers), 1955-1971					
Optimal Lag (years)	3	4	1	3	RailÛRoads
Final Prediction Error	(0.90e-3)	(0.99e-3)	(0.69e-3)	(0.29e-3)	m(+)
Rail Passengers (millions)/ High-Type Roads (kilometers), 1955-1993					
Optimal Lag (years)	2	1	2	4	RoadÛRail
Final Prediction Error	(0.50e-2)	(0.44e-2)	(0.12e-3)	(0.12e-3)	m(-)
Rail Passengers (millions)/ High-Type Roads (kilometers), 1955-1971					
Optimal Lag (years)	2	2	1	1	Feedback
Final Prediction Error	(0.75e-2)	(0.50e-2)	(0.68e-3)	(0.58e-3)	s(-);w(-)
Rail Passenger (millions)/ High-Type Roads(kilometers), 1955-1971					
Optimal Lag (years)	3	1	3	4	RailÛRoads
Final Prediction Error	(0.90e-3)	(0.11e-3)	(0.25e-3)	(0.23e-3)	w(+)
Rail Passengers (millions)/ Low-Type Roads (kilometers), 1955-1993					
Optimal Lag (years)	2	1	2	4	Rail Roads
Final Prediction Error	(0.50e-2)	(0.39-2)	(0.14e-3)	(0.15e-2)	s(-)
Rail Passengers (millions)/ Low-Type Roads (kilometers), 1972-1993					
Optimal Lag (years)	2	1	1	1	RoadsÛRail
Final Prediction Error	(0.75e-2)	(0.48e-2)	(0.13e-2)	(0.15e-2)	s(-)
Rail Passengers (millions)/ Low-Type Roads (kilometers), 1955-1971					
Optimal Lag (years)	2	1	1	1	No
Final Prediction Error	(0.90e-3)	(0.10e-2)	(0.13e-2)	(0.14e-2)	Relationship

These Patterns are consistent with the view that over time road transport in Pakistan has proven an alternative to rail Passengers. This pattern appears to occur independently of the type of road. If anything however the expansion of low-type toads may have opened up transport opportunities that were previously only available by rail.

During the early years after independence the expansion of rail passengers appears to have placed some pressure on the government to expand connecting roads. Once in place further increases in rail passengers no doubt could be met out by greater utiliztion of excess highway capacity.

For rail freight (Table 3), the dominant pattern was again one whereby expanded highway infrastructure cut into railroad activity:

- For the total road system, no clear pattern was observable during the first (1955-1971) period.
- However, expanded road distance in the more recent period cut into rail freight. Again, this pattern was strong enough so that it characterized the period as a whole.
- In contrast to total roads, high-type roads developed a complex interaction pattern with freight:
- While the expansion in high-type roads reduced subsequent rail freight in all of the periods examined, the latest period was characterized by a feedback from rail freight to roads. Specifically, expanded rail traffic provided and added stimulus to expand the nation's high-type road system.
- On the other an expansion in the road system (1972-1993) tended to depress subsequent rail freight.
- For all of the periods examined, expanded road infrastructure depressed the amount of freight carried by rail. This effect was fairly weak in the early (1955-71) period, but strengthened considerably in the latter period (1972-93).

Table 3

Pakistan: Interaction of Railroad Freight and Highway Infrastructure, 1955-1993.

	Causation Patterns				Dominant
	Rail Rail	Rail Road	Road Road	Road Rail	Pattern
Rail Freight (millions tons)/Total Roads (Kilometers), 1955-1993					
Optimal Lag (years)	1	4	1	1	RoadsÛRail
Final Prediction Error	(0.76e-2)	(0.57e-2)	(0.66e-3)	(0.70e-3)	s(-)

Rail Freight (millions tons)/Total Roads (Kilometers). 1972-1993					
Optimal Lag (years)	2	4	1	1	RoadsÛRail
Final Prediction Error	(0.66e-2)	(0.50e-3)	(0.72e-3)	(0.77e-3)	m(-)
Rail Freight (millions tons)/Total Roads (Kilometers). 1995-1971					
Optimal Lag (years)	1	1	1	3	No
Final Prediction Error	(0.63e-2)	(0.64e-2)	(0.69e-3)	(0.74e-3)	Relationship
Rail Freight (millions tons)/Total Roads (Kilometers). 1955-1993					
Optimal lag (years)	2	1	2	4	Feedback
Final Prediction Error	(0.76e-2)	(0.58e-2)	(0.12e-3)	(0.11e-2)	s(-);w(+)
Rail Freight (millions tons)/Total Roads (Kilometers). 1972-1993					
Optimal lag * (years)	2	1	1	3	Feedback
Final Prediction Error	(0.66e-2)	(0.55e-2)	(0.68e-3)	(0.42e-2)	s(-);w(+)
Rail Freight (millions tons)/Total Roads (Kilometers). 1955-1971					
Optimal Lag (years)	3	1	3	4	RailÛRoads
Final Prediction Error	(0.63e-2)	(0.49e-2)	(0.25e-3)	(0.29e-2)	w(-)
Rail Freight (millions tons)/Total Roads (Kilometers). 1995-1971					
Optimal Lag (years)	1	4	2	1	Feedback
Final Prediction Error	(0.76e-2)	(0.63e-2)	(0.14e-3)	(0.13e-2)	s(-);w(-)
Rail Freight (millions tons)/Total Roads (Kilometers). 1972-1993					
Optimal Lag (years)	2	4	1	1	RoadsÛRail
Final Prediction Error	(0.66e-2)	(0.48e-2)	(0.13e-3)	(0.15e-2)	m(-)
Rail Freight (millions tons)/Total Roads (Kilometers). 1995-1971					
Optimal Lag (years)	1	3	1	1	FeedsÛRail
Final Prediction Error	(0.63e-2)	(0.39e-2)	(0.14e-3)	(0.15e-3)	m(+)

- Another contrast is provided by the low-type road system. In the earlier period, expanded roads provided a fairly strong stimulus to expand rail freight. Over time this stimulus turned negative with increased low-grade roads dampening the future expansion of rail freight.
- It is interesting to note that while expanded rail freight has often provided a stimulus to expand the road network, it has provided no such stimulus to the rail network (Table 4).

A pattern somewhat similar to freight was experienced by rail tonnage/distance (Table 5):

- For all periods an expansion in total roads, reduced future tonnage/Kilometer services provided by rail. This effect was relatively weak however.
- While high-type roads did not cut into rail freight in the earlier period, they had a fairly strong impact in this regard during the second period.

ñ In contrast during the early period, expanded rail freight/distance provided a positive stimulus for the country to extend its high-type road network (again, Table 4, no such effect linked rail services with rail infrastructure).

ñ Expanded low-type roads provided a stimulus to rail freight/distance in the early period. However further expansion in the latter period cut into rail services. Similarly an expansion in rail freight/distance tended to depress the expansion of low-roads.

Table 4

Pakistan: Interaction of Railroad Infrastructure and Rail Services, 1955-1993

	Causation Patterns				Dominant
	Rail Rail	Rail Road	Road Road	Road Rail	Pattern
Rail Lines (Kilometers)/ Rail Passengers (millions), 1955-1993					
Optimal Lag(years)	1	1	2	2	No
Final Prediction Error	(0.22e-4)	(0.32e-4)	(0.50e-2)	(0.51e-)	Relationship
Rail Lines (kilometers)/ Rail Passengers (millions), 1972-1993					
Optimal Lag (years)	1	2	2	2	ServicesÛLine
Final Prediction Error	(0.14e-5)	(0.13-e5)	(0.75e-2)	(0.75e-2)	w(+)
Rail Lines (Kilometers)/ Rail Passengers (millions), 1955-1971					
Optimal Lag (years)	4	1	3	4	Line Services
Final Prediction Error	(0.79e-6)	(0.85-e6)	(0.90e-3)	(0.73e-3)	w(+)
Rail Lines (Kilometer)/ Rail Freight (tons), 1955-1995					
Optimal Lag (years)	1	3	1	4	No
Final Prediction Error	(0.22e-4)	(0.23e-4)	(0.76e-2)	(0.76e-3)	Relationship
Rail Lines (Kilometers)/ Rail Freight (tons), 1972-1993					
Optimal Lag (years)	1	1	2	2	No
Final Prediction Error	(0.14e-5)	(0.15e-5)	(0.66e-2)	(0.67e-2)	Relationship
Rail Lines (Kilometers)/ Rail Freight (tons), 1955-1971					
Optimal Lag (years)	4	1	1	4	LineÛServices
Final Prediction Error	(0.79e-6)	(0.89e-2)	(0.63e-2)	(0.56e-2)	w(-)
Rail Lines (Kilometers)/ Rail Freight (tons), 1955-1993					
Optimal Lag (years)	1	4	1	4	No
Final Prediction Error	(0.22e-4)	(0.66e-4)	(0.66e-2)	(0.69e-2)	Relationship
Rail Lines (Kilometers)/ Rail Freight (tons-Kilometers), 1972-1993					
Optimal Lag (years)	1	1	1	1	No
Final Prediction Error	(0.14e-5)	(0.15e-5)	(0.92e-2)	(0.10e-1)	Relationship
Rail Lines (Kilometers)/ Rail Freight (tons-Kilometers), 1955-1971					
Optimal Lag (years)	4	3	1	3	Feedback
Final Prediction Error	(0.79e-6)	(0.21e-6)	(0.36e-3)	(0.30e-3)	m(+):w(-)

Table 5

Pakistan: Interaction of Railroad Tonnage/Distance and Highway Infrastructure

	Causation Patterns				Dominant
	Rail Rail	Rail Road	Road Road	Road Rail	Pattern
Rail Freight (ton-kilometer)/ Total (Kilometers), 1955-1993					
Optimal Lag (years)	1	1	1	2	Feedback
Final Prediction Error	(0.66e-2)	(0.64e-2)	(0.66e-2)	(0.65e-3)	w(-);w(-)
Rail Freight (ton-kilometer)/ Total Roads (Kilometers), 1972-1993					
Optimal Lag (years)	1	1	1	2	RoadsÛRail
Final Prediction Error	(0.93e-2)	(0.83e-2)	(0.72e-3)	(0.73e-3)	w(-)
Rail Freight (ton-kilometer)/ Total Roads (Kilometers), 1955-1993					
Optimal Lag (years)	1	2	1	1	RailÛRoads
Final Prediction Error	(0.36e-2)	(0.37e-6)	(0.59e-3)	(0.59e-3)	w(-)
Rail Freight (ton-kilometer)/ High type Road (Kilometers), 1995-1993					
Optimal Lag (years)	1	2	2	1	RoadsÛRail
Final Prediction Error	(0.66e-2)	(0.62e-2)	(0.12e-2)	(0.13e-2)	w(-)
Rail Freight (ton-kilometer)/ High type Road (Kilometers), 1955-1993					
Optimal Lag (years)	1	1	1	3	RoadsÛRail
Final Prediction Error	(0.93e-2)	(0.81e-2)	(0.68e-2)	(0.70e-2)	m(-)
Rail Freight (ton-kilometer)/ Low type Road (Kilometers), 1955-1971					
Optimal Lag (years)	1	1	2	2	RoadsÛRail
Final Prediction Error	(0.36e-2)	(0.39e-6)	(0.25e-2)	(0.19e-2)	m(+)
Rail Freight (ton-kilometer)/ Low type Road (Kilometers), 1955-1993					
Optimal Lag (years)	1	1	2	2	RoadsÛRail
Final Prediction Error	(0.66e-2)	(0.85e-2)	(0.14e-2)	(0.14e-2)	w(-)
Rail Freight (ton-kilometer)/ Low type Road (Kilometers), 1973-1993					
Optimal Lag (years)	1	1	1	3	RoadsÛRail
Final Prediction Error	(0.93e-2)	(0.85e-2)	(0.14e-2)	(0.13e-2)	w(-);w(-)
Rail Freight (ton-kilometer)/ Low type Road (Kilometers), 1955-1971					
Optimal Lag (years)	1	2	1	1	RoadsÛRail
Final Prediction Error	(0.36e-2)	(0.27e-2)	(0.14e-2)	(0.16e-2)	m(+)

Road vehicles provided another interesting interaction pattern with rail services (Table 6)

- As one might anticipate, an expanded road vehicle fleet cut into rail passenger traffic. This effect was fairly weak in the initial (1955-71) period, however it strengthened over time.
- While an expanded number of rail passengers retarded the expansion in road vehicles in the early period, there was no such effect in later years.

ñ Again rail freight was reduced as the number of road vehicles increased. While some competition existed between the two in the earlier period, expanded rail freight had no appreciable impact on the vehicle fleet in the later years.

ñ Finally, increased numbers of road vehicles appear to have stimulated rail's freight/distance services in the early period, but this effect disappeared in more recent times.

Summary

Several general patterns come out of the analysis presented above. With regard to the issue of transport modes competition or complementarity, the picture is mixed (Table 1). In the case of high-type roads and rail tracks, the two types of infrastructure of transport seem to be in competition. The nature of this competition is not clear however- is it for funding of resources or does the trade off come about due to a decline in road usage brought about by an expansion in rail tracks? Given the high cost of track expansion and the declining usage of rail infrastructure, one suspects that competition is in the form of varying budgetary allocations.

Table 6

Pakistan: Interaction of Railroad Activity and Highway Vehicles, 1955-1992

	Causation Patterns				Dominant
	Rail Rail	Rail Road	Road Road	Road Rail	Pattern
Rail Passengers (millions)/ Roads Vehicles (000). 1955-1993					
Optimal Lag (years)	2	1	1	1	Feedback
Final Prediction Error	(0.50e-2)	(0.46e-2)	(0.16e-2)	(0.15e-2)	m(-);w(+)
Rail Passengers (millions)/ Roads Vehicles (000). 1955-1993					
Optimal Lag (years)	2	4	1	1	RoadsÛRail
Final Prediction Error	(0.75e-2)	(0.48e-2)	(0.45e-3)	(0.50e-3)	m(-)
Rail Passengers (millions)/ Roads Vehicles (000). 1955-1993					
Optimal Lag (years)	3	3	1	1	Feedback
Final Prediction Error	(0.90e-3)	(0.63e-2)	(0.35e-2)	(0.27e-2)	m(-);W(-)

Rail Passengers (millions)/ Roads Vehicles (000), 1955-1993					
Optimal Lag (years)	1	1	1	1	RoadsÛRail
Final Prediction Error	(0.76e-2)	(0.66e-2)	(0.16e-2)	(0.17e-2)	m(-)
Rail Passengers (millions)/ Roads Vehicles (000), 1955-1993					
Optimal Lag (years)	2	1	1	1	RoadsÛRail
Final Prediction Error	(0.66e-2)	(0.61e-2)	(0.45e-3)	(0.50e-3)	w(-)
Rail Passengers (millions)/ Roads Vehicles (000), 1955-1993					
Optimal Lag (years)	1	4	1	1	Feedback
Final Prediction Error	(0.63e-2)	(0.47e-2)	(0.34e-2)	(0.28e-2)	m(-);W(+)
Rail Passengers (millions)/ Roads Vehicles (000), 1955-1993					
Optimal Lag (years)	2	1	1	1	No
Final Prediction Error	(0.66e-2)	(0.67e-2)	(0.16e-2)	(0.16e-2)	Relationship
Rail Passengers (millions)/ Roads Vehicles (000), 1972-1993					
Optimal Lag (years)	1	1	1	1	RoadsÛRail
Final Prediction Error	(0.93e-2)	(0.82e-2)	(0.45e-3)	(0.50e-2)	w(-)
Rail Passengers (millions)/ Roads Vehicles (000), 1955-1971					
Optimal Lag (years)	1	1	1	1	RoadsÛRail
Final Prediction Error	(0.36e-2)	(0.31e-2)	(0.35e-2)	(0.40e-2)	w(+)

The competition between rail lines and low-type roads appears different from that of high-type roads. In this case the two types of infrastructure appear to shift one of partial complementarity in the 1955-71 period to one of competition in the 1972-93 interval. That is in the earlier period expanded roads tended to induce a follow on expansion in rail perhaps as more farmers had access from their farms to cities and rail terminals. Again however expanded rail lines tended to retard the subsequent expasion in the low-type road system. In the more recent period expansion of either type of infrastructure appears to have come at the expense of the other.

Rail passenger services (Table 2) appear to currently face competition from both high and low-type roads, although this is a fairly recent phenomenon. In the earlier period increased rail passengers (apparently) placed some pressure on the authorities to expand the High-type roads. Again, this pattern shifted to one of competition in the more recent period with increased rail passengers retarding somewhat the expansion in both types of road infrastructure.

The patterns of interaction between rail freight and the highway system is fairly easy to interpret. In general road expansion has significantly reduced amount of freight carried by the railroads. While there is some evidence of a feedback (both complementary and competitively) from rail traffic to roads, this mechanism is much weaker and barely statistically significant.

The linkages between the road system and rail services as measured by freight distance (Table 5) have varied considerably over time. Initially (1955-71) expanded rail lines also provided a stimulus for enlargement of high-type roads. Similarly the growth of the low-grade road system tended to expand railroad freight/distance. In more recent times this complementarity has turned to one of competition with expanded high-type roads cutting into rail services. A somewhat weaker relationship has developed between rail services and low type roads with an expansion in either dampening the expansion of the other.

One of the more interesting findings was the lack of interaction between rail activity and rail infrastructure (Table 4). For passengers there appear to be two fairly distinct periods. During the earlier (1955-71) period expanded rail lines tended to result in slightly increased volumes of passengers in subsequent years. In more recent years this pattern has changed to one of increased passengers (apparently) putting some pressure to expand rail lines. For freight the pattern was also one in the earlier period of increased lines leading to a subsequent expansion in services. No linkages between freight and rail lines was found for the more recent periods.

Conclusions

From these patterns we can conclude that the country's rail startegy was likely one of unbalanced infrastructure development with an over expansionof capacity in the early years after independence. In part this expansion was response to the new opportunities opening up as a result of the expansion in the road nework increasing accessibility to rail stations.

In more recent times the authorities have allowed the system to equilibrate by letting the volume of services catch up with the stock of rail infrastructure. Given the relatively slow expansion in rail services, there has been little pressure to extend the sector's infrastructure. In large part the slow expansion in rail services stems from the increased competitive position of the highway system.

Many of the factors responsible for the development and expansion of the country's rail system in the 1950s and 1960s have ceased to function. The initial complementarities with the highway system diverting larger and larger volumes of services from the

railroads. Given the high cost of maintaining rail infrastructure the sector's demise should countinue into the foreseeable future.

Notes

1. Edwin T. Haefele ed., Transport and National Goals (Washington, DC: The Brookings Institution, 1969,P.10

2. Cf. C. W.J. Granger, "investigating Causal Relations by Models and Cross-Spectral Methods" Econometrica, vol/37 (1969), PP. 424-38,and C.W.J. Granger "Some Recent Developments in a Concept of Causality" Journal of Econometrics, vol. 39, pp, 199-211.

3. If the disturbances of the model were serially correlated, the OLS estimates could be inefficient, although still unbiased, and would distort the causal relations. The existence of serial correlaion was checked by using a maximum likelihood correlation for the first-order autocorrelation of the residuals [AR (1)]. The comparison of both OLS and AR (1) results indicated that no significant changes appeared in causal directions. Therefore, we can conclude" roughly" that serial correlation was not serious in this model.

4. C. Hsiao, "Autoregressive Modeling and Money-Income Causality Detection, "Journal of Monetary Economics, vol. 6(1981), pp. 85-106.

5. Since the F statistic is redundant in this instance they are reported here. They are, however, available from the authors upon request.

6. C.Hsaio."Causality Tests in Econometrics, "Journal of Economic Dynamics and Control (1979), P. 326.

7. G.G. Judge, W. Hill. Griffiths, H. Lutheenphol and T.C. Lee, "Introduction to the Theory and Practice of Econometrics" (New York: John Wiley and Sons, 1982).

8. Tests were performed using regression Analysis for time Series RATS 386 Version 4,0 (Doan 1992).

9. Tests were performed using PC Give. See J.A.Dornik and D.F. Hendry, PC Give Version. 7.0, "An interactive Econometric Modelling System "(Oxford:University of Oxford, 1992). The

theory and importance of unit roots is outlined in D.A. Dickey and W.A. Fuller "Distribution of the Estimators for Autoregressive Time Series With a Unit Root", Journal of the American Statistical Association, 74 (1979), pp 427-31, and D.A.Dickey and W.A. Fuller "Likelihood Ratio Statistics for autoregressive Time Series with a Unit Root", Econometrica, 49(1981), pp, 1057-72.

10. Notes: Summary of results obtained form Granger Causlity Tests. A Hsiao Procedure was incorporated to determine the optimal lag. All variables are in the form of growth rates. The dominant pattern is that with the lowest final prediction error. The signs (+ -) represent the direction of impact. In the case of feedback the signs refer to the second and fourth set of causation patterns (i.e., rail/road and road/rail). Each of the variables was regressed with 1,2,3, and 4, year lags. Strength assessment (s= Strong; m =moderate; w = weak) based on the size of the standardised regression coefficient. All data is from: government of Pakistan, Economic Survey 1993-94 (Islamabad, 1994).

REMITTANCES AS A DETERMINANT OF INVESTMENT FUNCTION
(Empirical Evidence From Pakistan)

By

Khair -uz-Zaman[1] and Mahmood Shah[2]

Abstract:- This paper aimed at examining the impact of overseas workers remittances on investment function. All variables are significant at the 5% level of significance. The difference between change in remittances (DRt) and change in domestically generated income (DYt) is also tested and found that there is no significant difference between the two parameters. The estimates of investment equation explained that remittances play a significant role in the determination of investment.

Introduction:

It is well established that investment plays a crucial role both in long-term development and in the design of short-term stabilization programmes in the developing countries. But the shortage of capital for investment is a major constraint on the economic development of many developing countries. Other constraints include purchase of agricultural implements, financing of technical innovation and the establishment of labor and capital intensive agro-industrial enterprises. Given the widely held view that remittances are an important source of scarce foreign exchange in labour exporting countries, it would seem reasonable to expect that the large inflow of remittances would help to overcome obstacles impeding economic development.

Investment Function:

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investment purpose such as to purchase agriculture machinery, to invest in improvement of agricultural land, to purchase industrial machinery and to invest in commercial ventures. The migrant households receive a large amount of remittances and they are in a position to run family firms. In addition, there are ample opportunities for migrant households to invest in agriculture as well as in small scale manufacturing sector of the economy.

So following the accelerator principle, change in investment spending is assumed to depend on the change in domestically generated income (Δ Y), change in remittance (ΔR) and the rate of interest (i).

The equation for change in investment is as follows:

$$\Delta I = f(\Delta Y\ dh, \Delta R, i) \qquad (2)$$

Where

ΔI = Change in Investment

ΔY dh = Change in domestically generated income

ΔR = Change in remittance

i = Rate of interest

Where the expected signs of the coefficients $\partial\Delta I/\partial\Delta Ydh>0, \partial\Delta I/\partial\Delta R> 0$ while $\partial\Delta I/\partial\Delta i<0$ respectively.

This paper, using quarterly data for Pakistan, for the Period (1975q2 - 1990q4) finds that remittances do have a significant impact on investment. Ordinary Least Square (OLS) and Two Stage Least Square (2SLS) regression are used for the estimation of the investment function. IN parentheses directly below the coefficients are t-statistics.

Estimates of Investment Function

Following the accelerator principle, the investment function is a regression of change in investment of change in domestic income (ΔYH), change in remittances (ΔR) and interest rate (i). There quarterly shift dummies are added to take account of seasonality. The equation for investment in simple linear form gave the following results:

OLS$\Delta\hat{I}$ = 17.72 + 0.15 (ΔY dh t) + 0.14 (ΔR t) – 0.32 ΔIt – I 0.0li

(2.97) (13.98) (3.22) (−1.73) (0.11)

$$-0.09Q1 + 0.002Q2 + 0.09Q3$$
$$(-1.17) \quad (0.02) \quad (1.18)$$

$\bar{R}^2 = 0.98$ D.W = 1.83

$$2SLS\Delta\hat{I} = 17.35 + 0.15\ (\Delta Y\ dht) + 0.14(\Delta Rt) - 0.31\Delta It\text{-}I + 0.0li$$
(2.97) (13.98) (3.22) (−1.72) (0.11)

$$-0.09Q1 + 0.002Q2 + 0.09Q3$$
$$(-1.17) \quad (0.02) \quad (1.18)$$

Where

ΔI = Change in Investment

ΔY dh = change in domestically generated income

ΔR = Change in remittances

$\Delta It\text{-}1$ = Lagged dependent variable

i = interest rate

Q1, Q2, and Q3 are quarterly dummies.

In this equation both slope parameters for change in domestically generated income (ΔY dht) and remittances (ΔRt) are significantly different from both 0 and 1 at 5% significance level. The lagrange multiplier test indicating that there is not a serious problem of serial correlation.

All variables have significant coefficients except in interest rate (i). It is not significant. It may be because in Pakistan, legal limit exists on interest rate from central authorities. So we exclude the interest rate from the equation and re-estimate it. The new estimates are:

$$OLS\ \Delta\hat{I} = 14.03 + 0.15\ (\Delta Y\ dht) + 0.14\ (\Delta Rt) - 0.03\ \Delta It\text{-}1$$
(5.50) (14.06) (3.19) (−1.73)

$$-0.08.64Q1 - 0.001Q2 + 0.09Q3$$
$$(-1.14) \quad (-0.007) \quad (1.15)$$

$$\bar{R}^2 = 0.98 \quad D.W = 1.83$$

$$2SLS\Delta \hat{I} = 17.02 + 0.16\ (\Delta Yt) + 0.15(\Delta TRt) - 0.04\ \Delta\ It-1$$
$$(10.10)\ (10.79) \qquad (3.34) \qquad (-1.75)$$

$$-0.09Q1 \ -0.002Q2 + 0.09Q3$$
$$(-1.17) \quad (-0.003) \quad (1.19)$$

All variables are significant at the 5% level of significance. The difference between change in remittances and change in domestically generated income in also tested by F-test. We found that there is no significant difference between the two parameters (at 5% level).

Conclusion:

The estimates of the investment equation explained that remittances play a significant role in the determination of investment. Here we used the accelerator principle and found that change in remittances (ΔR em) affect investment in the same way as the change domestically generated income (ΔY dh). This fact can be seen from the regression that the coefficient of change in remittances (0.14) and that of change in domestic income (0.15). Remittances increase investment and thus will generate capital formation in the economy.

Our result goes against the general findings put forth in the specification of investment function by Naqvi, et al (1983) and saving function by, Burney (1987). They claim that remittances have no significant effect on investment. Both estimates investment/saving function for Pakistan have been unsatisfactory because: (i) There is data limitations in both studies and (ii) They have not been tested for differences between the two parameters of interest.

The results show that remittances are not only consumed but are also invested significantly. Following the estimates of our investment function, remittances represent as one of the main source for investment in Pakistan.

DATA

The principal sources of data are:

The principal sources of data are:

i. IMF: International Financial Statistics (Various issues).

ii. IMF: Balance of payments, Statistical year books.

iii. Pakistan Economic Surveys. Government of Pakistan, Finance Division, Economic adviser's Wing.

iv. Annual Report, State Bank of Pakistan (various issues)

v. Monthly bulletin of Statistics, State Bank of Pakistan (various issues).

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COST-BENEFIT ANALYSIS OF SAINDAK COPPER PROJECT

By

M. Nawaz*

With resource constraints all-around in the economy, a policy oriented towards the exploration and utilization of new avenues of resources can create a "Silver Line" on the dark horizon. As the contribution of 'Quarrying' to GDP is increasing e.g. Oil, Gas, Coal; to this could be added other potential sources of revenue. An important such resource is 'COPPER' with a reserve of 250 million tonnes [Resource Development Corporation Report-1993.]

With the international price of Copper at $ 2,850 per tonne [London Metal Exchange as per average]

(a) Contract Price

(b) Market Price = 1993 $2,640 to $2,950 May, 1998. and output from 0.4m to 0.6 m tonnes the benefits are:

Projection No. 1:

(a) The direct value-added, resource mobilisation, and foreign exchange earnings:

$$\left(\$2{,}850\times\left(\frac{0.4+0.6}{2}\right)\text{m}\right)$$

$$= \$1{,}425\text{m}$$

and in domestic currency at the rate of Rs. 18.50 per Dollar [as per Exchange Rate State Bank of Pakistan 26 June, 1988]

[A- (i.e. at the time of negotiation for the Project = Rs. 25,642.88 million];

[B-On the basis of 15th April, 1989 rates: Copper, $3,170.50 mt.

London Metal Exchange: r@ [Rs. 20.17 = $1 158 ("); the value =Rs. 31,974.49 million];

---

*M, N-Project Analysts and Co-Consultants, Lahore.

besides additional income from:

(b) Import substitution,
(c) Employment opportunities,
(d) Infra-structural facilities and their spillover impact,
(e) Multiplier and acceleration impact of the project,
(f) Development of Industries based on Copper.
(g) Growth of subsidiary industries.
(h) Development of workshops and technical centres.

All these will contribute towards boosting up Copper output, increasing employment opportunity and bridging 'resource gap'.

The second section of the study is about the technique employed for the Cost-benefit of Saindak Copper Project: 3rd section deals with the Cost-Benefit analysis; 4th section takes up the problem of Pareto-Optimality and the concluding remarks have been given in the last section.

The following notations have been used in the analysis that follows:

Sb = Social benefits from Saindak Project.
ΔOp = Increase in output.
ΔF-Ex = Increase in foreign exchange earnings.
Vad = Value added to GDP.
Emp = Employment.
Mult = Multiplier.
r = Discount Rate.
DSb = Discounted Social Benefits [Saindak project]
TCc = Total Capital cost of Saindak project.
Cc = Capital cost.
C-Inf = Infrastructural Cost.
Sc.P.f.v = Shadow price of Capital cum variation in exchange rate and Price level.

Marglin's Notations ⟶ θ_1 = Investment displaced in the private Sector
θ_2 = Amount of investment displaced and reinvested.
p = return in the private sector

(A)

For the Ratio of Social Benefit-Cost, with uniform rate of discount, the following formula has been used;

$$R, Sb/C = \frac{\sum_{f=1}^{n} B_n}{\frac{(1+r)^{n-1}}{\sum_{f=t}^{n} C_n}{(1+r)^{n-1}}}$$

and with different discount Rates the Formula is

$$\frac{\sum_{f=1}^{n} C_n}{(1+r)^n} : B_0 + \frac{B_1}{(I+r)} + \frac{B_2}{(I+r)^2} + \ldots\ldots \frac{B_n}{(I+r)^n}$$

The discount rate is based on:

(i) Marginal productivity
(ii) Social Time Preference Rate.
(iii) Opportunity Cost.
(iv) Social Opportunity Cost.

These rates may vary from market rate of interest to the Social time Preference Rate, covering marginal productivity and Social Opportunity Cost. In Pakistan the Bank rate is 10 per cent [as per State Bank Weekly Reports- [23rd June, 1988 Nov. 1992.] Making allowance for other parameters, of 2 per cent; the discount rate for the purpose of Saindak Copper Project Evaluation is 12 per cent.

For the Cost-Benefit analysis of Saindak Copper Project the Total Capital Cost is as follows;

$$TCc = [Cc + C.\ Inf. + Sc.\ P.f.v.]$$

where in,

Cc = $227m.
C.Inf = $90m.

as for shadow price of capital, the following formulas based on Marglin, Sen, Gupta and A.C. Herberger, have been used [[1]–[4]],

$$Pk = \sum_{t=1}^{\infty} \frac{(1-5)\ r\ (1+5r)^{t-1}}{(1+i)^t}$$

besides, based on Opportunity Cost, shadow price of per dollar is as follows:

$$A_1 = \frac{(1-_1\theta`)r + \theta_1 P}{r} \qquad 2$$

$$A'_1 = \frac{(1-_1\theta_1)r+\theta_1 P}{(1-_1\theta_2)r+\theta_2 P} \qquad 3$$

$$A'_2 = \frac{(1-\theta_1)r+(\theta_1+\theta_2)P}{r-\theta_2 P} \qquad 4$$

$$A'_2 = \frac{(1-\theta_1)r+(\theta_1-\theta_2)P}{(1-\theta_2)r+(\theta_2-\theta_2)P} \qquad 5$$

$$A_3 = \frac{(1-\theta_1)(1+r)+(\theta_1-\theta_2)(1+P)}{(1+r)-\theta_2(1+P)} \qquad 6$$

$$A'_3 = \frac{(1-\theta_1)(1+r)+(\theta_1-\theta_2)(1+P)}{(1-\theta_2)(1+r)+(\theta_2-\theta_2)(1+P)} \qquad 7$$

As in the region, there is hardly any other alternate project, more profitable and higher return bearing, than the Saindak Copper Project, so using formula 7, the shadow price per Dollar will be as follows:

$$A'_3 = \frac{(1-\theta_1)(1+r)+(\theta_1-\theta_2)(1+P)}{(1-\theta_2)(1+r)+(\theta_2-\theta_2)(1+P)}$$

With values of parameters and variables as follows:

$P = 0.05$
$\theta_1 = 0.75$
$\theta_2 = 0.25$
$r = 0.02$

the shadow pice-per unit of capital [Dollar's term] is as follows:

$$= \frac{[(1-0.75)(1+0.02)+(0.75-0.25)(1+0.05)]}{[(1-0.25)(1+0.02)+(0.75-0.75)(1+0.05)]}$$

$= \$1.02$

Making allowance for price variations [0.3] and for tariffs cum other variables contributing to variation in Cc[0.235]

Sc,f.v. = [227] . [0.02+0.3 + 0.253]

= \$130m.

So TCc = [Cc+C.Inf+Sc P.f.v.]

= [227+90+130]

TCc = $447m.

Sb = [[ΔOP+ΔF-Ex+Vad]=[Emp.+ B.Inf.] + Mult]

where in [ΔOP+ΔF-Ex+Vad] = $3375m.

@$2,250 per tonne (1.5)m: as on January. 30th, 1988.

London Metal Exchange.

[Emp. + B.Inf]=$535m.

and

[Mult.]=$600m.

So

Sb=[[ΔOP + ΔF-Ex+Vad] = [Emp. + B.Inf.] + Mult]

= [3375 + 535+600]

Sb = $4,510m.

$$DSb = \sum_{i=1}^{n} Sb \left(\frac{1}{(1+r)t^{n-1}}\right)$$

With

r = 12 percent. [discount rate as explained in Section 2].

Tn = 10 years

Sb = $4,510m.

$$DSb = \sum_{i=1}^{n} Sb \left(\frac{1}{(1+r)t^{n-1}}\right)$$

$$= 4,510 \left[\frac{1}{(1+0.12)^{10}}\right]$$

So

DSb = $1,452.22m.

and with TCc as $477m, the Cost Benefit Ratio for Saindak Copper Project is:

C/B [Saindak] = [1: 3.24]

which shows its economic viability and profitability.

[Projection No.2]: (based on data — per P-2)

with reserves as 466 million tonnes [RDC –Pak]

Price of Copper: £ 1,757 P.T

[2nd May, 1990, London Metal Exchange]

r @ (1=$1.69)

Copper Price terms of dollars:= $2,969. 33P.T.

and [ΔOP + ΔF.Ex + Vad] = at

$$at = 2{,}969{,}33\left(\frac{0.8+1.2}{2}\right) 10 \text{ yrs.}$$

at = $29,693.30 million

and Sb = $29,693.30 + 535+600

$30,828.30m

$$DSb = \frac{30{,}828.30}{\frac{1}{(1+0.12)^{t-1}}} = \$9{,}926.7\text{lm}$$

and

$$\text{Cost -Benefit Ratio} = \left(\frac{\frac{447}{\frac{1}{(1+0.12)^{t-1}}}}{\frac{30{,}828.30}{\frac{1}{(1+0.12)^{10t}}}}\right)$$

Or C/B Ratio = [1:22.207]

which shows higher rate of return and profitability.

As for Pareto Optimality ------- the problem of economic rearrangement, the beneficiaries of otherwise; it was taken up by Pareto, scitovsky and others. In terms of Saindak Copper Project, there are several beneficiaries----- the State, in terms of value added and Foreign exchange earning; different enterprises, e.g. WAPDA and KESC: about 5,000 person who will get employment and many others who will be gainers from the Project.

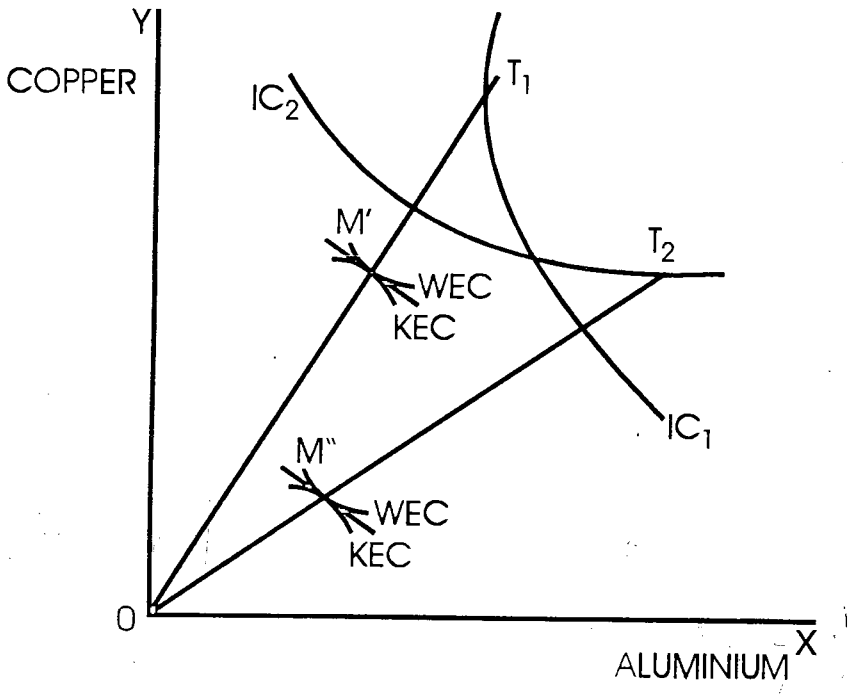
As for the problem of substitute of copper i.e. Aluminium --- it is very costly and uncompetitive in the international market. The benefit to WAPDA and KESC due to the use of Copper and Aluminium has been portrayed through the attatched diagram with the help of Ic_1 and Ic_2.

It is based on their respective prices: Copper $2,790 per tonne and Aluminium $3,348 per tonne [as per average May, 1988: London Metal Exchange].

Moving from T_1 to T_2 both users find that Ic_2 lies below T_1 and WEc are the losers. So they move to T_1 to reap the additonal benefit from the low price of Copper. At T_1 the gain

Benefits to Wapda and KESC

Gaint to their respective electricity consumers. [WEc,KEc]



to the consumers of electricity will be minimum. In this process , in terms of Pareto Optimality_____.

$$\left(\begin{matrix} Sb\ T_1 \\ WEc,KEc \end{matrix}\right) > \left(\begin{matrix} Sb\ T_2 \\ WEc,KEc \end{matrix}\right)$$

an empirical example of realising pareto Optimality.

Conclusion:

The problem of resource constraint can be overcome to some extent with the extraction and use of abundant copper reserves. With proven reserve as 250 million tonnes [Resource Development corporation of Pakistan] t_1;

Copper price = $2,950 – 1992 –93 (average): With contract price $ 2850 per tonne average May, 1988: London Metal Exchange; one can visualise, how far, Saindak Copper Project with Cost-benefit ratio of 1:3.24 can go in bridging the resource gap faced by Pakistan. The price of copper is going up with passage of time; thereby ensuring the additional foreign exchange earning capacity of the project. The price of copper was $2,250 per tonne in January 1988. After about half a year, the price went up to $2850 per tonne; (2) later to $2,969.3. (1995)[3] with 12 per cent discount rate and appropriate shadow pricing [as explained in sections 2 and 3]; Social benefits = $4,510 m; Total Capital cost, based on shadow pricing = $447m; on the basis of 'present Value' the Cost-benefit Ratio for saindak Copper Project is [1:2.24] as has been explained in section 3; and Projection -2 gives C.B.R = 1:22.207: (at 1990-1993 Rates).

As for its substitute -- Aluminium; it is very costly. Due to production slowdowns at the important centres; for example,

(a) Alcan Quebec Smelters Canada,
(b) Norsk Hydro A/S of Norway;

the price of Aluminium is $3,348 per tonne; and it is on the increasing points [International Primary Aluminium Institute: January, 1988.]

So Aluminium is uncompetitive in the international market. Under such a condition copper has an edge over it. It is very competitive and at $2,850 per tonne with output of [0.4] m to [0.6] m, the average value added and foreign exchange earnings [in domestic currency @ Rs. 18.5 per Dollar as per exchange Rate, State Bank of Pakistan, June 26,1988]

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t_1 besides an annual output of: Gold: 56,320 Ounces, [RD Pak. PA-Deptt, Oct. 1988]. Silver : 95,040 Ounces.

=Rs. 25,642.88m and 15th April, 1989 rates - Rs. 31,974.49 m. and at May, 1990 rates = Rs. 63,269.59 m. and variating (1993).

So implementation of such multiple economically viable projects can go long way in augmenting the foreign exchange reserves; besides bridging the resource gap at home. There is no Scylla and Charybdis in the way, and the value of the reserves is in no way less than that of Forthnox!

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PAKISTAN'S TRADE SITUATION AND ECONOMIC GROWTH

By

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Abstract:- The study is as an attempt to investigate the casual relationship between exports, foreign remittances and foreign capital inflow and economic growth in Pakistan for the period 1961-94.A simple version of the two-gap model is used as theoretical framework for the analysis. Results indicate that export variable is highly significant in determining the level of GDP growth and that exports tend to have a greater impact on economic growth than has foreign remittances and foreign capital. Pakistan should continue to follow an export oriented strategy to boost its economy. The main thrust of Pakistan's trade policies should be export expansion, diversification of export structure and import liberalization. Such policies can strengthen the interlinkage between the foreign sector and domestic economy.

Introduction:

The relationship between trade and economic growth has been the subject of inquiry by development economists for a long time. Diverse views on this relationship are contained in the literature. Most of the researchers tend to suggest that growth in exports has substantially contributed to the growth of the export-oriented economies [Samuelson 1948; Chenery and Strout, 1966; Bhagwati 1978; Krueger 1978; Schenzler, 1982; Dodaro, 1991 and Serletis, 1992]. The proponents of export-led growth argue that growth in exports leads to a rise in the demand for country's output, enhances technical efficiency, increases

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pressures on foreign exchange controls, and allows necessary imports of inputs. The direct implication of this was that less Developed Countries (LDCs), which trade with developed countries, gain from trade because low wages in the former are pulled up towards the level of wages which prevail in the latter. The above standard trade argument is challenged by economists who find international trade as representing a mechanism of exploitation of the less-developed countries by the developed countries [Prebish, 1959; and Emmanuel, 1972]. These alternative views suggest that role of international trade in economic development of a country, especially of a developing country, needs to be observed closely.

A number of empirical studies on export growth and output growth have been conducted in LDCs using cross-section and time-series data. The present study will explore the role of exports in economic growth of Pakistan by examining times-series data. The focus on a single country permits us to use a larger set of explanatory variables than typically is the case in cross-countries studies. It also allows us to eliminate variability caused by differences in the characteristics of countries and measurement of variables. Previous studies based on time-series data are also questioned by many eonomists. First, the data set included are of fifties and sixties which are quite old. Second, in most of the pervious studieŝ GDP growth is regressed only one explanatory variable, exports growth. While in fact many other explanatory variables such as investment, and foreign remittances also explain GDP growth.

The present study is an atempt to determine the extent to which exports in the presence of other variables are a source of variation in economic growth of Pakistan. This explanation is aimed at providing a test for the hypothesis that exports, capital inflow and remittances can play an important role in the promotion of economic expansion and development. A data set of 33 years (1961-1993) will be used to have regression analysis of relationship between economic growth and exports growth. The data on both explanatory and explained variables is taken from Pakistan Economic Survey published by Government of Pakistan in different years. Part II reviews Pakistan's trade situation for the period 1961-1993. Part III formulates a model incorporating exports, foreign capital inflow, remittances and other relevant variables to investigate their relationship with GDP growth for Pakistan using two-gap model, a standard model applied in some previous studies also. Part IV presents

empirical findings and the last part gives the summary and conclusions of this study.

PAKISTAN'S TRADE SITUATION

Export expansion is regarded as one of Pakistan's highest national commitments, and a large number of concessions and incentives have been given to exports in recognition of their pivotal role. These incentives enable exporters to be competitive in international markets. Exports grew at an annual growth rate of 10.7 percent during the 1960s and 13.5 percent during 1970s. Export growth was 7.7 percent during eighties because of the world recession in the first half of the 1980s. During 1990-93 the exports growth was only 7 percent because of the floods and cotton crop's successive failure. The share of manufactured and semi-manufactured goods exports is reaching 67 percent and if primary commodities it came down to only 10 percent in 1993-94 shifting the economy from primary goods to exports of manufactured goods.

Pakistan's trade balance was in deficit throughout he period under review except 1972-73 when Pakistan's currency was devalued. This is because of domestic trade policies, tariff and non-tariff barriers imposed by developed countries, and the low world market prices of Pakistan's export commodities which adversely affect Pakistan's export earning to a large extent. The government has been endeavouring to reduce the country's heavy dependence on imports through import substitution and rapid industrialization, but imports have continued to increase. The average annual growth rate of imports was 7.3 percent during the 1960, 16.6 percent during the 1970s, 4.3 percent during the 1980s and fell to 5 percent during 1990-94.

Workers remittances from abroad have played a significant role in financing the country's imports and overall economic development. They were $136 million (equivalent to 18 percent of the total exports) in 1972-73. Within a decade, they reached $2,886 million even surpassing export earnings in the same year. Since then, a declining trend started and total remittances were $ 1415 million during 1994-95. The decline in remittances of the overseas workers emanated mainly from the slowing down of development activities in the Middle East and the supply of cheaper labour to Middle East from other countries than Pakistan.

THEORETICAL MODEL

This study uses Chenery's two-gap model. In doing so we will relate GDP growth to both exports and capital inflow and other explanatory variables found in literature in order to find out the impact of these variables on economic growth. The model can be derived in the following manner.[1]

$$K(t) = v\ Y(t) \tag{1}$$

Where K(t) is the capital stock, v is the (constant) capital-output ratio and Y(t) is total output at time t. Rearranging equation (1)

$$Y(t) = 1/v\ K(t) \tag{2}$$

and

$$\Delta Y(t) = 1/v\ \Delta K(t) \tag{3}$$

It is assumed in the model that investment is equal to the increase in the capital stock, K(t), that is

$$K(t) = I(t) \tag{4}$$

therefore

$$\Delta Y(t) = 1/v\ \Delta K(t) = 1/v\ I(t) \tag{5}$$

Let us define foreign capital inflow F(t) during any time t

$$F(t) = M(t) - X(t) \tag{6}$$

M(t) is total imports of capital and consumer goods, X(t) is total exports of goods and services, Rearranging (6), we get

$$M(t) = X(t) + F(t) \tag{7}$$

We also assume that an insufficient inflow of imports of capital goods serves as the obstacle to capital formation and economic growth.[2]

$$I(t) = b\ M(t) \tag{8}$$

Plugging the values of M (t) from equation (7) in equation (8)

$$I(t) = b\ \{X(t) + F(t)\} \tag{9}$$

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[1] This model draws on Fajana (1979) and Ram (1981). Fajana estimated the relationship between exports, external eapital inflow and economic growth for Nigeria, and Ram estimated for developing countries, with special reference to South Asian Countries.

Substituting the values of I(t) in equation (5)

$$\Delta Y(t) = I/v\ b\ \{X(t) + F(t)\}. \qquad (10)$$

Dividing both sides of equation (10) by Y (t), we get growth rate of Y (t)

$$\Delta Y(t)/Y(t) = b/v\ [X(t) + F(t)] / Y(t) \qquad (11)$$

Equation (11) shows that growth of output has positive relation with the ratio of export to total output and the ratio of capital inflow to total output. We will estimate the following models to see the impact of exports, foreign capital inflow and worker's remittances on GDP for Pakistan.

1. $\ln (\Delta Y/Y) = a_0 + a_1 \ln (X/Y) + e_0$
2. $\ln (\Delta Y/Y) = \beta_0 + \beta_1 \ln (X/Y) + \beta_2 \ln (F/Y) + e_1$
3. $\ln (\Delta Y/Y) = \lambda_0 + \lambda_1 \ln (X/Y) + \lambda_2 \ln (F/Y) + \lambda_3 \ln (R/Y) + l_2$

EMPIRICAL RESULTS

The results of regression equations are presented in Table [1]. Equation 1 indicated a strong positive relation between the two variables, with the coefficient on the export output ratio variable being significant at the 1 percent level. About 46 percent of the variation in the growth rate of output is explained by the export output ratio only. Equation 2 includes foreign capital inflow as a proportion of GDP along with export variable. The positive coefficient on the varibles X/Y strongly supports the export-led growth hypothesis. The coefficient on X/Y is significant at the 1 percent level and indicates that on average a one percent rise in ratio of exports to GDP (X/Y) is accompanied by 0.169 percent rise in the rate of growth of GDP (X/Y). The coefficient is accompanied by 0.169 percent rise in the rate of growth of GDP. The coefficient on capital inflow as a proportion of GDP (F/Y) is positive, but insignificant, in this model. The inclusion of capital inflow as an explanatory variable of output growth adds a little to the value of R^2. The low value of R^2 is perhaps due to the exclusion of some other important variables responsible for economic growth. Foreign remittances is an important casual factor in economic growth of Pakistan. Equation 3 includes foreign remittances also. With the inclusion of remittances the coefficient X/Y becomes significant at the 10 percent level. However, its coefficient increases from 0.169 to 0.493. Moreover, F/Y and R/Y variables become insignificant. Remittances

[1] 2- See Fajana (1979).

started flowing in the economy from 1974, and this may be the reason that in the regression for (the period 1961-1993) it is not significant. Equation 4 regresses all there ($^{x}/_{y}$, $^{f}/_{y}$, $^{r}/_{y}$) for the period 1974-1989. In this equation, exports and remittances as proportions of GDP appear to have exerted greater impact on GDP. One percent increases in X/Y and R/Y lead to 0.548 and 0.332 percent increases in the growth of GDP, respectively. Foreign capital inflow (F/Y) as a proprotion of GDP is positive but remains insignificant. The value of R^2 improved from 0.478 to 0.591.

In equation 5 the variable F/Y was dropped. Here we regressed X/Y and R/Y on GDP growth for the period 1974-93. Our results indicate that X/Y and R/Y are significant at 5 and 10 percent levels, respectively. The coefficient of X/Y indicates a large impact on economic performance (0.918) while the impact of remittances appears to be weakened to 0.21 percent as remittance started to decrease after 1984. In most cases exports are significant in our equations, which implies that the role of exports as a catalyst of economic growth has been quite impressive.

SUMMARY AND CONCLUSIONS

Pakistan's balance of trade was negative throughout the period (1961-93) yet its trade performance was good which helped to mitigate the very sharp deterioration in the invisible account that occured due to adverse exogenous developments Exports grew at an annual rate of 10 percent during 1960s the growth in exports was registerd at the 30 percent on average. In contrast, export growth has a downward tendency during 1980s. However, if we see it together with workers' remittances in this period this figure becomes very impressive. The average annual growth rate of imports was 5.2 percent during 1960s and 30 percent in 1970s. During 1980s the average annual growth was 4.2 percent specifically in three years (1982,85 and 89) growth was negative which may be attributed to a fall in imports of machinery and edible oil.

The role of exports in economic growth is subject of inquiry in the literature. However, there is a dearth of empirical and theoretical studies on the subject for Pakistan. This study was an attempt to investigate the casual relationship between exports and economic growth in Pakistan for the period 1961-1993. More specifically, this stduy was focused to judge whether exports and remittances are important for economic growth of Pakistan. A simple version of the two-gap model developed by Chenery was used as theoretical framework for the analysis.

Generally, our results indicate that export growth was an important variable for economic growth in Pakistan. In the first model, we found that the export variable is highly significant in determining the level of GDP growth. In the second model, which included foreign capital inflow, the results suggest that exports tend to have a greater impact on economic growth than has foreign capital inflow. The third model inlcuded workers' remittances. With the inclusion of this variable, the significance level of exports deteriorated and other two variables showed a weak impact on economic growth. Since workers' remittances started only in 1974, the fourth model looks only at the period 1974-89. The results inidcate that exports and remittances have greater impact on economic growth than foreign capital inflow. Model 5 drops the foreign capital inflow; exports and remittances became more significant. These results suggest that the role of exports as a catalyst of economic growth has been quite impressive. Wokers' remittances have also played a significant role in economic development after 1974.

If appears from our results that Pakistan should countinue to follow an export oriented strategy to boost its economy. The main thrust of Pakistan's trade policies should bc export expansion, deversifiction of export structure and import liberalization. Such policies can strengthen the interlinkage between the foreign sector and the domestic economy. An efficient export-led growth can make a significant contribution to reducing Pakistan's trade deficit and need for external financing.

TABLE

Regression Estimates of the Growth Model
(Dependent Variable = Growth in Real GDP)

Equation	(1)	(2)	(3)	(4)	(5)
Period	1961-63	1961-93	1961-93	1974-93	1974-93
Constant	–0.3734	0.4084	0.1900	0.131	–0.950
In X/Y	0.611	0.169	0.493	0.548	0.918
	(4.680)	(4.701)	(1.623)	(1.427)	(2.365)
In F/Y	-	0.0530	0.0390	0.098	-
	-	(0.807)	(0.534)	(0.934)	-
In R/Y	-	-	0.041	0.332	0.210
	-	-	(0.639)	(1.622)	(1.706)
R^2	0.457	0.471	0.471	0.590	0.502

Note: Figures in parentheses are t-statiscs.

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THE PRIVATIZATION TRENDS & DEVELOPMENTS IN SOUTH ASIA AND LESSONS FOR FUTURE

By

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Abstract:- This paper is an analysis and overview of the recent trends and experiences of privatization in Bangladesh, India, Srilanka and Pakistan. The wave of privatization is response to the domestic economic and political situation of these countries. These countries have been adopting the privatization policy in one form or another since the early 1980s. This paper identifies certain social, political and economic constraints in the process of privatization and lessons for year 2000.

Introduction

The privatization policies and programmes are as varied as the countries themselves reflecting the specific characteristics of their circumstances and their economic position. The South Asian developing countries set high goals for privatization e.g. the efficiencies of enterprises would be improved, capital market development would be stimulated, internal and external debt levels would be reduced, the allocation of different resources within the country would be improved, and there is a considerable debate about the fulfilment of these objectives. The sectors and enterprise of different countries have their own unique characteristics that implementation strategies have to vary. However, these countries have vast privatization programme in every field of enterprise.

The recent trend of privatization has been prescribed as a method for improving the operating efficiency and hence profitability of the public enterprises. It is often claimed that the privatised firm will yield a higher return on capital invested and will accelerate economic progress (Gray L. Cowan 1983).

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It is also claimed by some writers and economists that public enterprises are a drain in the public purse and have also failed to meet the social and political objectives set for them. As a result of this there has been growing criticism of public enterprises and their performance in some of these countries. Other policy makers argue that the main cause of poor performance of public enterprises and even of privatized ones in developing countries is poor planning and implementation. Wrong selection of product line, lack of enterprise are seen as the major causes of inefficiency.

Nowadays the governments are gradually trying to eliminate these handicaps or weaknesses as a policy of learning by doing. Alan Rufus Water (1985) states that the present general downward trend in the economic performance of many of the South Asian developing countries and the existence of mass poverty, have increasingly led to the development of strategies for privatization; and foreign investment and private domestic capital are less likely to be regarded as an agents of foreign domination and exploitation. Alan also argues that economic theory is now quite explicit and clear that due to the nature of ownership and hence incentive, a state entity cannot be as efficient as private entity in the production of the same output.

For Water, economic growth in the developing countries can only be achieved through one solution; that is privatization of public enterprises. For him it is self evident that the managers of private enterprises have the incentive to work harder and manage better than the managers of the public enterprises.

It has been suggested that in some developing counties, public enterprises have become a vehicle for corruption, nepotism, misappropriation of the public funds and indeed an instrument for furthering the political and material interests of the ruling parties. Although these are very strong views these things are generally thought to have happened in situations where PEs experience substantial political bureaucratic interference in decision making. The literature reviews show that the public sector enterprises have not been able to achieve their objectives especially in the developing countries. Under these circumstances, the privatization of public enterprises in the developing countries would be justified in order to dispose of the above mentioned problems.

Dinnis A.Rondinelli (1991) also analyzed the rapidly increasing public debts, inadequate revenues and inefficiency of the SOEs in the developing countries by saying that "inadequate revenues and high level of debt service exacerbate the inability of the over-burdned government agencies to provide services and infrastructure efficiently. Many state owned enterprises (SOEs) in the public service industry lose large amounts of money every year, further depleting the government treasury. However, all the above mentioned problems are not attributable only to the state owned enterprises in South Asain countries; they can also be attributabie to poor planning, faulty selection of product lines, underdeveloped infrastructure and undue interference by the governments. If all these handicaps can be removed and SOEs enjoy a competitive environment, then there is no reason that public enterprises can not be successful business entities (Berhanu Mengistu, 1988) Mengistu's arguments seem logical, that if the governments in the developing countries can provide a free and competitive environment while commercializing the state enterprises, then SOEs have the ability to succeed and compete in domestic and international markets.

Privatization in least developed countries was motivated by political as well as economic reasons. Governments' commitments to lower taxes and reduce public sector borrowing requirements, was politically easier to achieve by selling government assets than by cutting expenditure. On the other hand, for economic reasons they wanted to improve efficiency and productivity by introducing competition into the private sector. There are political, historical and ideological reasons behind the privatization movement but economic factors probably are the major one. Another important cause of the privatization movement is the international pressure from the donor agencies to pursue this policy as an economic reform programme.

Implementation Programs in Selected Countries:

The privatization programme was started in the South Asian countries by the influence of the developed countries and objectives according to their social and economic positions. Privatization objectives are, therefore, often more theoretical notions rather than targets for practical implementations. Ideally, there should be a well defined organizational set up and structure within the government to permit orderly and efficient implementation including the prioritization of

candidate enterprises, the definition of responsibilities of outside advisers, and the selection of advisors to monitor the implementation process. Most civil servants are not endowed with either the practical experience or the technical skills required in the implementation proccess. In a few cases, the privatization programme and its objectives are quite clear, but not in most cases. The analysis of the experience in most countries suggests that privatization is proceeding gradually, at best. However, almost all developing countries are divesting state owned enterprises. This wave of Privatization in the developing countries is being done by offering shares publicly on the stock exchange, private sales of shares to domestic or foreign investors, management buy outs and the distribution of shares of vouchers to the general public. It has been to the aim of improving these services and increase their efficiency that the sale of these public enterprises has been directed. Recent developments in privatization in selected Asian countries are discussed as under:

Bangladesh's Experience:

In the early 1970s, after independence, the Bangladesh government nationalized major industries. In July 1974 the government started considering liberalization of state industrial sectors due to the poor performance of the SOEs. By June 1982, a policy was announced to withdraw all restrictions on ceilings for private investment and only 6 industries were reserved for government ownership.

The shift to a policy of economic liberalization after 1975 has included some serious attempts to revive private investment through incentives and disinvestment by the government. Mr Ershad's government was keen to promote manufacturing and pursued a policy reminiscent of early, South Korea and Taiwan. While the industrial capitalist class in the country remains small and lacks of political influence, the government is nevertheless seriously committed to promoting industry, and this is potentially conducive to industrial growth (Clive Hamilton, 1987). The new government has developed its own strategies and public enterprises and defined as public sector corporations and under each of them there are several other units. This sector now consists of 15 financial and 35 non financial enterprises.

Privatization: What & How

The government of Bangladesh has divested a total of 1076 state owned enterprises including 609 in the industrial sector. Most of these divestitures took place during the early 1980s with 33 Jute and 27 textile mills returned to the former owners in 1982. The majority of these units have been transferred to the private sector or negotiated with the former owners and returned to them as part of the denationalization policy.

The government has also decided to carry on gradually the task of restructuring the equity base of state owned enterprises (SOEs) and has undertaken extensive rehabilitation of them. 49% shares of most of SOEs are being sold to private buyers as a part of the gradual privatization process and 15% of these have been given to the workers of the enterprises concerned. The USAID through the Center for privatization and the World Bank under the Structural Adjustment Programme (SAP) have helped the Bangladesh government and also carried out comprehensive privatization studies regarding the industrial and agricultural sectors. With the assistance of the above agencies the government made an evaluation of future privatization opportunities in the country and recommended appropriate strategies for improvement of the privatization programme (Muhith A, 1989). The government has sold most of the manufacturing and agricultural enterprises to the private sector. For example, 50 enterprises under the Bangladesh Chemical Industries Corporation, consisting of 25 tanneries, 5 rubber plants, 7 manufacturing companies, 5 paper manufacturing units and 8 other were sold to the private sector through open bids, and in the Agricultural sector 30 enterprises which came under the Bangladesh Sugar and Food Industries Corporation were also sold to private buyers throuhg open tender for $11.5 million. The following industrial sectors were privatized in the following ways:

Agricultural, chemical industries, textile and Jute mills through private sale; Iron and Steel companies by public shares; machine Tools manufacturing units through management contract.

This privatization programme has been claimed as one of the largest privatization programmes in Asia and has been successful despite some difficulties at different stages of the process. However, the private

investment trend is very low and has hardly improved efficiency except in the textile industries.

Sri-Lankan Experience:

Sri Lankan economic reform started in 1955. The government made a long term plan in 1955 under Government Sponsor Corporation Act 1955, to divest and transfer the statutory bodies into joint stock companies. A 1957 act permitted the government to take over all these joint stock companies. This process was accelerated during 1971 by nationalization of several key private sectors of the industries. The government established various forms of public enterprises, e.g the public companies, government owned companies, the public corporations, government enterprises and government owned business undertakings (David Heald 1989).

In 1977, under the Land Reform Act, some further enterprises were nationalized which meant the country had one of the largest public sectors outside the centrally planned economies. The state owned enterprises (SOEs) accounted for around 40% of the gross output in manufacturing and over 40% of the employment in this sector. Out of 143 state owned enterprises, 127 were from non-financial enterprises and 16 from financial enterprises. They were performing below satisfactory level and so the government decided to improve their position and divest them.

Privatization: What & How

During the 1980s the trend towards privatization was started where a committee was appointed to restructure and improve the efficiency of public sector enterprises. In 1987, the World Bank gave conditional loans to the Sri Lankan government for the divestiture of state owned enterprises and corporations. As a result, the government formed a Presidential committee on the privatization in July 1987 which consisted of high level government officials and the private sector as well. The committee identified 18 enterprises which would be candidates for privatization. The Government has sold some of them and 11 enterprises have been partially divested and 5 enterprises have been contracted out to management. The committee launched an extensive campaign to explain the objectives of the privatization programme along with the economic benefits.

The government endorsed the programme and objectives of the newly formed privatization commission. The rationale, criteria and merits of Privatization have been debated and identified and three main techniques of privatization have been used by the government of Sri Lanka.

The first, complete ownership transfer, has been used in the manufacturing sector, three textile factories have been sold to the private sector. At the time of sale these three factories were profit making units.

Second, partial ownership transfer. The government decided to convert the State Rubber Manufacturing Corporation into a joint stock company, with 60% government ownership and 40% to be offered to the general public and employees. Initially the SRMC position was not good but after the formation of the new company its profits have improved. Third, joint venture and management contract. This approach of full or partial privatization takes advantage of the greater scope for operational autonomy enjoyed by the joint stock companies relative to the public corporations. Under this mode the components of the Bank of Ceylon and Corporative Whole Establishment (CWE) were privatized. Sri Lanka textile companies, Thulhiriya, Pagoda and Vayangoda under the National Textile corporation, Cement Corporation, Kanka Cement, Air Lanka and several Hotels were contracted out (Helon Nankani, 1989 and 1990). However, the Sri Lankan authorities have been careful on the choice of the instruments responding creatively to a multitude of environmental constraints. According to Peter Smith and G Staple (1994), "Sri Lanka has pursued a step by step sector program that has been strongly influenced by other commonwealth countries. The operator, Sri Lanka Telecom (SLT) has been corporatized, the scope for private investment has been broadened, and an independent regulator has been chartered, and all these steps have significantly increased the level and scope of available telecommunications. This is specially so for wireless services: there are now two cellular radio operators, and a third nationwide license is expected (pxxi). This is a new development in the Sri Lankan telecommunications industry. Other industries like National Textile Corporation, Cement corporation and Air Lanka were privatized through management contracts and other enterprises through private sale. The Sri Lankan government experience suggests that the privatization of public utilities required reorganization before the implementation of the privatization process, Sri Lanka Telecommunication department also

provides a good example of the use of complementary sectoral policies in the case of public monopoly. Initial efforts involved formulation of the telecom policy framework, formation of a new legal entity and design of a regulatory body.

Indian Experience:

The Indian government declared a privatization programme in the policy framework of its Seventh Five Year Plan that commenced in 1985, while encouraging overseas investment in certain industries. The industrial policy assigns a more responsible role to private sector which can operate in those areas which were closed to them e.g. telecommunications equipment, power generation and petro-chemicals. (Y. venugopal, 1990). The Indian planning commission has outlined the eighth Five Year Plan, 1990 to 1995, which indicates the selling of 25 precent of state owned enterprises. It is estimated in the plan to raise Rs. 120 billion revenue for the government. According to the new Indian policy joint ventures are welcomed, with a maximum of 49 percent to be held by the government. The government has made further changes, easing the 40% ceiling on foreigners equity holding in Indian companies, allowing Indian companies to raise equity capital abroad, revising monopoly regulation and raising the funds through the privatization programme (K.K Sharma, 1988). The Indian government has made several plans with the help of the USAID but the implementation process is not as fast as in other countries.

Privatization: What & How

The Indian government policy involved, inter-alia, elements of deregulation, liberalization and autonomy to public enterprises in the seventh Five Year Plan, 1985-90. These measures introduced competitive elements into domestic industry and encouraged international direct access to the open market funds, redefining the role of public enterprises. The techniques of contracting out and franchising are not considered as privatization in India, only disinvestment, or divesture is considered as privatization. A greater role was given to the foreign joint venture programme in areas hitherto reserved for public enterprises. The Government of India is using a case by case approach to privatization.

Generally, privatization in India has the following policy and programme:

(a) case by case policy;

(b) deal initially only with loss-making enterprises;

(c) dealing with the competitive sector where the private sector is already dominant;

(d) includes conversion into joint venture.

The Indian government has a great deal of social and equity issues along with those of financial and legal regularity. It is not clear that public enterprises can't improve or that the private sector can be more efficient through the simple transfer of ownership under the current situation. It would however, be unrealistic to proceed on assumption that the issue of Privatization will not take an important place in future economic policy.

The Indian government can show good result if both central and states governments develop combined strategies and policies under a central committee (Ramanadham V.1990). However, in India the pace of privatization and change in the economy depend on the stability of the government because government is facing other problems than the inefficiency of public sector enterprises. For example the burning question is the Political instability in India is also a major cause of slowness of the privatization movement.

Pakistan's Recent Experience:

Despite frequent changes in government, privatization in Pakistan is one of the most important economic reform programmes being implemented in the last 8 years under the leadership of the two major political alliances of the Pakistan Muslim League (IJI) and the Pakistan People's Party (PDA). The most up to date sale of public sector enterprises are as under:

Revenues From Privatization of SOEs During 1991-1996

As PC reported in 1996 (up dated) Rs in millions

Industry/units	Number of Units	Receipts
Automobile	7	1111.91
Cement	11	7648.12
Chemicals	12	1630.49
Fertilizers	1	435.39
Ghee	16	581.93
Rice	8	237.35
Engineering	7	102.49
Roti Plants	12	78.34
Banks	2	3391.63
Newspapers	5	266.10
Telecom (PTCL)	2(offerings)	30500.0
Others	6	229.39

Source: Privatization commision & Business Recorder (kh)

The above government industrial units were sold during last five years and received about Rs 16260.3 excluding PTCL. The government used pak telecom proceeds for its fiscal operation as provided in original plan (Pakistan Economic Survey 1996).

The consortium of consultants for PTC approved by the IMF has proposed the sale of a controlling stake of 26% and 40% to strategic investors. They will further invest about $5 billion in seven years for expansion of PTCL (The Muslim, December 23, 1996).

An Overview of Privatization Under Various Governments Table-1:

Privatization During Nawaz Sharif's Tenure (1990-93)

Total Units	115
Expected Income	Rs. 300 Billion
No. of units privatised	69
Amount received from sale of 69 units	3.95 Billion
Bank guarantees	Rs. 4.66 Billion
Loans, given to 69 units Written off	Rs. 10.00 Billion
Reserved for golden shake	Rs. 16.35 Billion

Source: The News, Feb, 9, 1996 & Senate Standing Committee.

Table-2:

Privatization During Benazir Bhutto's Tenure (1993-1996)

Total Units	31
No. of units privatised	13
Income after selling units	Rs. 863.9 million
Amount invested for golden hand shake	Rs. 1.00 Billion

Source: The News Feb. 9,1996 & Senate S. Committee.

Table-3:

The privatization: an Overview (1988-1995/96).

Amount Received After Privatization	Rs. 34,531 Billion
Amount Invested on the Social Action Program (SAP).	
Public Sector Development Plan,	Rs. 1600 Billion
Amount Invested on Debt Payment	Rs. 600 Billion

Source: As Above

The above liberalization and privatization development to date shows that different governments have made various programmes for implementation but due to political uncertainity no one could properly achieve its specified goals. As on November 5, 1996 the PPP government was again dissolved and election would be held on February 3, 1997 and newly elected government will take time to establish itself under the current political and economic situation of the country. According to the paper presented on 14-16 December 1996, at PIDE's conference, by A.R. Kamal that Pakistan has been able to privatise 86 manufacturing units. 2 banks, one development financial institution and one thermal unit, 12% shares of PTC and 10% shares of PIA over the last 5 years. While the pace of privatization may have been impressive but it has not been able to realize the avowed objectives. Perhaps the government should draw lessons from its own past privatization experiences as well as from other Asian countries. It is therefore, important to establish the legal framework and its operating mechanism before deregulating monopolistic enterprises/utilities otherwise its consequences may not be favourable.

Pakistan has not yet achieved a continuity and stability in political and economic sector for privatization development. However, the social and physical infrastructure as well as the business environment are gradually developing and if any political group succeeds in ruling for a substantial period of time then Pakistan may have the opportunity to implement a privatization and deregulation policy and to move towards industrialization and self reliance.

Conclusion:

The above analysis of the selected South Asian countries shows that a rapid privatization is taking place especially in regard to the utilities and services sectors i.e. telecommunication, electricity, transportation, education and health care. All these sectors are alleged to be poorly managed by governments which are not able to provide the good facilities and proper standards of service to all consumers. There is thought to be a need for private participation and investment in order to create a competitive environment for the improvement of services and life style leading towards the social, political and economic development of these countries. The comparative studies of above countries and past experiences show that the problem is not one of ownership only. Often there is also a lack of a clear blueprint, organized control, motivation and reward systems and a suitable organizational culture in the above selected Asian countries. These "technical" difficulties may be as constraining as political factors. However, the lessons learned are that the success of any particular privatization project will depend on socio-political development, a well planned infrastructure and an appropriate implementation programme with full political stability and commitment.

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ECONOMIC ROLE OF WOMAN IN MOGHUL SOCIETY

By

Qais Aslam*

The Moghul Economy

The Moghul Empire in India was as mighty an empire as any in that period and is considered by many historians as the wealthiest of its time. The might of this Empire was not only political but also had an economic base. The land was fertile, the soil rich, the people hard working and the climate variable for different regions, but favourable for agricultural production. Throughout this period, the economy was based upon agriculture as its main source of production and revenue. The village in the Moghul Empire was a self-sufficient economic unit producing and exchanging on natural economic basis. During this period, there was a transformation, from a natural economy to a commodity exchange economy, with agriculture as the main source of income in the rural areas and commodity production both in rural areas and in urban centres. Large scale producing sectors of Moghul empire were, mining of precious stones, construction of buildings, along with its affiliated crafts and the production of saltpetre and armaments. Most of the historians believe that the overall ownership of land during the Moghul period, vested with the Emperor. But historical evidence also shows, that many economic enterprises (especially in Akbar's time) were owned and run by the rulers themselves, we can safely say that most of the economic activity, both in agricultural and non-agricultural production, during that period, was carried on by individual owners in the non-governmental sector - a form of private ownership in the pre-capitalist economy. While, construction of buildings, mausoleum, infrastructure, maintenance of army for war effort, along with social welfare programmes were paid from the state treasury, therefore we can say that these were forms of state enterprise in that period. Rough calculations show that the Gross Domestic Produce of the Moghul Empire would be (in pound starlings) 108 million in 1594 and

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270 million in 1695 respectively.(1) Most of the revenue of the state was spent on the emperor's luxurious life style and his large household as well as on costly but frequent wars in accordance to the will and wishes of the emperor himself. At the same time, the condition of the general masses, in spite of the huge economic activity in the Moghul Empire, remained poor and often miserable throughout that period.

The Moghuls, during their rule in India, united a large part of the country, giving a relevant level of stability and centralised authority to their Empire. During this period in the Moghul Empire there were peasants, craftsmen and artisans, who were not only highly skilled, but also hard working. Apart from agriculture, there was in the Moghul Empire, an immense level of non-agricultural production. The Moghul society was a consumer-based society. There existed during that period, commodity-money relationships both in urban as well as in the rural areas. Money as a medium of exchange was both prevalent in the society and was being accepted by the common people to pay their debts, taxes and dues. During the Moghul period, an indigenous, but highly efficient banking system was in place in the Empire, through which money could be transferred from one part of the country to another. Also an efficient spy cum postal system was in place in the country, for the ruling class, to exchange information from one part of the Empire to another. There existed during that period, middlemen, traders and entrepreneurs who were ready to employ the skills of others in order to sell their goods both in the local as well as in the foreign markets. Most of the towns and cities of the Moghul Empire had become big trading centres. Employment opportunities in the public sector as well as the private sector were there. Most of the jobs created through the state treasury were in the construction industry, in administration and in the army. Huge revenues were gathered by the state each year, which was one-third of the gross domestic produce of the country. Even before the Moghuls, a certain level of education and technology existed in India. All their emperors were surrounded with thinkers and scholars of that time. Their buildings and architecture revealed a high level of knowledge of mathematics and physics, and use of imagination. There was an active political, economic and cultural contact of the Moghuls with the outside world, from where new ideas could and must have filtered in. In short, there was consumption, there was employment, there was output, and there was exchange. Wealth was being created and exchanged, but there was very little capital accumulation and economic development.

Role of Women in the Family

It is true that, even the men of the lower castes and classes had no say in the economic and political decisions of the country, Moghul India was a male dominated society. The role of women, at home, in the family and in society, was secondary. Because of the joint family system in India, women did not have any decision-making powers. N. Chaudhry writes about the status of women that with the on coming of the Moghuls, "Not only her role was restricted but also. development in terms of education and learning".(2)

Women as Craftsmen in the Home and family

Contrary to what N. Chaudhry describes above as the status of women in the Moghul society, historical evidence suggests that women and children actively took part in the economic process throughout the Moghul period. It is not only that the peasant women worked in the fields along side their men folks, but also there is evidence that most of the weaving and spinning going on in the homes of the artisans. was done by their Women folk. A. I. Chicherov writes about many crafts where women and children of craftsmen and artisans were engaged in the productive processes. For example, women did washing in the Jat caste families. Women carried on spinning in the villages and in the towns. A. I. Chicherov writes that, in Bengal "In addition to women of the peasant castes, spinning also occupies the leisure hours of all the women of high rank ... Even the women of the Brahmans here employ themselves in this useful industry". "Generally the best kind of thread were produced by women of higher castes, especially (in Bengal) by impoverished Brahman widows. The coarse thread was produced by women of the common riots who could not spin fine thread because of their fingers were rendered stiff by hard work. Spinning was becoming the profession of the widows of the higher castes, who thereby made a livelihood for themselves and their dependants. The spinning of thread of the highest quality required special skills, which was passed on from generation to generation, took up practically all the time of the women spinners and was, in fact, their main occupation".(3)

Women as Skilled Spinners

About the skill of women spinners Chicherov writes, "The finest kind of thread, used for the manufacture of fine fabrics - muslin, the production of which required special spinning skills - were hand-made with the help of a spindle. The women plying the trade had to have 'quickness of sight' as well as very nimble fingers". "The best spinners were women between 18 and 30; after 40 their eyesight deteriorated to such an extent that they could no longer spin fine thread". (4) Apart from weaving and spinning, the whole family of the artisan took part in printing process. The weaver's family also carried out bleaching and dying of cloth.

Women Engaged in Other Crafts

In the areas where iron ore was found there is evidence, that whole families were employed in digging up the ore and on the furnaces for its melting and re-moulding. "A furnace was often serviced by a whole family, which produced blanks in the form of bars, wedges, plates etc, which were sold".(5) This was also true for many other trade and crafts in Moghul India.

Women as Traders

There is also evidence that these women artisans bought raw materials from the traders, and in return sold their own produce in the market for money. In one of the districts of Gorakhpur, for example, the thread belonged to ' the good women of the country' who paid the weavers for their work "partly in money, partly in thread, and partly in grain".(6)According to W. Ward, the women spinning cotton in Bengal often sold the thread to merchants or weavers; a mother of a family earned sometimes as much as 7 to 10 shillings (about Rs. 5 to 8) a month.(7) In Dinajpur small merchants sold cotton "to the women who spin and who again sell their thread to the weavers. Similar practices were observed in a number of districts in Bhagalpur (Bihar). In Mysore at the weekly markets the cotton wool is bought up in small quantities, by the poor women of all castes, except the Brahmans". "The women of all other casts spin, and at the weekly markets sell to the weavers the thread that is not wanted for family use".(8) in other parts of India thread were available in the market produced by women.

Economic Activity of Some of the Rich and Power full Women

As the peasant women worked in the fields, the women artisans produced thread and cloth, many ladies of the ruling elite freely took part in trade and commerce with the outside world, and some more famous in that period had their hand in politics and intrigues of that time. M. P. Srivastava writes, "Though in fact trade and commerce was never a favourite occupation of the ladies but there are some instances of the ladies of the royalty who were interested in trade and commerce during the Moghul period". "Some ladies of the royalty had their own junks (ships). Jahangir's mother had one Junk and her ships carried on brisk trade". "Nurjahan Begum also took much interest in foreign trade and she had a number of ships. Nurjahan dabbled indigo and embroidered cloth trade". "Jahanara Begum, the favourite daughter of Shah Jahan also owned a number of ships and used to carry on trade on her own account". (9)

Women in Politics

There were more than a few famous women of the Moghul Dynasty who had an active role in politics of their time. One was Empress Nurjahan, the wife of Emperor Jahangir, who was known as the power behind the throne; because she actively ruled the country along side her husband. Then there were the two daughters of Emperor Shah Jahan, i.e. Princess Jahanara and Princess Rawshanara who played an active part in supporting their brothers, Prince Dara Shakoh and Prince (later Emperor) Aurangzeb for the quest to the throne on their father's sick bed. Reading of the Spy News Letters It is important to note that the record or the gazette containing the important news through the highly efficient spy network of the Moghul Empire was sent once a week to the Emperor, wherever the Emperor might be at that time. The women of the palace at about nine O'clock read the important state newsletters in the presence of the Moghul Emperor.

Princess Zebunisah, one of Emperor Aurangzeb's daughters was the best-known poetess the Moghul period has ever produced.

Social Behaviours of the Moghuls and Their Women

N. Chaudhry writes, about marriage, widows and divorce, during that period, that "Caste marriage was strictly followed and observed".

[10]"Child marriage was not the development in Moghul India; it existed since the ancient days".[11] "The wealthy in both Hindu and Muslim society practised polygamy. But the normal practice was to have one wife". "Polygamy was more prevalent among the rich Moslems. N. Chaudhry further writes that, "Among the Hindus, widow remarriage was not allowed except the lower castes". "So Sati system became an established social institution".[12] "The Moghul Emperors, particularly Emperor Akbar and Emperor Aurangzeb, tried to abolish this custom",[13] but to no success. About Harem and prostitutes N. Chaudhry writes, "The Imperial Harem was an important institution in Moghul India. It was a place where the Emperor, the ladies of the royal families and nobles of high ranks resided". [14]"More than 5000 ladies were in Akbar's Palace, all had their respective apartment and were attended to by adequate number of servants, female guards and eunuchs".[15] "The queens and princesses were paid pay or pension to meet their expenses. Besides they also received presents from the king from time to time. They enjoyed all the pleasures of the world without any anxiety. They wore fascinating costumes and rich and matchless jewellery. Their standard of living dazzled the eyes of contemporaries. The Moghul Emperors made suitable arrangements for the entertainment of the inmates. Many beautiful and renowned dancers and singers were appointed".[16] This also shows, that there were women singers, dancers and prostitutes working in that period and present at the courts of the kings and their nobles. "The nobles, both Hindu and Muslims, had their own harems designed on the pattern of royal harem".[17]

Misfortunes of the Moghul Women

Women and children of the royal family while shared in the fortunes of their men, during that period, also shared in the misfortune of their husbands and fathers. These women of the Royal family often courted disgrace, exile, prison and even death along with their men at the hands of their own relatives. For example, Emperor Akbar was born when his mother was accompanying Emperor Humayun in exile. When Emperor Shah Jahan was crowned, his step mother, Empress Noorjahan, and wife of his father Emperor Jahangir had to flee and died in exile. In turn, when Emperor Shah Jahan was imprisoned by his son Emperor Aurangzeb, his daughter (and Aurangzeb's elder sister) Princess Jahan Ara "and all of Emperor Jahangir's numerous women kept him company [18]in captivity. Moin-ud-Din writes, about the flight of Prince Dara Shikoh, after his

defeat by his brother Emperor Aurangzeb's forces, "On this painful flight, Dara was accompanied, among others, by his beloved wife Nadira Bano". "The wives and children of Suleman Shikoh and Sipihr Shikoh also accompanied them".(19) S. L. Poole writes, "Two daughters of Aurangzib were given in marriage to the prisoners: one was allotted to the younger son of Dara, and a similar consolation was awarded to the son of Murad-Bkhsh".(20)

Conclusion

What has been written above is a collection of historical evidence taken from different historical sources of that period. This evidence has been compiled, in order to disapprove the common beliefs that the women during the Moghul period were confined to their homes and had little access to the outside world. From what has been said above, it is quite clear that the women during that period actively took part in economic, commercial, political and cultural activity along side their men folk, irrespective that these women were from the richer or the poorer strata and classes.

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