

Analysis of the Trade Pattern of Pakistan: Past Trends and Future Prospects

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ABSTRACT

A study was designed to check the past trends of Pakistani trade both in case of exports and imports, and to investigate future prospects. A time series data from 1971-2003, collected from various secondary sources, were used for analysis. Growth rates for the past trends were calculated by using log linear model whereas ARIMA (Auto Regressive Integrated Moving Average) model was used for the forecasting of imports and exports. An increasing trend both in case of imports and exports during the study was seen. According to the forecasting results, imports were expected to reach at Rs. 550089.0 million with upper and lower limits of Rs. 834915 million and Rs. 265263 million respectively whereas exports were intended to reach at Rs. 418461 million with upper and lower limits of Rs.696056 and 140866 million respectively.

Key Words: Trade; ARIMA; Forecast; Growth rate

INTRODUCTION

Trade means exchange of goods and services between or among the parties and is meant for the transactions both at national and international level. From the barter trade to online trade, world has passed through many recessions and booms but learning through time has added a number of terms in the dictionary of trade terminology. At international level, trade means both export and import. The word 'Export' can be defined as commercial sale of goods, services and financial assets in the international market. Export refers to the value of goods and non-factor services that one country produces and sells to the rest of the world; it includes merchandise, freight, insurance, travel, and other non-factor services whereas the repetition of the same phenomena with the intention of purchasing from the international market is declared as imports (Appleyard & Field, 1992).

In the early years, potential of available resources could not be exploited in a better way, which later on, proved a major factor for slowing down the pace of development. That earlier sluggish development resulted in small exportable surpluses, which delayed the stage of quantum development in Pakistan. In 1950-51 Pakistan exported products worth of 1343 million rupees whereas during the decade of 1950s, exports decreased by 43.18%. However, in the decade of development under Ayub Khan's regime industry was established and nature of production changed, so did that of trade. In 1960-61 exports were recorded as Rs.540 million, showing a declining trend earlier on but shortly regained the momentum and during the decade of 1960s exports increased by 161.88%. The pattern of trade took on a different story after 1971, when

Bangladesh was created, because the contribution of East Pakistan in Pakistan's trade and foreign exchange had been quite substantial. In the decade of 1970s exports increased from Rs. 1998 million to Rs. 29280 million and reached at Rs. 138280 million in the 1990-91 (Zaidi, 2000). The figure rose up to Rs.560947 million in the year 2001-02 whereas according to the most recent statistics, in the year 2003-04, Pakistan's exports are recorded as \$10001.0 million showing an increase of 13.1 % from the last fiscal year (Govt of Pakistan, 2003-04).

The composition of Pakistani exports has changed significantly over the years. The principal changes have been the steep fall in the shares of primary and semi manufactured exports and equally sharp increase in the share of manufactured exports. In the early years, share of primary goods was more than semi manufactured and manufactured goods. In 1948-49, 99% of Pakistani exports were made up of just five primary commodities i.e. raw jute, raw cotton, raw wool, hides and tea. So, Pakistan fits the classical case of an unindustrialized, undeveloped country, in the very early years producing and exporting only primary products and mainly dependent on adequate climatic conditions (Zaidi, 2000).

On the other side, Pakistani exports are highly concentrated in a few items namely cotton, leather, rice, and synthetic textiles and sports goods. These five categories of exports accounted for about 79.8% of total exports during 2003-04. Among these categories cotton group alone contributed 62.5%, followed by leather 5.3%, rice 5.2%, synthetic textile 4.2% and sports goods 2.6%. On the other hand, Pakistan is trading with large number of countries but its exports and imports are highly concentrated in few countries. Slightly above one half of exports went to seven

countries namely: USA, Hong Kong, Dubai, Japan, Germany, UK and Saudi Arabia (Govt of Pakistan, 2003-04).

The present study was conducted to investigate the past trends and to evaluate the future prospects of imports and exports in Pakistan.

DATA AND METHODOLOGY

The study was based on secondary data collected from various institutions including Statistical Bureau and Export Promotion Bureau of Pakistan as well as from various issues of economic survey, Ministry of Finance Pakistan. A time series data from 1971-2003 were used for analysis.

The growth rate were estimated by using the following equation

$$\text{Log}X_t = \beta_0 + \beta_1 t + \mu_t \quad (\text{Gujarati, 2003})$$

The growth rate was estimated by taking the antilog of X_t i.e. $X_t = \text{antilog}(\beta_0 + \beta_1 t)$. The analysis further enhanced to measure the export and imports by taking the percentage of each year's actual values from the growth values (Tariq & Najeeb, 1995).

Forecast can be generated by various methods but keeping in mind the nature of the study, availability of the data and efficiency of the model to forecast. ARIMA model was selected among various available time series to forecast the imports and exports. The acronym ARIMA stands for 'Auto Regressive Integrated Moving Average' showing a combination of auto regressive and moving average models. Lags of the differenced series appearing in the forecasting equation are called, 'Auto Regressive' terms, lags of the forecast errors are called moving average. A time series, which needs to be differentiated, is said to be integrated version of stationary series. A non-seasonal ARIMA model is denoted by ARIMA (p, d, q), according to Box-Jenkins. ARIMA is a sequence of four steps: Identification, Estimation, Diagnosing and forecasting (Box & Jenkins, 1976).

Correlogram was used to check the stationarity of time series data. It checked the autocorrelation and partial autocorrelation. The chief tool was to identify ACF and PACF and resulting correlograms which were simply the plots of ACFs (Auto Correlation Function) and PACF (Partial Auto Correlation Function) against the lag length.

The theory behind ARIMA estimation was based on stationary time series. A series is said to be stationary if the mean and autocovariances of the series do not depend on time. A stationary series is I (0). Standard interference procedures do not apply to regressions, which contain an integrated dependent variable or integrated regressors. Therefore, it was important to check whether a series was stationary or not before using it in a regression.

RESULTS AND DISCUSSIONS

The results and discussion has been divided into two

parts, first part showing the growth rates and forecasting of exports and second part showing the growth rates and forecasting for imports. To calculate the growth rate of both export and import, the data were divided into three following phases:

- A) First Phase 1970-71 to 1979-80
- B) Second phase 1980-81 to 1989-90
- C) Third phase 1990-91 to 2002-03

Part-A Growth rates and forecasting of exports. To calculate the growth rate, log-linear model was used; $\text{log}X_t = \beta_0 + \beta_1 t + \mu_t$. Dependant variable was exports whereas time was taken as independent variable. The results depicted two kinds of growth rate, Instantaneous growth rate which showed the overall growth rate for the whole phase; and compound growth rate which showed growth rate of each year. The summary of the results is given as under:

The estimated model for exports of First phase was $\text{log}X_t = -448.988 + 0.232t$ (Table I) However in this decade Pakistan was shocked with the dismemberment of East Pakistan, even then exports showed tremendous increase with 23.2% instantaneous growth rate and 26.11% compound growth rate. This was a result of heavy initial investment in industry which later on proved to be a major determinant of exports in Pakistan.

The estimated model for exports of second phase was found $\text{log}X_t = -303.126 + 0.159t$. (Table I) Instantaneous growth rate for exports was recorded as 15.9% whereas compound growth rate for export was 17.23%. The decade of 1980s was characterized with a modest rate of growth.

The estimated model for exports of third phase was $\text{log}X_t = -245.030 + 0.130t$. (Table I) Instantaneous and compound growth rate were found to be 13% and 13.88% respectively. So, the results of this analysis showed a continuous increase in exports in each of the above three phases.

In order to analyze the data for forecasting, firstly data were checked for stationarity or nonstationarity. The simple analysis of the correlogram showed that the data was non-stationary. Simple difference of order was taken, in order to make the data stationary. Data became stationary after first order. So the fit model was chosen of ARIMA (1, 1, 0) with constant. Each of the statistics was based on the one-ahead forecast errors, which were the differences between the data value at time t and the forecast of that value made at time $t-1$.

During the period where the actual data were available, it displayed the predicted value from the fitted model and the residual (data forecast) for time periods beyond the end of series; it showed 95.0% prediction limits for the forecast. These limits showed that where the true data value at the selected future time was likely to be with 95.0% confidence as shown in Table II.

The output summarizes the statistical, significance of the terms in the forecasting model. Terms with P-values less than 0.05 were significantly different from zero at the 95% confidence level. The P-values for AR (I) term was less than 0.05, so it was significantly different from 0.0. The p-values

Table I. Growth rate of exports

Phases	Model	Un-standardized Coefficients		Standardized Coefficients			R ²
		B	Std. Error	Beta	t	Sig.	
1 st Phase	Constant	-448.988	164.956		-2.722	.026	0.49
	Time	.232	.084	.700	2.776	.024	
2 nd Phase	Constant	-303.126	23.596		-12.847	.000	0.95
	Time	.159	.012	.978	13.305	.000	
3 rd phase	Constant	-245.030	10.967		-22.343	.000	0.98
	Time	.130	.006	.993	23.479	.000	

Table II. Prediction limits for forecast data of exports (Model: ARIMA (1, 1,0) with constant) (Million Rs.)

Years	Periods	Forecast	Lower 95% limits	Upper 95% limits
2004-05	2	395578.0	289748.0	501407.0
2005-06	3	390770.0	242194.0	539345.0
2006-07	4	393465.0	207073.0	579858.0
2007-08	5	400078.0	1800749.0	620077.0
2008-09	6	408736.0	158559.0	658913.0
2009-2010	7	418461.0	140866.0	696056.0

Table III. Parameters of forecasting for Exports

Parameter	Estimate	Std. Error	t	P-value
AR(I)	0.522022	0.240351	2.17191	0.038182
Mean	10891.0	10390.3	1.04819	0.303209
Constant	5205.68			

Estimated white noise variance is 8.07307E8 with 29 degree of freedom. Estimated white noise standard deviation is 28413.1. Number of iterations are 3.

Table IV. Growth rates of imports

Phases	Model	Un-standardized Coefficients		Standardized Coefficients			R ²
		B	Std. Error	Beta	t	Sig.	
1 st Phase	Constant	-553.986	61.788		-8.966	0.00	0.91
	Time	0.285	0.031	0.955	9.122	0.00	
2 nd Phase	Constant	-209.948	12.312		-17.053	.000	0.97
	Time	0.112	0.006	.988	17.979	.000	
3 rd phase	Constant	-224.081	21.276		-10.532	.000	0.93
	Time	0.120	0.011	.969	11.130	.000	

Table V. Prediction limits for Forecast Data of Imports (Model: ARIMA (1,1,0) with constant) (Rs. Million)

Years	Periods	Forecast	Lower 95% limits	Upper 95% limits
2004-05	2	491529.0	370367.0	612691.0
2005-06	3	498041.0	334334.0	661748.0
2006-07	4	509196.0	309310.0	709082.0
2007-08	5	522223.0	290840.0	753606.0
2008-09	6	536004.0	276588.0	795420.0
2009-2010	7	550089.0	265263.0	834915.0

Table VI. Parameters of forecasting for imports

Parameter	Estimate	Std. Error	t	P-value
AR(I)	0.403041	0.226738	1.77756	0.085966
Mean	14290.1	10165.4	1.40576	0.170419
Constant	8530.59			

for the constant term were greater than or equal to 0.05, so it was not statistically significant. So, the residuals were white noise or random, as shown in Table III. The estimated standard deviation of the input white noise was equal to 28413.1. Here autocorrelation was a serious problem. Parameters of Forecasting for Exports are:

Part-B Growth rates and forecasting of imports. In order to calculate the growth rates for import, time was taken as

independent variable whereas imports were taken as dependent variable.

For the first phase of imports, the estimated model was $\log X_t = -553.986 + 0.285t$. (Table IV) Instantaneous growth rate for imports, calculated from these results, was 28.5% whereas compound growth rate for import was 23.97%. If we take a look at the decade of 1970, one fact is clear that in this decade both imports and exports increased. Imports

increased because the industry of Pakistan was based on the raw material which was being imported.

According to the regression results, estimated model for exports of second phase was $\log X_1 = -209.948 + .112t$. (Table IV) Instantaneous growth rate for exports was found 11.2%, whereas compound growth rate for export was 11.85%. The decade of 1980s was characterized with a modest rate of growth both for imports and exports.

The estimated model for imports of third phase took a form of $\log X_1 = -224.081 + .120t$. (Table IV) Instantaneous growth rate for exports was found 12% whereas compound growth rate for export was 12.74%. So, similar to exports, imports also showed positive growth trends in each of the above phases.

In order to forecast the values of imports data were adjusted for stationarity. The simple analysis of correlogram showed that the data was non-stationary. Simple difference of one order was taken and model was chosen for ARIMA (1,1,0) with constant. Each of the statistics was based on the one-ahead forecast errors, which were the differences between the data values for time t and forecast of the value made at time $t-1$. For the first three statistics measures the magnitude of the errors, a better statistics model gave a small value. The last two statistics measures were biased. A better model would give a value close to 0.0.

The fitted model for the data is given in table no.10 with limit that show where the appropriate data value at fiscal selected future was likely to be with 95.0% confidence.

The output summarizes the statistical significance of the term in forecasting model terms with P-values less than 0.05 were statistical significantly in different form zero at the 95% confidence interval. The P-value for AR (I) term was greater than or equal to 0.05, so it was not statistically significant. The P-value from the constant term was greater than or equal to 0.05, so it was not statistically significant.

The estimated standard deviation of the input white noise was equally 34383.8. Estimated white noise variance was 1.18224 E9 with 29 degree of freedom was estimated white noise standard deviation was 34383.8 and number of iterations was 3.

CONCLUSION AND SUGGESTIONS

The analysis depicted an increasing trend both for imports and exports during the last three decades. Similarly, forecasting results also showed almost progressive future trends from 2004-05 to 2009-10. Accordingly, imports were expected to reach at Rs. 550089.0 million with upper and lower limits of Rs. 834915 million and Rs. 265263 million respectively whereas exports were intended to reach at Rs. 418461 million with upper and lower limits of Rs.696056 and 140866 million respectively. Following suggestions are recommended for the improvement of this sector.

1. The ultimate recipe for making balance of trade positive is to diversify its export pattern, both in terms of

products and destination, and to produce at the lowest possible cost. Pakistan should also focus on image building and to maintain a good reputation for the Pak-Marked exports. The specification of quality certificate as attached with exports consignments should be counter checked both for quality and quantity. An aggressive promotional camping by the government of Pakistan supplemented with the effort of private sector will further increase Pakistan's export in international market.

2. Government should lay greater emphasis on investment and growth as country's exports would be facing greater completion in the world market. It is therefore advisable that all stockholders in foreign trade got together and got prepared to meet these challenges effectively. Government as well as businessmen should study, how China has been able to achieve spectacular success with their products with in short time, which is offering its products at highly competitive prices. It is important to focus on enhancing value addition in our exports and try to earn more per unit of exports.

3. Our major export houses should develop their own brands and make them popular around the world. It is assuming to see the government to open retail outlet in Dubai, London and New York for promotion of the image and exports of Pakistan products. Services of reputable international relations companies are reportedly being required in order to launch a campaign for image building. Two special zones, one in Karachi and other in Punjab should be established with modern infrastructure. These will cater primarily to the need of textile sector.

4. One of the right strategies will be to focus on vocational training institutes to produce sector specific technical men power where as to produce highly skilled executives. Awareness campaigns should be launched to prepare people to use locally produce goods and to make balance of trade positive with less imports. Export promotion of non-traditional items should be given greater importance. Having paid so much for the imported machinery we should make full use of it instead of using machinery far below than its capacity, Full capacity use will reduce per unit cost and will make our products more competitive.

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