Determinants of Exports in Pakistan: An Econometric Analysis (1970-2006)

Khattak, Naeem Ur Rehman Khattak and Hussain, Anwar Hussain

Pakistan Instittute of Development Economics Islamabad Pakistan

2010

DETERMINANTS OF EXPORTS IN PAKISTAN: AN ECONOMETRIC ANALYSIS (1970-2006)

Naeem-ur-Rehman Khattak and Anwar Hussain***

ABSTRACT

The present study has been conducted in the year 2008 to assess the determinants of exports in Pakistan during 1970-2006 using econometric techniques. Time series data ranging from 1970 to 2006 on total exports, primary commodities exports, semi-manufactures and exports of manufactured goods has been taken from Economic Survey of Pakistan (Statistical Supplement, 2006-07). Augmented Dickey Fuller (ADF) test has been used for checking the stationarity of the data. Furthermore, the Johenson Co-integration test (likelihood ratio statistic) has been used to detect the long-term relationship among the series. The method of ordinary least square has been used to assess the determinants of exports in Pakistan. The results indicate that 1% increase in the exports of primary commodities brings 0.97% increase in total exports in Pakistan. Similarly, 1% increase in the exports of semi-manufactures leads to increase total exports by 0.99%. On similar pattern, 1% increase in the exports of manufactured goods leads to increase total exports by 1%. The coefficients of all the explanatory variables are statistically significant at both 5% and 1% level of significance. It is recommended to increase the exports of primary goods, semi-manufactures and manufactured goods so as make balance of trade favorable.

Key words: Determinants; exports; econometric; analysis

INTRODUCTION

The exports of Pakistan are based on primary commodities, semi-manufactures and manufactured goods. These include fish, rice, hides and skins, raw wool, raw cotton, cotton waste, leather, cotton yarn, cotton thread, cotton cloth, synthetic textile, foot wear, animal casings, cement, paints and varnishes, manufactured and raw tobacco, ready made garments and sports.

* Dean, Faculty of Social Sciences, Department of Economics, University of Peshawar, Peshawar.
** Lecturer, Department of Economics, University of Peshawar, Peshawar.

During the time period 1970-2006, significant fluctuations took place in exports products of Pakistan. In 1970-71, the total exports of Pakistan were Rs.1998 million which has been increased to Rs.1029312 million in 2006-07. In 1970-71, the share of primary commodities exports, semi-manufactures and manufactures goods exports were Rs.650 million, Rs.472 million, Rs.876 million and Rs.44 million respectively which have been increased to Rs.115219 million, Rs.110454 million and Rs.803639 million respectively in 2006-07 (Statistical Supplement, 2006-07). But trade deficit is alarming in the country. There needs effective policies so as to make terms of trade favourable.

Different studies conducted to highlight the issue using various approaches. According to Funke and Holly (1992) the most of the previous approaches have focused on demand factors but they remained unsuccessful in explaining the performance of exports in the long run. The research took into account quarterly time series data ranging from 1961.1 to 1987.4. The findings of the study recommended supply side factors for explaining export performance than demand side factors. Togan (1993) studied the export incentives in Turkey mainly export credits, tax rebate scheme, premium from the "Support and Price Stabilization Fund", duty free imports of intermediates and raw materials, and exemption from the value added tax, foreign exchange allocations, exemption from the corporate income tax and other subsidies. The study revealed that the Turkish export- and import-competing industries have benefited from the export incentives as compared to the other sectors. Riedel, Hall and Grawe (1984) studied the determinants of export performance in 1970s using Time-Series data ranging from 1968 to 1978. The study analyzes the effects of relative price of exports, relative domestic demand and domestic profitability on export performance. The findings revealed that export behavior is most closely connected

with domestic market conditions. Sharma (2001) conducted a study about exports determinant in India using the data ranging from 1970 to 1998. He applied simultaneous equation system. The findings revealed that demand for Indian exports increase when its export price falls in relation to world prices. Indian exports are mostly affected by the real appreciation of the rupee. There is a positive relationship between exports supply and domestic relative price of exports.

The present study is different from all of the above studies as it assesses the determinants of export in Pakistan during 1970-2006 using econometric techniques. All the export items have been divided into three categories i.e. exports of primary goods, semi-manufactures and exports of manufactured goods.

MATERIALS AND METHODS

The present study has been conducted in the year 2008 to assess the determinants of exports in Pakistan during 1970-2006 using econometric techniques. Time series data ranging from 1970 to 2006 on total exports, primary commodities exports, semi-manufactures and exports of manufactured goods has been taken from Economic Survey of Pakistan (Statistical Supplement, 2006-07). Augmented Dickey Fuller (ADF) test has been used for checking the stationarity of the data. The Akaike Information Criterion (AIC) has been used to select the optimum ADF lag. Variables which were non-stationary at level have been made stationary after taking first difference and second difference. Furthermore, the Johenson Co-integration test has been used to detect the long-term relationship among the series. To this end, the Likelihood Ratio (LR) statistic is used. To assess the determinants of exports in Pakistan, the following model was estimated using the method of ordinary least square method.

$$TEX = b_o + b_1PGEX + b_2SMFX + b_3MFX \quad (1)$$

Where TEX = Total Exports (Rs. in million) in Pakistan

PGEX = Primary Good Exports (Rs. in million) in Pakistan

SMFX = Semi-Manufactures Exports (Rs. in million) in Pakistan

MFX = Manufactures Exports (Rs. in million) in Pakistan

A statistical package Eview is used for deriving the results.

RESULTS AND DISCUSSION

The ADF test results have been presented in Table I and II. In Table I, the stationarity of the data has been checked including intercept and not trend while both intercept and trend have been included in Table II. Variables which are not stationary at level have been made stationary after taking the first difference denoted by I(1) and then the second difference i.e. I(2) if needed. The values given in the brackets are the optimum lags selected on the basis of AIC criterion (i.e the lag t which the AIC value is minimum). According to Table I, the variables PGEX and SMFX are not stationary at level, and therefore, have been made stationary after taking first difference. Including both intercept and trend, the variables TEX, PGEX and AMFX are not stationary at level and have been made stationary after taking first difference (Table II).

Table I: ADF test results for stationarity (including intercept and not trend)

Variable	I(0)		I(1)		Results
	Test Statistic	**Critical value**	**Test Statistic**	**Critical value**	
TEX	5.6591 [2][1]	-3.64			I(0)
PGEX	-3.5096 [2]	-3.64	-6.6066 [0]	-3.63	I(1)
SMFX	1.6775 [0]	-3.62	-5.7357 [0]	-3.63	I(1)
MFX	5.5445 [2]	-3.64			I(0)

(1) Figures in square brackets besides each statistics represent optimum lags, selected using the minimum AIC value.

Table-II: ADF test results for stationarity (including both intercept and trend)

Variable	I(0)		I(1)		Results
	Test Statistic	**Critical value**	**Test Statistic**	**Critical value**	
TEX	4.2039 [2][2]	-4.25	-5.1120 [0]	-4.24	I(1)
PGEX	-1.6361[2]	-4.25	-7.7464 [0]	-4.24	I(1)
SMFX	-1.4032 [0]	-4.23	-6.6001 [0]	-4.24	I(1)
MFX	5.2119 [2]	-4.25			I(0)

(2) Figures in square brackets besides each statistics represent optimum lags, selected using the minimum AIC value.

Furthermore, the regression results may be spurious due to no co-integration among the series. To this end the Jhonson Co-integration test has been used. The likelihood ratios statistic values are given in Table III (including no trend and no intercept) and in Table IV (including both intercept and trend), which indicates the long-term relationship among the variables of the study and rejects the hypothesis of no co-integration. Because most of the absolute values of the LR ratios are greater than their relevant critical values.

Table III Johansson Co-integration test results including no intercept and no trend

	Likelihood	5 Percent	1 Percent	Hypothesized
Eigenvalue	Ratio	Critical Value	Critical Value	No. of CE(s)
0.703741	68.27302	39.89	45.58	None **
0.415541	25.69476	24.31	29.75	At most 1 *
0.177912	6.897352	12.53	16.31	At most 2
0.001159	0.040593	3.84	6.51	At most 3

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Table IV Johansson Co-integration test results including both intercept and trend

	Likelihood	5 Percent	1 Percent	Hypothesized
Eigenvalue	Ratio	Critical Value	Critical Value	No. of CE(s)
0.765373	93.96282	62.99	70.05	None **
0.449030	43.22127	42.44	48.45	At most 1 *
0.383189	22.35862	25.32	30.45	At most 2
0.144120	5.446866	12.25	16.26	At most 3

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Regression results with TEX as dependent variable while PGEX, SMFX and MFX are as independent variables are given in Table V. The results indicate that 1% increase in the exports of primary commodities brings 0.97% increase in total exports in Pakistan. Similarly, 1% increase in the exports of semi-manufactures leads to increase total exports by 0.99%. On similar pattern, 1% increase in the exports of manufactured goods leads to increase total exports by 1%. The coefficients of all the explanatory variables are statistically significant at both 5% and 1% level of significance. The model is also best fitted as indicated by the high value of R-squared (0.999) and adjusted R-squared (0.999), showing that the included explanatory variables are entirely responsible for changes in total exports in Pakistan. Durbin-Watson value (2.09) suggests that there is no problem of autocorrelation.

Table V Regression results of export function

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	380.1805	482.6517	0.787691	0.4365
PGEX	0.967354	0.045156	21.42226	0.0000
SMFX	0.986507	0.020678	47.70881	0.0000
MFX	1.005095	0.005427	185.2053	0.0000
R-squared	0.999977	Adjusted R-squared		0.999975
Durbin-Watson stat	2.093590	Prob(F-statistic)		0.000000

Table VI and figure 1 depicts the values of variance decomposition of the four variables, showing how the variance of each one of the series is decomposed during a period of ten years. The first group of columns in table VI is referred to total exports (TEX). Those values of standard errors that total exports explain by itself lies between 83% to 100% with values declining slowly. PGEX is the second variable explaining most of the variation in TEX ranging from 9.3% to 13.1%. SMFX variation ranges from 0.24% to 0.18% and MFX explaining 3.78% to 3.10% variation in TEX.

On similar pattern, variances decomposition values of PGEX, SMFX and MFX are given in Table VI and Fig 1.

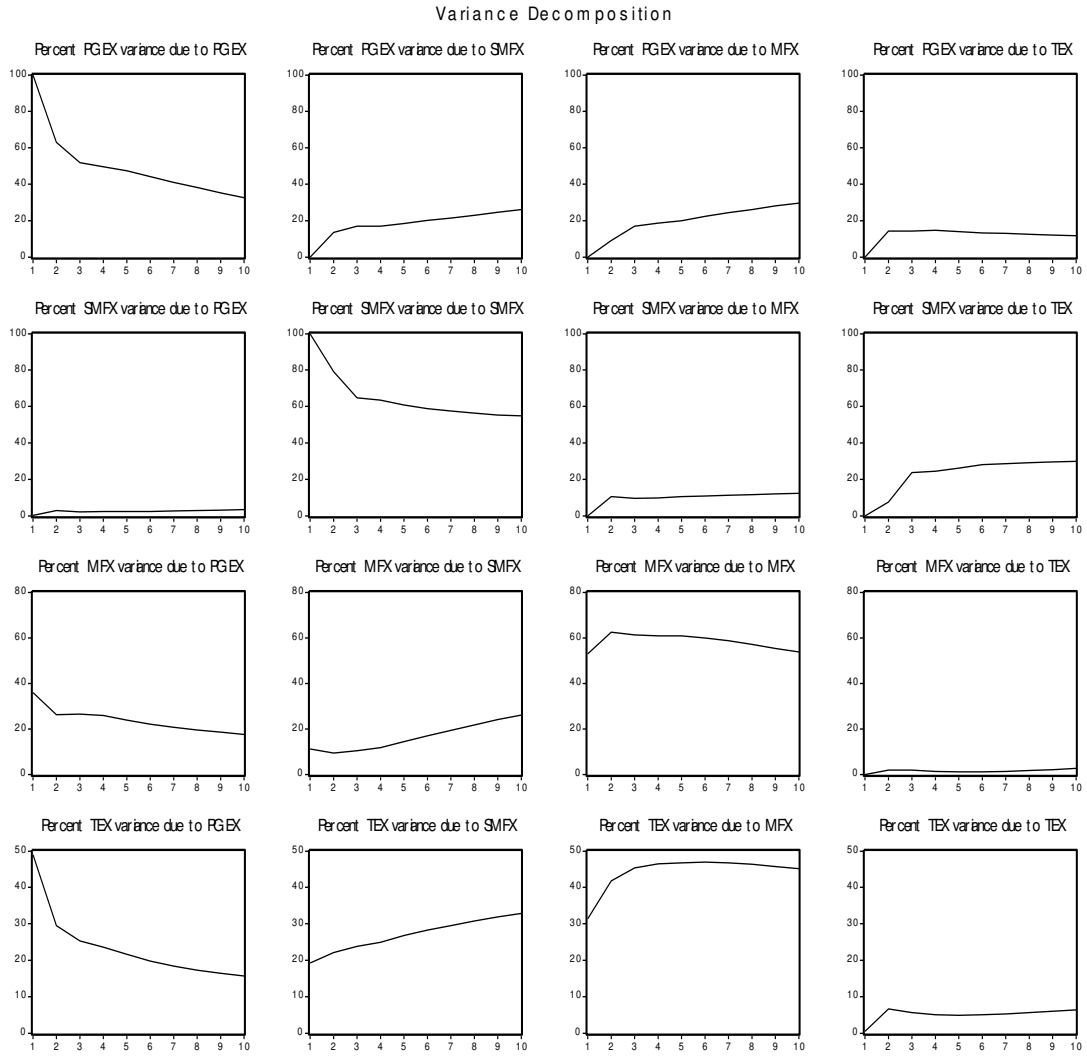

Fig. 1 Variance decomposition

Table VI Values of the variances decomposition

Variance Decomposition of TEX:					
Period	S.E.	TEX	PGEX	SMFX	MFX
1	18259.32	100.0000	0.000000	0.000000	0.000000
2	25094.85	86.68458	9.288366	0.245289	3.781761
3	30163.58	86.61341	10.27218	0.226542	2.887865
4	35227.97	87.23794	10.18558	0.179262	2.397220
5	41148.96	86.94966	10.67850	0.133095	2.238748
6	47717.18	86.28204	11.36530	0.105782	2.246884
7	54782.31	85.55978	11.95579	0.097166	2.387264
8	62652.44	84.91816	12.39766	0.112508	2.571674
9	71428.95	84.25025	12.79103	0.142011	2.816701
10	81144.54	83.57158	13.14184	0.182046	3.104535
Variance Decomposition of PGEX:					
Period	S.E.	TEX	PGEX	SMFX	MFX
1	4781.751	48.95997	51.04003	0.000000	0.000000
2	6433.748	57.38482	30.36011	0.639148	11.61593
3	7311.705	62.29014	26.31264	0.495457	10.90176
4	7576.001	63.15232	24.99675	0.531239	11.31970
5	7960.969	65.83491	23.01880	0.555187	10.59110
6	8452.606	68.07865	21.52463	0.517305	9.879414
7	8908.315	69.18505	20.79172	0.475893	9.547334
8	9425.898	70.59508	19.92864	0.465564	9.010717
9	10036.44	71.89468	19.14508	0.459903	8.500338
10	10735.14	72.91603	18.53249	0.461251	8.090222
Variance Decomposition of SMFX:					
Period	S.E.	TEX	PGEX	SMFX	MFX
1	3703.173	21.46555	16.22020	62.31425	0.000000
2	5944.012	43.74351	18.43376	32.21773	5.605004
3	7620.185	33.14018	23.28134	23.05716	20.52133
4	9135.734	36.68694	21.84490	20.49156	20.97660
5	10567.97	38.84114	20.85234	17.83043	22.47610
6	11892.07	39.58045	20.24935	16.13129	24.03891
7	13168.42	41.07721	19.51060	14.93964	24.47254
8	14382.38	42.16697	18.97908	13.94103	24.91292
9	15548.34	43.10910	18.55014	13.16266	25.17809
10	16685.29	44.05778	18.17979	12.51048	25.25195
Variance Decomposition of MFX:					
Period	S.E.	TEX	PGEX	SMFX	MFX
1	14121.80	94.79226	1.289024	3.228032	0.690685
2	16930.27	84.24164	7.896125	6.798940	1.063298
3	20235.84	85.38635	6.637798	5.736808	2.239047
4	24000.61	86.86299	6.404671	4.811484	1.920855
5	28116.36	87.23508	7.468538	3.888298	1.408082
6	32885.80	87.53913	8.412174	3.018421	1.030279
7	38221.99	87.55922	9.301531	2.315824	0.823430
8	44324.24	87.35849	10.11760	1.743282	0.780629
9	51276.40	86.96601	10.84904	1.304543	0.880402
10	59098.99	86.42316	11.49372	0.983442	1.099679
Ordering: TEX PGEX SMFX MFX					

CONCLUSION AND RECOMMENDATIONS

The facts and figures indicate that the major determinants of exports of Pakistan are primary goods exports, semi-manufactures and manufactured goods' exports. The results indicate that 1% increase in the exports of primary commodities brings 0.97% increase in total exports in Pakistan. Similarly, 1% increase in the exports of semi-manufactures leads to increase total exports by 0.99%. On similar pattern, 1% increase in the exports of manufactured goods leads to increase total exports by 1%. The planners are recommended to make balance of trade favorable through increasing the exports of primary goods, semi-manufactures and manufactured goods.

REFERENCES

Arize, A.C. (1999). "The demand for LDC Exports: Estimates from Singapore". The International Trade Journal, vol.13(4). Pp. 345-370.

Funke, M. and S. Holly (1992). "The Determinants of West German Exports of Manufactures: An Integrated Demand and Supply Approach", Weltwirtschaftliches Archive, 128(3): 498-512.

Government of Pakistan, (2006-07). Statistical supplement, economic survey, finance division, economic advisor's wing, Islamabad.

Riedel, J., C. Hall and R. Grawe (1984). "Determinants of Indian Exports Performance in the 1970s", Weltwirtschaftliches Archive, 120(1): 40-63.

Sharma, K. (2001). "Export Growth in India: Has FDI Played a Role?" at:http://www.econ.yale.edu/~egcenter/

Togan, S. (1993). "How to Assess the Significance of Export Incentives": An Application to Turkey", Weltwirtschaftliches Archive, 129 (4): 777-799.