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Estimation of import and export demand functions using bilateral trade data: The case of Pakistan

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We estimated the import and export elasticities of Pakistan trade with traditional trade partners and some Asian countries to see the dynamics of Pakistan trade from 1973 to 2008. OLS results suggest that income is the principal determinant of exports and imports. Pakistan exports are cointegrated with Japan and USA while the imports are cointegrated with UAE and USA. Pakistan imports and exports are cointegrated with Bangladesh and Sri Lanka but not with India and China. Income and exchange rate are both important determinants of foreign trade. Continuing its trade with traditional partners and making efforts for greater market access to USA and EU, Pakistan should make efforts to increase its trade with Asian countries notably China and India because both are fast growing economies and have huge market.

JEL Classifications: F01, C51

Keywords: Import and export elasticities, Pakistan, Asian countries, cointegration.

Introduction

International trade has played an important role in the development of both developed and underdeveloped countries because countries are dependent on one another due to uneven distribution of resources. Export of agricultural and other primary commodities accounts for a major share of developing countries income. Besides export dependence developing countries are also heavily dependent on the import of diverse capital and consumer goods to feed their industries and satisfy their peoples' consumption needs. Developing countries have been facing balance of payments (BoPs) problems because of divergence in imports and exports and hence the importance of foreign trade is obvious.

Pakistan is an important country of the world. However, in terms of trade it does not enjoy a significant share. Recognizing the importance of trade, different governments have adopted different policies about trade according to international economy demands.

Precarious nature of the Pakistan's economy was acknowledged by the government soon after independence in 1947and a strategy of import substitution (IS) industrialization was adopted through over-valued exchange rate, use of quantitative controls on imports and the export taxes on principal agricultural exports: cotton and jute. Though some 1950s policies were continued in 1960s, a number of new policies in the realm of economic management were adopted. Pakistan's economy suffered as well as benefited from international events in 1970s. Pakistan started liberalizing the economy with the help of IMF and World Bank in 1982-83 with a view to improving the efficiency of the economy by increasing the role of the private sector. Most of these reforms were implemented by mid-1980s. The process of liberalization started during 6th Five-Year-Plan (1983-88) and was implemented with great force after 1988. The government pursued vigorous trade liberalization in the beginning of 1990s. Like many other developing countries, Pakistan has made significant efforts to integrate its economy with rest of the world through

foreign trade, investment and other macroeconomic policies (Afzal 2006a). Pakistan's trade suffers from a number of problems that includes concentration in composition and markets, lack of market access to major trading partners EU (European Union) and USA, uninspiring performance of the economy, unfavourable international conditions, adverse terms of trade, high population growth, lack of technological development etc. Although Pakistan trades with a large number of countries its exports are highly concentrated in few countries. More than 50% of Pakistan exports during 1990-99 went to seven countries namely, USA, Japan, Germany, UK, Hong Kong, Dubai, and Saudi Arabia. Pakistan exports are highly concentrated in few items namely, cotton group, leather group, rice, synthetic textiles, wool and carpets and sports goods. These seven categories of exports accounted for 84% in 1990-91 but declined to 76.6% in 2005-06. Such a high degree of concentration of exports in few items leads to instability in export earnings that also hinders smooth growth of Pakistan's exports (Afzal and Ali 2008).

A large number of studies have been done on the import and export behaviour of Pakistan and trade policy (Afzal and Ali, 2008; Afzal, 2008a,b; Afzal 2006a,b; Bader, 2006; Afzal, 2005; Afzal, 2004; Afzal, 2002; Afzal 2001a,b; Akbar and Naqvi, 2000; Anwar, 1985; Sarmad and Mahmood, 1985; Sarmad, 1989; Khan and Saqib, 1993; Naqvi et al., 1983). These studies have used different methodologies, different objectives, and diverse time periods and have reported divergent results.

However, these studies are Pakistan's trade-specific that have not addressed Pakistan's imports and exports scenario with its traditional trading partners (USA, EU, UK, Japan, Saudi Arabia, UAE) and also trade with the neighbouring Asian countries (India, Bangladesh, China, Sri Lanka) whose importance has been acknowledged by the government of Pakistan (2009-12, 37). This document noted that China, Afghanistan, Iran and India are "our natural trading partners".

Pakistan is a member of two regional groups, the South Asian Association for Regional Cooperation (SAARC) and the Economic Cooperation Organization (ECO), but none of the two has been successful in promoting intra-regional trade in a significant way. Despite the preferential treatment, intra-regional trade has been around 4 percent of the total trade in the ECO and the SAARC. The share of intra-regional imports was 11.7, 0.7, 33.2, 2.3 and 10.1 percent of the total imports of Nepal Bangladesh, Sri Lanka Pakistan and India respectively in 2000. Trends in intra-regional exports reveal a different picture (Kemal, 2004).

Keeping in view the growing importance of trade notably trade with close neighbours, the purpose of the paper is to empirically address and investigate the imports and exports of Pakistan with its traditional trading partners and the neighbouring Asian countries using traditional and time series techniques of estimation.

Pakistan imports and exports

Pakistan does not enjoy an enviable share in international trade. Pakistan has been trading with many countries over the years and particularly with the few traditional partners. It is difficult to present even brief review of Pakistan trade for the last 60-years. Pakistan exports performance has remained mixed due to internal and external economic conditions. During the recent years Pakistan trade has fluctuated considerably. Pakistan's export performance was impressively good in 2002-06 with average exports growth of 16% per annum because of the strong macroeconomic policies pursued at home and international trading environment. Pakistan's export performance was dismal in 2006-07 as it witnessed abrupt and sharp deceleration to less than 4%. Pakistan's import grew at an average rate of 29% per annum during 2002-06 on the back of strong economic growth which triggered a consequential growth in investment. The surge in investment led to a substantial increase in imports. However, import growth slowed to a normal level in the fiscal year 2006-07 but registered a sharp pick up in 2007-08 on account of unprecedented

rise in oil import bills and imports of wheat and fertilizer. As a result, Pakistan's trade and current account deficits have widened substantially contributing to serious macro economic imbalances (Government of Pakistan, 2007-08, pp.133).

Table 1 and Table 2 provide Pakistan's exports and imports scenario with ten countries comprising the traditional partners (USA, UK, Japan, Germany , UAE, Saudi Arabia) as well as the neighboring Asian countries (India, China Bangladesh, Sri Lanka). More than 50% exports and imports go to these 10 countries. USA enjoys the principal share followed by Japan, Germany, and UK. In Asian countries China has the largest share in export and imports and its share has increased over the years. Exports to Bangladesh, India and Sri Lanka have followed a constant trend. However, imports from India have followed an increasing trend while for Bangladesh and Sri Lanka it has remained the same.

TABLE 1. MAJOR EXPORT MARKETS OF PAKISTAN: 1991-2008 (%)

Country	1991	1995	2001	2002	2003	2004	2005	2006	2007	2008
Bangladesh	1.6	1.9	1.3	1.1	1.4	1.5	1.3	1.5	1.4	1.9
China	1.2	1.5	3.1	2.4	2.2	2.3	2.3	2.7	3.4	3.7
Germany	8.5	7.4	5.2	4.9	5.1	5.0	4.3	4.9	4.1	4.6
India	0.7	0.5	0.7	0.5	0.7	1.2	1.7	1.5	1.8	1.6
Japan	8.0	6.8	2.0	1.4	1.2	1.2	1.2	1.1	1.5	1.8
Saudi Arabia	4.0	2.8	3.2	4.0	3.9	2.5	2.3	1.8	1.6	1.9
Sri Lanka	1.0	0.7	0.8	0.7	0.7	1.0	0.8	0.9	1.1	1.5
UAE	3.6	4.4	7.6	8.4	9.4	7.4	7.6	8.3	8.0	8.4
UK	6.9	6.5	6.8	7.2	7.1	7.3	6.0	6.4	6.8	5.3
USA	11.4	15.1	24.3	24.5	23.1	23.5	22.0	22.6	20.7	19.8
Others	53.1	52.4	45	44.9	45.2	47.1	50.5	48.3	49.6	49.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: IMF Direction of Trade Statistics (various Issues).

TABLE 2. MAJOR IMPORT MARKETS OF PAKISTAN: 1991-2008 (%)

Country	1991	1995	2001	2002	2003	2004	2005	2006	2007	2008
Bangladesh	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2
China	4.2	4.4	4.8	6.2	7.3	8.4	8.5	7.6	9.2	7.8
Germany	8.0	6.4	4.0	4.4	4.5	4.0	4.9	4.6	4.2	3.8
India	0.6	0.8	2.5	1.6	1.8	2.7	2.5	4.3	3.9	4.1
Japan	14.8	10.8	5.3	6.2	6.6	6.5	6.4	5.6	5.0	3.9
Saudi Arabia	4.6	5.0	11.3	11.7	10.9	11.7	8.9	12.3	10.8	11.2
Sri Lanka	0.5	0.5	0.3	0.3	0.3	0.3	0.3	0.4	0.2	0.2
UAE	3.7	4.8	12.9	11.8	11.3	10.0	10.7	11.5	13.6	15.3
UK	5.2	4.8	3.6	3.3	3.1	2.6	3.9	3.0	3.2	2.4
USA	11.3	9.4	5.7	6.6	6.1	9.8	5.5	3.6	4.6	3.8
Others	46.7	52.8	49.3	47.6	47.8	43.7	48.2	46.9	45.1	47.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: IMF Direction of Trade Statistics (various Issues).

Review of studies

Bond (1985) explains that exports have played a critical role in the economic growth of non-oil developing countries and policies are made to increase their exports so that the problem of balance of payments is resolved. Khan and Knight (1988) estimated extended demand and supply functions instead of standard demand and supply functions to test the

relation of exports and imports. They developed three models dealing with export supply, exports demand and trade balance and overall balance of payments. Results show that 10% reduction in exports will decrease the imports by 2% in the short run while the reduction in imports will be more than 5% in the long run.

Sinha (1997) examined the import demand function for Thailand and concluded that imports of the country depend upon the import price, domestic price and gross domestic product. Rana (1983) study is the most detailed study in context of developing countries. He estimated the import demand function for his sample countries and concluded that the increase in exchange rate risk has a significant negative impact on import volumes. Arize (2000) estimated the long-run convergence of import and exports of 50 countries comprising some industrial and some developing countries. The results show that 57% low-income countries have stable long-run relationship between exports and imports.

Naqvi et al., (1983) used three categories, each of exports and imports. Import equations are demand oriented while export equations are supply-oriented and assumed that Pakistan export demand to be exogenous. Sarmad and Mahmood (1985) got estimates of import elasticities at a disaggregated level for the period 1969-80. They also obtained price and income elasticities for aggregate imports. They have reported mixed results for price and income elasticities.

Anwar (1985) studied export performance of Pakistan and estimated elasticities of export demand and supply for primary and manufactured exports for the period 1959-80 and has reported reliable and better estimates for the said categories of exports.

Khan and Saqib (1993) estimated export (total, primary and manufactured) demand and supply functions simultaneously for the period 1972-88 and also the relationship between GDP and exports using exports-augmented Cobb-Douglas production function. They have concluded positive and significant relationship between GDP and exports and have suggested export orientation towards manufactured goods. Akhtar and Malik (2000) examined impact of price and income on Pakistan's trade with USA, UK, Germany and Japan. Results show that increase in GDP leads to increase in imports of Pakistan from USA and Japan. The results also tell that 1-percent devaluation in rupee decreases imports from UK, Germany and Japan in range 0.61-0.75 percent.

Afzal (2001a) investigated the demand and supply of imports of Pakistan for the period 1960-1999 and has reported negative and insignificant price coefficient but a positive and significant domestic income coefficient. Liberalization is found not to have a positive impact on import demand. Atique and Ahmad (2003) have reported that that 1-percent decrease in real exchange rate will increase the demand of exports by 0.49 percent. In the same way 1-percent devaluation of rupee will increase the export demand by 0.39 percent in the long run. Afzal (2004) developed a simultaneous equation model exploring the relationship between economic growth, exports and other important macroeconomic variables and found significant impact of agriculture, industry, investment and human resource development (HRD) on growth. Export contribution to GDP growth is positive but less significant than agriculture, industry, human HRD and investment.

Using partial adjustment model, Afzal (2005) investigated the responsiveness of total and the other three groups of exports of Pakistan for the period 1960-2002 and reported that domestic income elasticity of total exports (1.27), manufactured exports (1.76) and semi-manufactured exports (1.34) is much less than the world income elasticities for total (1.99), manufactured (2.6) and semi-manufactured (2.58) exports respectively. For primary exports, world income elasticity is even negative (-1.87).

Afzal (2006a) examined the relationship between economic growth, exports and its different categories, imports and world income and has reported bidirectional causality between manufactured exports and GDP. After making a detailed critical review and analysis of Pakistan's foreign trade in historical perspective, Afzal and Ali (2008) concluded that economy had led exports more than the export had led the economy. Using both traditional and time-series econometrics techniques Afzal (2008a) studied the

impact of real exchange rate, income, imports prices and foreign exchange reserves on import demand in Pakistan for the period 1980-2008. Results show long-run relationship between imports and real effective exchange rate.

Methodology and data

A number of factors determine imports and exports of a country. Some of those factors are - level and dynamics of domestic income and GDP components (investment, consumption, public expenditure, and exports); price competitiveness of domestic production; exchange rate level and fluctuations as well as inflation differentials between the country and foreign nations; non-price competitiveness of domestic production; national attitude toward foreign goods etc among others. Similarly imports are expected to grow if families' disposable income increases, inflation abroad is lower than domestically so that foreign products become cheaper, changes in domestic supply and demand conditions etc.

The above analysis reveals that there are multiple factors that are likely to influence imports and exports of a country. To translate the behaviour and response of imports as well as exports into a functional form, the main point to be considered is factors which are supposed to determine the imports and exports significantly. It is difficult to identify and quantify all the factors. A choice of the most important factors becomes imperative and binding.

The response of both imports and exports depends on a host of factors. Studies have identified those factors. Government of Pakistan (2009-12) has mentioned many factors that influence Pakistan exports supply and demand. It is difficult to consider the impact of all factors on imports and exports. However, some factors are more predominant than others. Lack of market access (MA) is a major problem that exports of developing countries face and this is the major bottleneck in the success of WTO. This is also the major problem faced by the Pakistan's exports. USA and EU do not allow free market access to Pakistan exports despite various governments request to the countries. It is difficult to quantify MA. Because of non-availability of data, many important factors like MA and technology are difficult to represent. Therefore, researchers have devoted attention to those factors about which data are easily available and which also show direct as well as indirect impact on trade of a country. For example GDP can also be used as a proxy for political stability and domestic supply conditions. Studies have identified real exchange rate and income as the most significant factors influencing the demand of both imports and exports. Thus exports and imports functions are specified as under:

$$lnex_{pak} = \beta_0 + \beta_1 ln\ rex_t + \beta_2\ lny_{tj} + \mu_t \qquad (1)$$

$$lnim_{pak} = a_0 + a_1 lnrex_t + a_2 lny_{tpak} + \varepsilon_t \qquad (2)$$

Where ln - natural logarithm; ex_{pak} - Pakistan's exports; Im_{pak} - Pakistan's imports; rex - real exchange rate = $er_j * cpi_j / cpi_{pak}$; $j= 1,2, \ldots 10$; er_j = bilateral exchange rate between Pakistan and the jth trade partner; cpi_j - consumer price index of the trade partner j; cpi_{pak} - consumer price index of Pakistan; y_j - real GDP of the trade partner j; y_{pak} - real GDP of Pakistan; μ and ε - disturbance terms that satisfy the classical regression assumptions

The expected signs of the coefficients in the export function are positive ($\beta_1 > 0$, and $\beta_2 > 0$). An increase in the rex or a real depreciation means that foreign prices of goods in rupees (Pakistan's currency) have increased relative to prices of domestically produced goods. This implies that foreign goods (imports) become more expensive compared to goods at home while the domestic goods become cheaper for the foreign countries. Therefore, correct and expected sign of the coefficient of rex is positive. The expected

signs of the coefficients of import function are $\alpha_1<0$, and $\alpha_2>0$. Reduction in rex will increase imports while the increase in y_{pak} will lead to increases in imports. Furthermore since we have used double-log models we will get elasticity estimates. We used it since we are dealing with trade data.

We assume that the error term follows the first-order autoregressive process (AR (1)) $\mu_t = \rho \mu_{t-1} + \varepsilon_t$. The parameter ρ is the first order serial correlation coefficient and $-1<\rho<1$. We will estimate these equations with ordinary least squares (OLS) method which is considered a powerful and useful method for estimating linear regression model due to its desirable properties.

Econometric methodology: Co-integration analysis and causality testing

Time-series econometrics focuses on the time-series properties of the economic variables in order to overcome the problem of spurious regression. Examination of stationarity/nonstationarity is important before doing any empirical work which is closely linked to the tests for unit roots. Cointegration may provide useful information about the relationship between the nonsatationary variables. The theory of cointegration attempts to study the interrelationships between long-run movements in economic time series. Most economic theories are about long-run behaviour. Therefore acceptance of cointegration between two series implies that there exists a long-run relationship between them. From a statistical point of view, a long-term relationship means that the variables move together over time so that short-term disturbances from the long-term trend will be corrected. A lack of cointegration suggests that such variables have no long-run relationship: in principle they can drift arbitrarily far away from each other.

If variables are cointegrated then an error correction model (ECM) ECM exists which combines the long-run relationships with the short-run dynamics of the model known as Granger's representation theorem. Before applying the cointegration technique, we need to determine the order of integration of each variable, for which we use Augmented Dicky Fuller (ADF) test. We use cointegration methodology suggested by Johansen (1991, 1995). If the series are not cointegrated, standard Granger causality can be used. In the bivariate case testing, the variable X is said to cause the variable Y in the Granger sense if the forecast for Y improves when lagged values of X are taken into consideration, ceteris paribus. This means that standard Granger causality test is based on past changes in one variable that explains the actual changes in another variable.

This test is highly sensitive to the choice of lag length that can be decided using diverse criteria and for lag selection Akaike information criterion (AIC), Schwarz information criterion (SIC) and final prediction error (FPE) are generally used. The reported F-statistics are the Wald statistics for the joint hypothesis. Based on Engle and Granger (1987, p.255) representation theorem, the error-correction model is formulated as follows:

$$\Delta lnY_t = \alpha + \lambda K_{t-1} + \sum_{i=1}^{n} \beta_i \Delta InY_{t-i} + \sum_{i=1}^{n} \psi_i \Delta lnX_{t-i} + \mu_t \qquad (3)$$

K_{t-1} is the error correction term generated from the Johansen multivariate procedure and the parameter λ is the error correction coefficient that measures the response of the regressand in each period to departures from equilibrium. Lagged explanatory variables represent short- run impact and the long-run impact is given by the error correction term

Data sources

Annual data on GDP, CPI, and bilateral exchange rate of Pakistan and ten trading partners were obtained from IMF International Financial Statistics (various year books).

The annual data on imports and exports of Pakistan with all the trading partners from 1973 to 2008 was obtained from IMF direction of trade statistics (various year books). The period of the study is 1973-2008.

Empirical results

The OLS results of equations 1 and 2 for Pakistan's traditional trade partners as well as Asian partners (Table 3, Table 4, Table 5 and Table 6) reveal that except Germany and UK the income variable has a significant coefficient for the remaining four countries suggesting that income is the major determinant of Pakistan exports. This means that Pakistan's exports to these countries will increase with the increase in the income of these countries. For example for 1% increase in Saudi Arabia income**,** Pakistan exports will increase by 0.54% and this applies to other countries as well. On the other hand except Germany and UAE real exchange rate coefficient is not significant for other traditional partners implying that exchange rate in these countries do not play as significant role as the income does.

Income is significant for all the Asian partners. Exchange rate is not significant for India only. This means that depreciation of Pakistani rupee and increase in income of trading partners will increase exports of Pakistan (Table 6).

TABLE 3. EXPORT FUNCTIONS: $\ln expak = \beta_0 + \beta 1 \ln rex_j + \beta 2 \ln y_j$
Pakistan exports to traditional partners (Germany, Japan, Saudi Arabia, UAE, UK, USA)

Country	Constant	Real exchange rate	Income	R2	DW	ρa
1. Germany	4.54 (3.58)*	0.40 (2.25)*	0.16 (0.78)	0.97	1.84	23.5 (0.000)
2. Japan	-44.89 (-3.05)	0.33 (0.95)	5.76 (3.45)*	0.90	1.94	33.34 (0.000)
3. Saudi Arabia	6.48 (3.00)*	-0.77 (-1.00)	0.54 (2.50)*	0.84	1.44	8.22 (0.000)
4. UAE	0.82 (1.29)	0.72 (3.88)*	0.69 (3.86)*	0.96	1.93	3.01 (0.005)
5. UK	2.80 (0.94)	0.41 (1.64)	1.02 (0.98)	0.98	2.59	17.62 (0.000)
6. USA	-2.18 (-0.38)	-0.075 (-0.20)	2.33 (2.25)*	0.99	2.82	27.9 (0.000)

Note: (a) * and ** indicate 5% and 10% levels of significance; (b) ρa = first-order autocorrelation coefficient if DW indicated such autocorrelation in the residuals.

TABLE 4. EXPORT FUNCTIONS $\ln exp = \beta_0 + \beta 1 \ln rex_j + \beta 2 \ln y_j$
Pakistan Exports to Asian Partners (Bangladesh, China, India, Sri Lanka)

Country	Constant	Real exchange rate	Income	R2	DW	ρa
1.Bangladesh	1.69 (1.90)**	1.17 (2.21)*	1.10 (3.49)*	0.83	2.50	6.30 (0.000)
2. China	-3.01 (-1.52)	1.55 (3.59)*	1.34 (3.90)*	0.78	2.03	4.39 (0.000)
3. India	-2.23 (-1.27)	-0.37 (-0.28)	1.29 (3.63)*	0.63	1.98	2.50 (0.019)
4. Sri Lanka	0.05 (0.02)	1.39 (3.34)*	0.54 (1.81)**	0.78	1.60	2.98 (0.005)

Note: (a) * and ** indicate 5% and 10% levels of significance (b); ρa = first-order autocorrelation coefficient if DW indicated such autocorrelation in the residuals.

Except Japan and UAE the income variable has significant coefficient (Table 7) for the remaining four countries suggesting that Pakistan's income is the major determinant of Pakistani imports. Except Saudi Arabia real exchange rate coefficient is not significant for other traditional partners. Except China we do not get encouraging results from other Asian Partners (Table 8).

TABLE 5. IMPORT FUNCTIONS: $lnim_{pak} = \alpha_0 + \alpha_1 lnrex_j + \alpha_2 lny_p$
Imports from Traditional Partners (Germany, Japan, Saudi Arabia, UAE, UK, USA)

Country	constant	Real exchange rate	Income	R2	DW	ρa
1. Germany	4.36	-0.06	0.69	0.92	1.90	7.90
	(4.93)*	(-0.31)	(2.35)*			(0.00)
2. Japan	5.68	-0.10	0.32	0.85	2.17	8.08
	(4.78)*	(-0.30)	(1.12)			(0.00)
3. Saudi Arabia	7.27	-1.57	1.08	0.90	1.85	6.46
	(2.72)*	(-1.73)**	(3.85)*			(0.00)
4. UAE	1.43	0.229	1.39	0.88	1.87	6.08
	(0.599)	(0.207)	(1.005)			(0.00)
5. UK	5.06	-0.17	0.56	0.90	1.93	8.38
	(5.71)*	(-0.54)	(2.12)*			(0.72)
6. USA	5.46	-0.22	0.64	0.67	1.99	3.08
	(4.17)*	(-0.36)	(1.82)**			(0.004)

Note: * and ** indicate 5% and 10% levels of significance; ρa = first-order autocorrelation coefficient if DW indicated such autocorrelation in the residuals

TABLE 6. IMPORT FUNCTIONS $lnim_{pak} = \alpha_0 + \alpha_1 lnrex_j + \alpha_2 lny_p$
Pakistan imports from Asian Partners (Bangladesh, China, India, Sri Lanka)

Country	constant	Real exchange rate	Income	R2	DW	ρa
1.Bangladesh	3.88	0.005	0.002	0.79	2.07	9.87
	(3.02)*	(0.03)	(0.005)			(0.000)
2. China	-0.07	-0.01	1.96	0.98	1.17	5.64
	(-0.05)	(-0.32)	(4.79)*			(0.000)
3. India	-3.85	-1.53	1.16	0.86	0.92	3.24
	(-3.11)*	(-0.96)	(0.18)			(0.003)
4. Sri Lanka	4.31	0.33	-0.11	0.29	1.87	3.14
	(6.52)*	(1.07)	(-0.71)			(0.004)

Note: * and ** indicate 5% and 10% levels of significance; ρa = first-order autocorrelation coefficient if DW indicated such autocorrelation in the residuals.

Johansen co-integration results

Since the variables under consideration have unit roots (results not reported to conserve space), we examine the export and import models for cointegration whose results have been shown in Tables 7-10. The lag order of VAR is determined by SC (Schwarz Information Criterion), FPE (Final Prediction Error) and AIC (Akaike Information Criterion) for both import and export models. Lag order based on the said criteria has been indicated against each country. Pakistan exports are cointegrated with Japan and USA based on λ-trace test only while the imports are cointegrated with UAE and USA on the basis of both tests. While for rest of the partners, there is no cointegration as the hypothesis of no-cointegration has been accepted by both the test-statistics (λ-trace and

λ-max). In the Asian group Pakistan imports and exports are cointegrated with Bangladesh and Sri Lanka but not with India and China.

TABLE 7. JOHANSEN COINTEGRATION RESULTS - EXPORTS: lnexp, lnrex, lny_j
(Germany, Japan, Saudi Arabia, UAE, UK, USA)

Hypothesized No. of CE(s)	λ-trace	5%CV	Prob.**	λ-max	5%CV	Prob.**
1.Germany (VAR Lag: SC=1 FPE, AIC =3)						
None	23.43	29.80	0.226	13.97	21.13	0.367
At most one	9.45	15.50	0.325	8.03	14.26	0.376
At most 2	1.425	3.84	0.233	1.43	3.84	0.233
2. Japan (VAR Lag: SC=1 FPE, AIC =3)						
None	36.214*	29.80	0.008	18.15	21.13	0.1242
At most one	18.062	15.50	0.020	12.70	14.26	0.087
At most 2	5.357	3.84	0.021	5.36	3.84	0.021
3. Saudi Arabia (VAR Lag: SC=1 FPE, AIC =3)						
None	29.75	29.80	0.051	18.34	21.13	0.118
At most one	11.41	15.50	0.188	10.38	14.26	0.188
At most 2	1.027	3.84	0.311	1.03	3.84	0.311
4. UAE (VAR Lag: SC=1 FPE, AIC =3)						
None	20.92	29.80	0.36	15.34	21.13	0.26
At most one	5.58	15.50	0.745	4.97	14.26	0.75
At most 2	0.61	3.84	0.44	0.61	3.84	0.43
5. UK (VAR Lag: SC=1 FPE, AIC =3)						
None	12.13	29.80	0.93	7.67	21.13	0.92
At most one	4.46	15.50	0.86	4.16	14.26	0.84
At most 2	0.298	3.84	0.59	0.30	3.84	0.58
6. **USA** (VAR Lag: SC=1 FPE, AIC =3)						
None	31.28*	29.80	0.034	20.39	21.13	0.06
At most one	10.88	15.50	0.22	6.91	14.26	0.50
At most 2	3.98	3.84	0.05	3.98	3.84	0.05

Note: * denotes rejection of the hypothesis at the 5% level.

TABLE 8. JOHANSEN COINTEGRATION RESULTS - EXPORTS: lnexp, lnrex, lny_j
(Bangladesh, China, India, Sri Lanka)

Hypothesized No. of CE(s)	λ-trace	5%CV	Prob.**	λ-max	5%CV	Prob.**
1. Bangladesh (VAR Lag: SC=1 FPE, AIC =3)						
None	52.68*	29.80	0.000	39.93*	21.13	0.0001
At most one	12.75	15.50	0.1243	9.13	14.26	0.275
At most 2	3.62	3.84	0.0571	-	3.84	0.057
2. China (VAR Lag: SC=1 FPE, AIC =3)						
None	20.56	29.80	0.386	10.80	21.13	0.668
At most one	9.76	15.50	0.299	6.46	14.26	0.554
At most 2	3.296	3.84	0.069	3.30	3.84	0.069
3. India(VAR Lag: SC=1 FPE, AIC =3)						
None	14.60	29.80	0.805	12.59	21.13	0.49
At most one	2.004	15.50	0.995	1.96	14.26	0.99
At most 2	0.041	3.84	0.840	0.407	3.84	0.84
4. Sri Lanka (VAR Lag: SC=1 FPE, AIC =3)						
None	38.13*	29.80	0.004	23.16*	21.13	0.0256
At most one	14.97	15.50	0.059	13.095	14.26	0.0759
At most 2	1.87	3.84	0.171	1.875	3.84	0.171

Note: * denotes rejection of the hypothesis at the 5% level.

TABLE 9. JOHANSEN'S COINTEGRATION RESULTS - IMPORTS: $lnimp_{pak}$, lnrex, lny_{pak}
(Germany, Japan, Saudi Arabia, UAE, UK, USA)

Hypothesized No. of CE(s)	λ-trace	5%CV	Prob.**	λ-max	5%CV	Prob.**
1.Germany (VAR Lag: SC=1 FPE, AIC =3)						
None	23.04	29.80	0.24	13.42	21.13	0.41
At most one	9.62	15.50	0.31	7.02	14.26	0.49
At most 2	2.6	3.84	0.11	2.60	3.84	0.11
2. Japan (VAR Lag: SC=1 FPE, AIC =3)						
None	19.66	29.80	0.45	12.09	21.13	0.54
At most one	7.6	15.50	0.51	7.50	14.26	0.43
At most 2	0.07	3.84	0.79	0.07	3.84	0.79
3. Saudi Arabia (VAR Lag: SC=1 FPE, AIC =3)						
None	27.74	29.80	0.085	19.88	21.13*	0.028
At most one	4.86	15.50	0.82	3.17	14.26	0.93
At most 2	1.69	3.84	0.19	1.70	3.84	0.19
4. UAE (VAR Lag: SC=1 FPE, AIC =3)						
None	27.80*	29.80	0.05	22.54*	21.13*	0.031
At most one	7.26	15.50	0.55	6.96	14.26	0.50
At most 2	0.30	3.84	0.58	0.30	3.84	0.58
5. UK (VAR Lag: SC=1 FPE, AIC =3)						
None	19.70	29.80	0.44	11.01	21.13	0.65
At most one	8.70	15.50	0.40	8.01	14.26	0.38
At most 2	0.69	3.84	0.41	0.69	3.84	0.41
6. USA (VAR Lag: SC=1 FPE, AIC =3)						
None	30.60*	29.80	0.04	22.90*	21.13*	0.03
At most one	7.70	15.50	0.50	5.40	14.26	0.70
At most 2	1.30	3.84	0.13	2.3	3.84	0.13

Note: * denotes rejection of the hypothesis at the 5% level.

TABLE 10. JOHANSEN COINTEGRATION RESULTS - IMPORTS: $lnimp_{pak}$, lnrex, lny_{pak}
(Bangladesh, China, India, Sri Lanka)

Hypothesized No. of CE(s)	λ-trace	5%CV	Prob.**	λ-max	5%CV	Prob.**
1. Bangladesh (VAR Lag: SC=1 FPE, AIC =3)						
None	31.80*	29.80	0.03*	26.35*	21.13*	0.008
At most one	5.45	15.50	0.76	4.50	14.26	0.80
At most 2	0.95	3.84	0.33	0.95	3.84	0.33
2. China (VAR Lag: SC=1 FPE, AIC =3)						
None	19.67	29.80	0.445	8.80	21.13	0.85
At most one	10.87	15.50	0.22	7.45	14.26	0.44
At most 2	3.42	3.84	0.06	3.42	3.84	0.06
3. India (VAR Lag: SC=1 FPE, AIC =3)						
None	27.44	29.80	0.09	20.50	21.13	0.06
At most one	6.94	15.50	0.58	5.75	14.26	0.65
At most 2	1.19	3.84	0.28	1.18	3.84	0.28
4. Sri Lanka (VAR Lag: SC=1 FPE, AIC =3)						
None	34.63*	29.80	0.013	23.81*	21.13	0.08
At most one	14.81	15.50	0.063	11.27	14.26	0.14
At most 2	3.55	3.84	0.06	3.55	3.84	0.06

Note: * denotes rejection of the hypothesis at the 5% level.

Error correction results

For USA we do not get statistically tenable results for the obvious reason that USA does not allow adequate market access to Pakistan's exports despite enjoying the principal share in trade with Pakistan. While for Bangladesh and Sri Lanka error-correction term is not only significant but also has the correct negative sign that implies long-run relationship between Pakistan exports to these countries (Table 11). This means that Pakistan should make efforts to promote its trade with these countries instead of begging USA and EU for market access.

TABLE 11. ERROR-CORRECTION RESULTS - EXPORTS
(Bangladesh, Sri Lanka, Japan and USA)

Country	Variable	λ	dlnxj(-1)	dlnrex(-1)	dlnyj(-1)
Bangladesh	Dlnexb	-0.51	-0.40	1.29	1.54
		(-6.65)*	(-3.48)*	(2.49)*	(2.92)*
Sri Lanka	Dlnexsri	-0.27	0.07	-1.24	-2.41
		(-2.82)*	(0.49)	(-2.19)*	(-1.58)
Japan	Dlnexjapan	-0.002	-0.07	0.27	1.56
		(-0.25)	(-0.36)	(0.63)	(0.73)
USA	Lnexpusa	0.11	-0.63	-0.16	1.19
		(1.42)	(-3.55)	(-0.43)	(1.06)

Note: * and ** indicate 5% and 10% levels of significance; exb= exports to Bangladesh, exsri = exports to Sri Lanka, exjapan = exports to Japan, expusa= exports to USA.

TABLE 12. ERROR-CORRECTION RESULTS - IMPORTS
(Bangladesh, Sri Lanka, UAE and USA)

Country	Variable	λ	dlnimp(-1)	dlnrex(-1)	dlnyp(-1)
Bangladesh	Dlnimb	-0.19	-0.08	-0.36	-1.64
		(-3.90)*	(-0.54)	(-1.88)**	(-1.09)
Sri Lanka	Dlnimsri	-0.17	-0.22	-0.56	-1.38
		(-1.80)**	(-1.23)	(-1.56)*	(-1.31)
UAE	Dlnimuae	-0.51	0.04	-2.91	-1.51
		(-5.07)*	(0.40)	(-1.94)**	(-0.64)
USA	Dlnimusa	-0.26	-0.13	0.006	-0.35
		(-3.00)*	(-0.84)	(0.018)	(-0.31)

Note: * and ** indicate 5% and 10% levels of significance; imb= Imports from Bangladesh, imsri = Imports from Sri Lanka, imuae = imports from UAE, imusa = imports from USA.

However, for imports we get a different scenario (Table 12). Pakistan imports have long-run relationship with imports from Bangladesh, Sri Lanka UAE and USA. Lagged exchange rate is significant for Bangladesh Sri Lanka and UAE suggesting the significance of exchange rate for imports. A stronger rupee will benefit the domestic consumers and hurt the exporters. Therefore, a realistic and stable exchange rate will benefit the economy of the country. For the last two years Pakistan exchange rate has depreciated alarmingly that has made the imports extremely expensive culminating in distressing trade deficit and Pakistan is obliged to knock the doors of IMF.

Granger causality results

TABLE 13. GRANGER CAUSALITY RESULTS - PAKISTAN'S EXPORTS
(China, Germany, India, Saudi Arabia, UAE, UK)

Null Hypothesis	Obs	F-Statistic	Probability	Country
rex does not Granger-cause ex_c	30	1.89	0.18	China
y_c does not Granger Cause ex_c		1.03	0.32	
y_g does not Granger Cause x_g		0.36	0.54	Germany
rex does not Granger-cause ex_g	35	0.37	0.54	
y_i does not Granger-cause ex_{india}		6.65	0.01	India
y_i does not Granger-cause rex	31	3.01	0.09	
y_{sa} does not Granger-cause ex_{sa}		7.55	0.01	Saudi Arabia
rex does not Granger-cause ex_{sa}	35	0.17	0.68	
rex does not Granger-cause ex_{uae}		2.51	0.12	UAE
ex_{uae} does not Granger-cause y_{uae}	35	0.12	0.72	
e_{xuk} does not Granger-cause rex		10.73	0.002	UK
y_{uk} does not Granger-cause ex_{uk}	35	1.08	0.31	

Note: exc = exports to China, y_c = Income of China, y_g = income of Germany, xg = exports to Germany, y_i = income of India, exindia = exports to India, ysa = income of Saudi Arabia, exsarabia = exports to Saudi Arabia, y_{uae} = Income of UAE, exuae = exports to UAE, y_{uk} = Income of UK, exuk = exports to UK.

TABLE 14. GRANGER CAUSALITY RESULTS - PAKISTAN'S IMPORTS
(China, Germany, India, Japan, Saudi Arabia, UK)

Null Hypothesis	Obs	F-Statistic	Probability	Country
y_{pak} does not Granger-cause im_c	30	4.68	0.03	China
rex does not Granger-cause im_c		0.08	0.77	
rex does not Granger-cause im_g		4.93	0.03	Germany
y_{pak} does not Granger-cause im_g	35	4.34	0.04	
y_{pak} does not Granger-cause im_{India}		11.50	0.001	India
im_{India} does not Granger-cause rex	31	3.39	0.06	
im_{Japan} does not Granger-cause rex		4.00	0.05	Japan
y_{pak} does not Granger Cause im_{Japan}	35	2.21430	0.15	
y_{ak} does not Granger-cause im_{UK}		4.26	0.04	UK
rex does not Granger-cause im_{UK}	35	5.38	0.08	
y_{pak} does not granger cause $im_{SArabia}$		0.08	0.78	S.Arabia
rex does not granger cause $im_{Sarabia}$	35	0.01	0.91	

Note: y_{pak} = Pakistan's income, im_c = imports from China, im_g = imports from Germany, im_{India} = imports from India, im_{Japan} = imports from Japan, im_{UK} = imports from UK., $im_{Sarabia}$ = imports from SArabias.

Real exchange rate as well as income of China, Germany and UAE does not Granger-cause Pakistan's exports to these countries while for India we see opposite scenario. Saudi Arabia's income Granger-causes Pakistan's exports but real exchange rate does not. UK income does not Granger-cause Pakistan's exports while real exchange rate does (Table 13). There is unidirectional causality from Pakistan income to imports from China; exchange rate does not cause imports from China. Pakistan income and real exchange rate Granger-cause imports from Germany and India. The real exchange rate and income of the trading partner's country are the means of improving the exports of Pakistan. Exchange rate causes unidirectional causality of Pakistan's imports from Japan, Pakistan income does not Granger-cause imports from Japan. Both Pakistan income and exchange rate Granger-cause imports from UK. For Saudi Arabia, neither income nor exchange rate

Granger-cause Pakistan's imports. Thus Pakistan's income and the exchange rate are not the principal determinants of imports from Saudi Arabia (Table 14).

Conclusion

We estimated the import and export elasticities of Pakistan trade with traditional trade partners and some Asian countries to see the dynamics of Pakistan trade from 1973 to 2008. OLS provides mixed results for exports function for real exchange rate, but we get expected results for income for all countries of the sample suggesting that income is the principal determinant for exports performance. However, exchange rate role is not underestimated. For imports function, except Bangladesh, Sri Lanka and UAE, we get the expected results for exchange rate. For income we get expected results for all except Sri Lanka. Because of autocorrelation problem which does not have a universal cure, OLS results are interpreted with caution. Nevertheless, we do get valuable insight about Pakistan's trade with both types of trade partners.

Income elasticity for Japan, UK and USA is higher than other traditional partners. However, for Asian countries, China and India have higher income elasticity suggesting that increase in income of these countries will increase Pakistan's exports to these countries. For imports Pakistan enjoys higher income elasticity with UAE and Saudi Arabia implying that increase in Pakistan income will increase Pakistan imports from these countries. Pakistan is desperately dependent on Saudi Arabia for oil imports. Import elasticity for USA and Germany are higher than Japan and UK.

Use of long period data necessitated the examination of time series properties. Pakistan exports are cointegrated with Japan and USA while the imports are cointegrated with UAE and USA. In the Asian group Pakistan imports and exports are cointegrated with Bangladesh and Sri Lanka but not with India and China. Real exchange rate as well as income of China, Germany and UAE does not Granger-cause Pakistan's exports to these countries while for India we see opposite scenario. Pakistan income and real exchange rate Granger-cause imports from Germany India and UK.

Income and exchange rate are both important determinants of foreign trade. Continuing its trade with traditional partner and making efforts for greater market access to USA and EU, Pakistan should make efforts to increase its trade with Asian countries notably China and India (both countries have high income elasticity) because both are fast growing economies and have huge market.

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