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Determining Import Intensity of Exports for Pakistan

Sadia Bader*

This study provides empirical evidence in support of the hypothesis that imports of intermediate and capital goods are critical inputs in the export production of the country. Thus, any short-run divergence in trade balance due to these would lead to higher exportable surplus in the long-run. In this context, the study estimates a semi-reduced export equation, for a sample of 1973-2005 annual data, through Ordinary Least Square method. The results indicate that in Pakistan's case, there is a long-run relation between exports and imports of intermediate and capital goods.

JEL Codes: C22, F10, F14
Key Words: Export, Imports, Intermediate Goods, Semi-reduced Function, Pakistan

1. Introduction

It is generally argued that in many developing countries, exports are crucial for the economic development as they help in generating foreign exchange necessary to finance imports which are important for domestic capital formation and are used as inputs in the export production process. Therefore, it would be more appropriate while explaining the determinants of export function to analyse the dynamic behaviour of imported goods also. Despite the fact that in the recent past, the long-run dynamic relation between imports and exports has received importance in the literature of international trade, the empirical work available on this topic is still limited; for example, Khan and Knight (1988), Koukouritakis (2004), Arize (2002), Irandoust and Ericsson (2004) and Tang (2005). Besides estimating the long-run relation, it is also pertinent to measure the contribution of imports as it has significant implications on trade balance.[1] In this respect,

* Author is an Analyst in the Economic Analysis Department of the State Bank of Pakistan [sadia.badar@sbp.org.pk]. She is greatly indebted to Shaghil Ahmed's valuable guidance and insightful suggestions. The author would also like to thank Zulfiqar Hyder and Syed Sajid Ali for their helpful comments. Errors and omissions are the responsibility of the author. Views expressed are those of the author and not of the State Bank of Pakistan.

[1] Trade deficit caused by high capital import bills would lead to higher export growth in future.

measuring the content of imports in exports, especially in developing countries, is of great interest.

In this back drop, Pakistan provides the opportunity to investigate the above issue as its trade deficit, in term of GDP, has increased sharply in the recent years (from 2.4 percent in FY00 to 5.6 percent in FY05) mainly due to a surge in capital and intermediate imports.[2] Meanwhile exports also recorded significant growth, whereas, growth in import overshadowed the reasonable export performance thereby leading to a substantial increase in the country's trade deficit. In view of the rising trend of capital and intermediate imports, the recent export performance raises an important economic question: how much of the export growth is an outcome of the higher imports?

This paper allows us to estimate the actual contribution of imports in the total export growth of the country over the period under review, from 1973-2005. It is also important to investigate the above economic hypothesis; that the upward trend in trade deficit might be of transitory nature and not permanent. In other words, the desirability of trade deficit is based on the assumption that the surge in imports will result in higher exportable surplus, thereby resulting in lower trade deficit in future years.

For Pakistan, there are empirical works on the estimation of the export supply and demand function such as Hasan and Khan (1994), Akhtar and Malik (2000), Atique and Ahmad (2004); however, none of these studies has used imported inputs in the export function. Therefore, the main objective of this paper is to empirically test the aforementioned hypothesis and to provide the estimate for the elasticity of export with respect to imported inputs.

In contrast to the existing work to estimate the long-run relation between imports and exports through Vector Autoregressive (VAR) method done by Irandoust and Ericsson (2004), Arize (2002), and Tang (2005), this paper employs simple Ordinary Least Square (OLS) technique to investigate the presence of imported inputs as one of the main variables in a semi-reduced export equation. The result shows that the imported inputs have a significant role in the overall export performance of Pakistan. The contribution of imported inputs in total export level is 37 percent, however, this impact would translate with one period lag. This paper

[2] The higher international oil prices could be another factor for the surge in import bills. Interestingly, imports excluding oil price impact are also showing significant rise thus trade deficit is 4.8 percent of GDP.

also provides the disaggregated long-run estimates of imports, which are 24 percent for raw material and 16 percent for capital goods.

The finding of the paper is broadly aligned with the available empirical work done on the subject. These studies can be broadly classified into developed and cross-country analysis. For developed countries, Koukouritakis (2004) has found that imports have significant effect on exports. Similarly, Irandoust and Ericsson (2004) use Johansen cointegration technique to estimate the long-run convergence between real exports and real imports for industrialized countries. Their results indicate that trade flows are cointegrated for most countries. However, their results are in contrast to the finding of Fountas and Wu (1999) with respect to USA, who do not reject the null hypothesis of no long-run relationship between imports and exports. On the other hand, Khan and Knight (1988) estimate export supply function for pooled countries. Their study does not provide country specific import coefficient; however, they estimate a combined effect of imports on exports, which is 52 percent. Some studies, such as Arize (2002), have found evidence in favor of cointegration between imports and exports in 35 out of 50 countries, including Pakistan.

Nonetheless, certain weaknesses can be identified in the above mentioned studies: (i) most of the studies, using Johansen technique, do not incorporate relevant control variables thus leading to a biased import coefficient; and (ii) these studies also implicitly include the imports of consumer goods while exploring the long term relation with exports.[3]

This study addresses the aforementioned weaknesses by controlling the demand and supply shifters to estimate a semi-reduced export function. In addition, this study has refined the measure of imports by excluding consumer imports. Another contribution of this study relates to the estimation of the contents of disaggregated imported goods to the export level. In general, none of the previous studies have estimated the impact of imports on exports at a disaggregated level.

The paper is structured as follows. Section 2 provides a brief review of overall trade structure and policies in Pakistan. Section 3 discusses the available literature on export function. Model specification is presented in Section 4. Section 5 describes data and discusses the results of empirical estimation. It also incorporates the effect of disaggregated components of imports on export performance. Conclusions follow in Section 6.

[3] These imports are not used in the export production.

2. Trade Structure and Policies in Pakistan

Pakistan inherited a weak industrial base since its inception as an independent state. In order to increase the industrial units, the government initially adopted the Import Substitution Industrialization (ISI) strategy. The main objective of this policy was to replace the domestic demand for imported consumer goods by domestically produced goods with more emphasis on encouraging the import of capital goods and raw material by relaxing restrictions.[4] In this context, the important measures which were taken to liberalize imports of raw material were: (i) introduction of Free List for raw material imports;[5] (ii) expanding licensable imports list; and (iii) simplification in procedures of import licensing. As a result of these policies, the share of consumer goods in total imports reduced from 30 percent in 1960-61 to 16 percent in 1969-70. While the share of capital and intermediate goods in total imports increased from 71 percent to 84 percent during the same period.

On the other hand, in order to encourage exports, the government introduced the Export Bonus Scheme (EBS) in the first half of the 60s, with an aim to support the exporters of manufactured goods through more favorable exchange rates. Similarly, the government maintained its policy stance for the promotion of export in later half of the decade in the form of issuance of Export Performance License during 1968.[6] Resultantly, the share of manufactured exports in total exports recorded a sharp rise from 39 percent in 1960-61 to 67 percent in 1970-71.

During the decade of the 1970s, trade policy continued towards import liberalization and export promotion. The main focus of the import policy was to eliminate administrative controls which adversely affect exports. In this context, the distinctions between industrial and commercial importers were removed, import of capital goods under Free List was permitted, and extensions were made in the Free List of raw material. On the export side, the Export Refinance Scheme (ERS) was introduced by the State Bank of Pakistan, adjustments were made in export duties on a number of items, tax exemption and rebate on excise and

[4] During the early 1960s and 1970s, the import of consumer goods was subject to different kinds of quantitative restrictions.

[5] Free list consists of three parts: *A* comprises items importable by all registered importers; *B* covers such items that are exclusively imported by industrial consumer; while in *C*, items imported by public sector agencies are included.

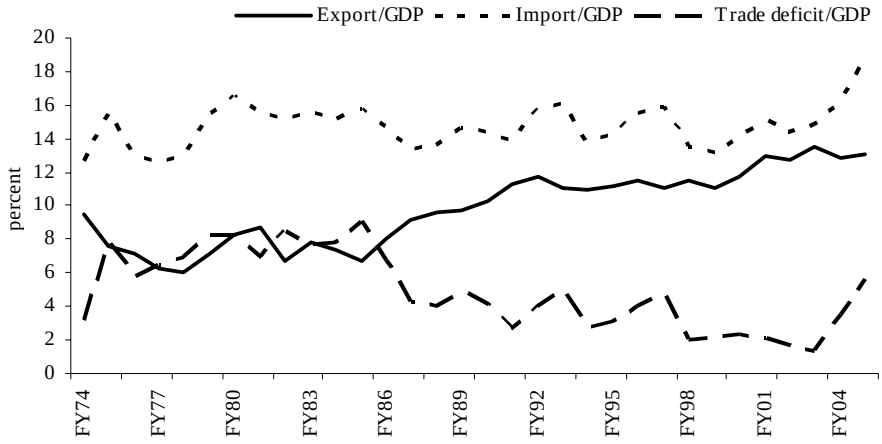
[6] The main aim of this policy was the provision of cash licenses to exporters cum manufacturers for importing items required for producing exports.

custom duties were also allowed to exporters.[7] In addition, after the devaluation of Pak Rupee by 10 percent in 1973, the exchange rate was pegged with the dollar at Rs 9.90/$.

Despite the above mentioned measures to encourage exports, Pakistan's trade pattern experienced a structural shift in the form of lower exports and rising import bills of capital and raw material since the 1970s. Resultantly, the surge in imports did not match the equal rise in exports and the economy faced a large trade deficit (Figure 1).

It is important to note, that besides the incentives provided by the government, there were some exogenous factors that adversely affected the export growth during the same period. Specifically, there was an increase in international oil price which led to recession in the international market and erratic agricultural performance of the country. Thus, exports decreased to an average of 7.0 percent of GDP in 1976-80 from an average of 8.1 percent of GDP during 1972-75. While, imports to GDP ratio increased to an average of 14.1 percent from an average of 10.9 percent of GDP in the same period (Figure 1).

Figure1. Historical Trends in Trade Deficit



Source: *Federal Bureau of Statistic,* Pakistan

[7] Export duties on all items except raw cotton, cotton waste, cotton linter, cotton seed, hides and silks, basmati rice, fish, oilcakes and molasses were abolished.

During the 1980s, there was a shift in trade policies globally from ISI to Export Led Growth (ELG). The success of ELG adopted by South Korea and Taiwan set an example for other developing countries. Following the experience of developing countries, Pakistan maintained its liberalization policies towards more export oriented industries. The conversion of fixed into flexible exchange rate, duty free imports of essential machinery and raw material to certain export-industries, and the export rebates proved to be major factors of export growth during this period. In addition, other main export incentives provided by the government included: (i) compensatory rebates scheme; (ii) export credit guarantee scheme; and (iii) concessionary credit for exporters. Furthermore, during the second half of the 80s, for the promotion of textile industry the duty-free imports of machinery for Balancing, Modernization and Replacement (BMR) purpose were allowed. On the import front, the government took various steps for liberalizing imports which included abolishment of the system of free and banned imports in 1983 and the introduction of a negative list items.[8] As a result of these policies, the share of manufacturing and semi manufacturing exports in total exports rose sharply (that is, 58 percent in 1979-80 to 80 percent during 1989-90).[9] However, as this policy also led to the acceleration of import growth, the share of intermediate and capital goods in total imports which was 78 percent in 1978-79 increased to 86 percent during 1987-88.

Further, the pace of trade liberalization was accelerated under a Structural Adjustment Programme (SAP) with the IMF in 1988. In case of imports, the government removed the Non-Tariff Barriers (NTB) and replaced them with tariffs measures, accompanied by reduction in maximum tariff rate. For export promotion, the program decided to change the previous system of uniform income tax rebate to encourage value addition in exports.[10]

The data on trade shows that in early 1990s, imports rose steeply primarily due to the continued import liberalization policies together with the international oil price shocks. For further liberalization of imports, the restriction on import license scheme (except for commodities on the negative list) was abolished. Resultantly, all authorized dealers were allowed to open letter of credit for imports. Also, importers were granted permission to use their own foreign exchange without any ceiling.

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[8] Items which were not on this negative list were allowed to import.

[9] Textile exports are almost 80 percent of total manufacturing exports of the country.

[10] "It was decided to replace the uniform income tax system with a graduated one that encourage higher valued exports, by permitting export houses to retain a small part (5%) of their foreign exchange earnings and by allowing the private sector a greater involvement in exporting rice and cotton" [Zaidi (2005); p. 173].

Moreover, trade policy during FY00-05 was primarily focused to increase the trade openness and industrial growth in the economy. In this context, the government provided incentives for reducing the cost of doing business for attaining competitiveness globally on the one hand, while on the other hand it also made efforts to increase and diversify the export base by exploring untapped markets for both traditional and non-traditional exports. Specifically in the recent past, the government has taken important trade measures to promote trade activities such as: (i) restriction on importing more than five year old machinery has been abolished; (ii) maximum tariff rate has been reduced to 25 percent; (iii) Pakistan export finance guarantee agency has been set up in the private sector to facilitate small and medium enterprises for working capital requirement; and (iv) for the promotion of textile sector, it has been proposed to develop textile cities in Karachi and Faisalabad.

To sum up, due to these policy initiatives taken by the government, the country's imports, particularly capital and raw material goods, grew very rapidly since the early 1970s. While the acceleration in the export growth after 1985 was mainly a reflection of the change in exchange rate regime in 1982. The upward movement in imports, to some extent, sustained during the first half of nineties resulted into persistent level of trade deficit in the same period. In recent years, imports again accelerated sharply primarily due to large oil import bills together with capital imports, while the exports have also shown remarkable growth during the same period.

Contribution of Import in Total Value of Domestic Production

The input-output tables developed by the Federal Bureau of Statistic (FBS) are not available after 1989-90.[11] Therefore, we use the share of imported inputs in total value of domestic production, based on the census of manufacturing industries, as a proxy for measuring the import content in total exports.[12] Table 1 suggests that during different sample periods, on average, the imported inputs contributed approximately 18 percent share in total value of domestic production. The disaggregated contribution of imported inputs for different industries reflects the highest ratio for machinery and equipments, and chemical which is 30 and 35 percent respectively in 2000-01.

[11] The input-out tables are used to gauge the content of imports in total export performance of a country.
[12] This ratio is calculated by the research staff of the State Bank of Pakistan.

Table 1. Share of Imported Inputs in Total Value of Domestic Production (percent)

	1987-88	1990-91	1995-96	2000-01
All industries	19	18	18	17
Food, beverages, and tobacco	15	16	19	14
Textile, apparel, and leather	8	6	7	5
Wood, wood product, and furniture	7	4	8	1
Paper, printing and publishing	27	20	18	30
Chemical, rubber and plastics	32	36	34	35
Non-metallic mineral products	3	2	2	3
Basic metal industries	15	2	25	8
Machinery and equipments, metal products	38	36	27	30
Handicrafts, sports, other manufacturing	8	16	14	8

Source: *Federal Bureau of Statistics*, Pakistan

The brief review of trade polices and statistical analysis raises two questions: (i) whether the fluctuations between exports and imports have some relation in the long-run, and (ii) what is the elasticity coefficient of total as well as the disaggregated imported inputs (raw material and capital goods) in total exports?

3. Review of Existing Work

In literature limited work has been done on the underlying study, however, this section presents a brief review of some of these studies for developing and developed countries.

In context of Pakistan we have found only one study that actually does not directly estimate Pakistan's case, but for a group of 50 countries.[13] Arize (2002) estimates the long-run convergence between imports and exports by using Johansen technique and Stock and Watson test on a quarterly data from 1973:2 to 1998:1. The result depicts long-run relation between trade variables in 35 countries, including Pakistan. For Pakistan, the estimated normalized vector, by using Johansen technique is 0.92, which is statistically significant showing the long-run convergence. Similarly, through Phillips-Hansen and Stock and Watson test the study found that the convergence vector is 0.26 and 0.30 respectively.

[13] Out of 50 countries, 13 are in Asia, 5 are in Middle East, 9 are in Africa, 7 are in Europe, 12 are in Latin America, and 4 countries are included in a section referred to as "the Pacific, USA, and Canada section."

Similarly, Khan and Knight (1988) estimate the import compression and export performance in developing countries through 2SLS method. They estimate a full trade model by using a pooled cross-sectional time series which incorporates industrial raw materials and capital goods as total imported inputs in export production. Their results do not provide country specific import coefficient; however, the combined elasticity of exports with respect to imported inputs is statistically significant, the point elasticity is 0.52.

On the other hand, Koukouritakis (2004) estimates the EU accession effects on trade flows. His model is based on the previous empirical work by Khan and Knight (1988). The main objective of his study was to estimate the effects of the Greek trade balance that were caused by the EU accession. He has used 3SLS approach to estimate the trade model, which reflects that the long-run export elasticity with respect to imported inputs is 0.78.

Irandoust and Ericsson (2004) examine the behaviour of trade flows in industrialized countries such as France, Germany, Italy, Sweden, the UK and the USA. They use the Johansen and Juselius cointegration technique to study the long-run convergences between imports and exports. The results reflect that in case of USA, Germany and Sweden there is no violation of international budget constraints. Moreover, due to effective macroeconomic policies any short-run divergences in their trade account are temporary and thus are sustainable in the long-run. However, for UK they found conflicting evidence of any long-run convergence between real trade variables. They argue that for UK, bad macroeconomic policies and permanent productivity gap creates hindrance for imports and exports to converge in the long-run.

4. The Model

This paper estimates a semi-reduced export function by using relative price variable (relative price index and nominal effective exchange rate) along with demand shifter (foreign GDP) and supply shifter (domestic GDP). Unlike the conventional work on exports, this paper also takes into account imported inputs as one of the supply determinants of exports. Since imports except consumer goods (10 percent of total imports) are used as input either in exports or in domestic production, therefore this paper estimates a semi-reduced export equation in which the intermediate and capital goods are taken as an aggregate import. Furthermore, we also estimate the contribution of the aforementioned classification of imports. Following are the econometric specifications of the estimating equation.

Semi-reduced export-function for aggregate imports:

$$\log EX = \alpha_0 + \alpha_1 \log CP + \alpha_2 \log YF + \alpha_3 \log NEER + \alpha_4 \log RPI + \alpha_5 \log M + \mu \quad (1)$$

Semi-reduced export-function for disaggregated imports:

$$\log EX = \beta_0 + \beta_1 \log CP + \beta_2 \log YF + \beta_3 \log NEER + \beta_4 \log RPI + \beta_5 \log RM + \beta_6 \log CM + \varepsilon \quad (2)$$

EX : quantum index of export	RPI : relative price index
CM : quantum index of capital import	$NEER$: nominal effective exchange rate index
M : quantum index of import	YF : USA domestic output index
RM : quantum index of industrial raw material import (both consumer as well as capital)	CP : cotton production index

All coefficients represent their respective elasticities and the expected sign is positive for all variables except for $NEER$ and RPI, which are negatively related with exports.

5. Empirical Estimation

5.1. Data

Besides imports (M, RM, CM), the paper also incorporates control variables. CP Index, is used as a supply proxy for domestic output,[14] YF is used as a proxy to world output.[15] Furthermore, $NEER$[16] is used to capture the effects of

[14] Ideally, real domestic production should be included as a potential variable to define the supply side determinant of export; however, due to high multicolinearity between imports and real GDP, the main variables turned out to be insignificant. Further, the variable of domestic output might have endogeneity/simultaneity bias. Nevertheless, as the cotton production explains 60 percent of the total exports, it could be treated as a best available choice for proxy; the expected sign of the *CP* is positive.

[15] We have used different proxy for world output, for example geometric mean of the major trading partner's GDP index with their respective exports weights, world output from IFS; however, none of them were significant.

[16] NEER is used to measure the value of Pakistan's currency relative to basket of trading partner countries. A decrease in NEER reflects a nominal depreciation of domestic currency.

competitiveness along with RPI, which is simply the weighted ratio of consumer price index (CPI) of Pakistan with its major trading partner's CPI.[17] Moreover, to capture the effects of exchange rate regime shift (as mentioned in Section 2), we introduce a dummy assuming 1 from 1982 onwards, zero otherwise.

The data span covered in this study is from 1973 to 2005 on annual basis and all variables are in log form. The source for trade data (EX, M, RM, CM) and CP is FBS, while data on $NEER$, RPI are taken from State Bank of Pakistan. The source of YF is International Financial Statistic (IFS 2005).

5.2. Estimation Technique

In literature, VAR model is used for estimating the long-run relation between imports and exports. However, due to insufficient number of observations (34 observations), we use the OLS technique. To establish the long-run cointegrating relation among non-stationary real trade variables, we have tested the residuals for stationarity.

Moreover, it would be pertinent to note that imported inputs in the form of raw material and capital goods take significant time in the production process and finally translate into exports. Therefore, we have included the lags of imports to capture this effect. The lag structure is selected by using the multivariate generalizations of the Akaike Information Criterion (AIC) or Schwartz Bayesian Criterion (SBC).[18]

5.3. Results of the Estimation

Before applying the OLS, the time series properties of all the variables is established by using Augmented Dickey-Fuller (ADF) test. The results presented in the Appendix (Table A2) suggest that all the variables are non-stationary at levels; however, they are integrated of the same order, I (1). Thus, fulfilling the criteria for estimating the OLS regression.

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[17] These includes United States of America, European countries, Japan, United Kingdom, China, Korea, Switzerland, Taiwan, Canada, Singapore, Australia, Hong Kong, Brazil, Saudi Arabia, Sweden.

[18] One should be careful while selecting lag length, as the results can be quite sensitive to the lag length, thus it is suggested to start with the maximum lag deemed reasonable, in accordance with the theory and degree of freedom, and then test whether the lag can be shortened.

5.3.1. Results of Semi-Reduced Form Model

In case of developing countries, the literature [Goldstein and Khan (1985)][19] suggests that the average lag involved in the adjustment of imported inputs into exports is between 2 to 5 years, however, Khan and Knight's (1988) study suggests the contemporaneous effect of imports on exports as well.

This paper therefore examines the contemporaneous as well as lagged effect of imported inputs. However, due to high level of multicolinearity among different lags of imports the regression can not include more than one lag of imported inputs. Finally, on the basis of AIC and SBC the results of the estimated models are reported in Table 2.

The elasticity coefficients of all controlled variables $(YF, NEER, RPI)$ in Regression I are statistically different from zero and are according to the economic

Table 2. Estimation of Semi- Reduced Export Equation
(Dependent variable: EX)

	Regression-I (total imports)	**Regression-II** (disaggregated imports)
Constant	5.78*	4.63
	(1.93)	(1.43)
log CP_t	0.11	0.14**
	(1.46)	(2.06)
log YF_t	1.15***	1.04**
	(3.24)	(2.34)
log $NEER_t$	-0.56***	-0.48**
	(-2.57)	(-2.14)
Log RPI_t	-1.29***	-1.10***
	(-4.88)	(-4.96)
log M_{t-1}	0.37***	
	(5.19)	
log RM_t		0.24*
		(1.78)
log CM_{t-1}		0.16**
		(2.37)
Exchange rate dummy	0.211***	0.22***
	(3.89)	(3.81)
DW-test	2.10	1.897
Adjusted-R^2	0.984	0.983
S.E. of Regression	0.082	0.085

Figures in parenthesis are t stats.

***, **, and * reflect the significance at 1 %, 5 % and 10 % respectively.

[19] Goldstein, Morris and Mohsin Khan (1985) as quoted in Khan and Knight (1988, p. 317).

theory. The only exception is the elasticity of exports with respect to the cotton production which although has a correct sign (positive), but the coefficient is not significant even at 10 percent. In case of imports, the study found that the long-run feedback relation between imported inputs and exports is 37 percent.

The estimated parameters shown in Table 2 are discussed as follows.[20] The elasticity of exports with respect to imported inputs suggests that the response of export performance to one percent change in the level of imports is significant- the value of the coefficient is 0.37; however, the likely impact would appear with one period lag. An increase in cotton production of one percentage point is associated with a 0.11 percent increase in exports. One percent increase in world GDP leads to 1.15 percent rise in export level. *NEER* has a negative impact on the exports level; One percent appreciation of *NEER* will reduce the demand for export in international market by 0.56 percent. Finally, one percentage point rise in *RPI* decreases export level by 1.29 percent.

5.3.2. Impact of Disaggregated Imports

On the basis of the above established long-run relationship between imports and exports, we now estimate the contents of disaggregated imports into exports. Table 2 shows the effect of capital and raw material imports on exports. The estimated elasticities for all controlled variables are statistically significant in Regression II.[21]

The average elasticity of exports with respect to imports of raw material and capital imports is approximately 20 percent.[22] At the disaggregated level, the results depict that one percent rise in import of raw material will have a significant positive impact on the exports of the same period, which is 0.24 percent. The elasticity of exports with respect to capital goods is 0.16 with one period lag. These elasticities reflect that the imports of raw materials have a stronger impact on the exports relative to capital imports. The rationale for the stronger impact of raw material towards export lies in the fact that Pakistan's major exporting sector

[20] It is important to note that due to high level of multicolinearity among different lags of imports the regression can not include more than one lag of imported inputs in the regression (Appendix; Table A4).

[21] In case of disaggregated imports, we have also tested for suitable lags of raw material and capital goods.

[22] The elasticity coefficient for total imports is 0.37; however, the average elasticity coefficient for raw material and capital goods is 0.20 (which is an average of raw material and capital import coefficients). This is primarily due to data coverage, as in total imports other than raw material and capital goods, manufactured goods and miscellaneous items are also included.

(textile) largely use raw material such as yarn, textile fiber, and pure telethelic acid (PTA) as an input in producing final goods.[23]

However, capital goods are mainly used to enhance the productive capacity of both the export and non-export sectors of the economy. [24] This is probably due to the fact that few items which are classified under capital goods, such as power generating machinery, telecommunication and sound recording equipments, road and motor vehicles, office machinery, construction and mining machinery (having approximately 38.9 percent share in capital goods), are largely imports for domestic production only. In addition, durable goods like mobile phone, handsets, cars, telephone sets, television and refrigerators and other consumer durables, are wrongly categorized in capital goods. However, they also have significant share (approximately 18 percent) in total capital goods; thus, explaining the low elasticity coefficient of capital imports. It would be important to note here that if we define the capital imports in terms of those goods which are directly used for export production, then the elasticity of exports with respect to capital imports would be higher than what we have obtained.

5.4. Diagnostic Tests

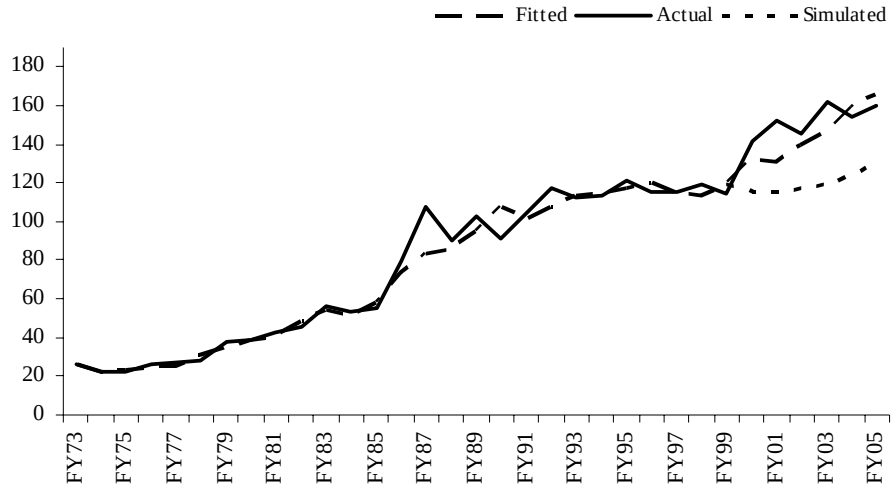
Both regressions satisfy various diagnostic tests, specifically, Jarque Bera stats for normality, AR for residuals at lags 1 and upto 4 lags, Q-stats for squared residuals, ARCH test and White test all are not significant in regression and are reported in the appendix (Table A3).[25] Similarly, CUSUM and the squared CUSUM tests, for the coefficient stability, remained within the 10 percent significance lines (Appendix; Figure A1, A2).

5.5. Simulation

To analyze the extent of impact of imports on exports, Figure 2 depicts three lines reflecting the actual real exports, fitted real exports obtained from the regression, and the simulated fitted line from FY00. The simulated line shows how export would perform if imports grew at some average growth rate rather than what was observed during the last five years (that is 9.38 percent). The simulation shows that had the imports recorded 4.7 percent growth during the past five years the

[23] Textile has approximately 65 percent share in total exports.
[24] For developing countries, at a given level of technology, the content of capital good imports in total exports should be significant.
[25] In case of Regression I, the JB test for normality is significant at 5 percent; however, it should not be a matter of concern since asymptotic theory does not require normality for standard statistical inference to be valid.

Figure 2. Visual Impact of Imports on Exports (real export index; FY 91=100)



level of exports would have been 23.7 percent lower than the actual exports during FY05.

6. Conclusion

The objective of this paper is to examine and estimate the long-run dynamics of the real exports and imports for Pakistan. This paper developed a semi-reduced export equation that takes into account the impact of imports on exports. The empirical evidence suggests that the long-run elasticity of exports with respect to imports is 37 percent; however, the effect appears with a lag. At disaggregated level, the contribution of raw material and capital goods in total export performance is 24 and 16 percent respectively. Despite the fact that the empirical result indicates that there is a tendency among the real trade variables to cointegrate in the long-run, there are some sources of concern as the contribution of total imports in export is not fairly large given the considerable deterioration in the country's trade balance emanating mainly from the import side.

The results, however, depict that the import of raw materials and capital goods have an important role in boosting the overall export level of the country; whereas, the country's exports are more sensitive to import of raw material rather than capital imports. It is pertinent to note that due to inappropriate recording of several items in capital goods, the estimated elasticity of exports with respect to capital

goods is biased downward. Despite all these data limitations, the elasticity coefficient of capital goods reflects that by increasing the capital imports for those exporting industries which have a potential to export but due to capacity constraints are unable to do so, we can increase the export level of the country. In addition, this study also indicates that in medium to long-run, it is the structure of imports, particularly capital and raw materials, which should be monitored closely. Since this will help the policy-makers to focus on importing more of those items which are directly used into export production, thereby increasing the export capacity of the country and reducing the excess pressure on trade imbalances.

On the face of burgeoning trade deficit, there is a need to analyze the different policy options to control trade imbalances. In this context, restricting imports through tariff measures might not be desirable given the country's obligation under WTO commitments. Thus, any slowdown in trade imbalance could only be achieved through appropriate exchange rate and interest rate policies. However, what is equally important for the policy-makers is not to significantly weaken the on-going growth momentum.

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Appendix

Table A1. Trade Indicators (in percent)

Years	Export/GDP	Import/GDP	Trade Deficit/GDP
FY74	9.5	12.6	3.1
FY75	7.6	15.5	7.9
FY76	7.1	12.9	5.8
FY77	6.2	12.6	6.4
FY78	6.1	13.0	6.9
FY79	7.1	15.4	8.2
FY80	8.3	16.6	8.3
FY81	8.7	15.7	6.9
FY82	6.7	15.2	8.5
FY83	7.8	15.5	7.7
FY84	7.4	15.2	7.8
FY85	6.7	15.8	9.1
FY86	8.0	14.7	6.7
FY87	9.2	13.4	4.2
FY88	9.6	13.7	4.0
FY89	9.7	14.6	4.9
FY90	10.3	14.4	4.1
FY91	11.2	13.9	2.7
FY92	11.8	15.7	4.0
FY93	11.0	16.1	5.1
FY94	10.9	13.7	2.8
FY95	11.2	14.3	3.1
FY96	11.5	15.6	4.0
FY97	11.1	15.9	4.8
FY98	11.6	13.5	2.0
FY99	11.0	13.2	2.1
FY00	11.7	14.1	2.4
FY01	13.0	15.1	2.1
FY02	12.7	14.4	1.7
FY03	13.5	14.8	1.3
FY04	12.8	16.2	3.4
FY05	13.0	18.7	5.6

Table A2. Unit Root Test

	Level	First Difference	Order of Integration
log CP	-0.573	-3.752***	I(1)
log YF	-0.082	-4.412***	I(1)
log NEER	0.467	-3.730***	I(1)
log RPI	1.803	-2.832*	I(1)
log M	-1.699	-3.655**	I(1)
log CM	-2.342	-3.663**	I(1)
log RM	-2.124	-5.983***	I(1)

*, **, *** significant at 10, 5, and 1 percent, respectively.

Table A3. Diagnostic Tests

	Regression-I	Regression-II
Normality		
Jarque-Bera	5.97	3.61
Prob	0.05	0.16
Breusch-Godfrey Serial Correlation LM Test		
F-stat	0.38	0.49
Prob	0.68	0.62
ARCH test		
F-stat	0.45	0.39
Prob	0.51	0.54
White Heteroskedasticity Test		
F-stat	0.45	0.31
Prob	0.91	0.98
Correlogram of residuals		
Q-Stat (2)	0.95	1.33
Prob	0.62	0.514
Q-Stat (5)	2.52	2.42
Prob	0.77	0.78
Correlogram of residual squared		
Q-Stat (2)	0.55	0.55
Prob	0.76	0.76

Table A4. Correlation Matrix

	RM	RM_{t-1}	RM_{t-2}	CM	CM_{t-1}	CM_{t-2}
RM	1.00					
RM_{t-1}	0.99	1.00				
RM_{t-2}	0.98	0.99	1.00			
CM	0.53	0.50	0.46	1.00		
CM_{t-1}	0.43	0.44	0.39	0.65	1.00	
CM_{t-2}	0.32	0.35	0.37	0.44	0.62	1.00

Figure A1. Cusum and Cusum Square Tests: Long-Run Export Regression I

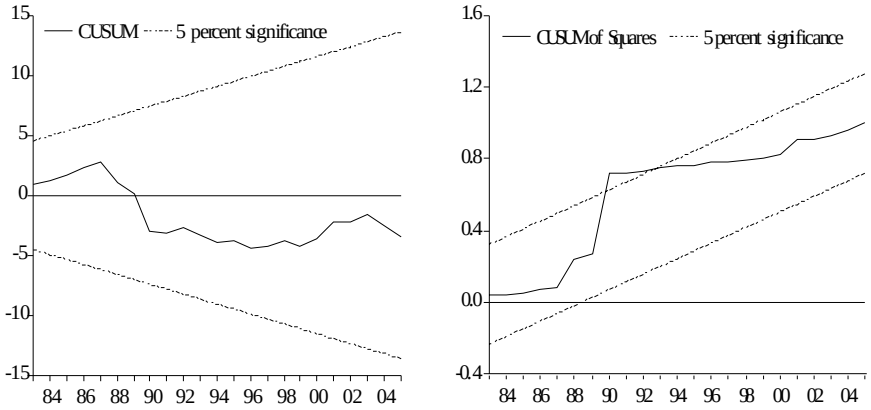

Figure A2. Cusum and Cusum Square Tests: Long-Run Export Regression II