ESTIMATED EXPORT DEMAND AND SUPPLY FUNCTIONS FOR PAKISTAN: A DISAGGREGATED ANALYSIS

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Abstract

This study estimates the impact of demand and supply side factors on the export performance of Pakistan. Using unrestricted autoregressive distributed lag (ARDL) model for the period 1971 to 2015, the study analyzes export performance using data both at aggregate and disaggregated levels. The study finds, firstly, that exports are elastic with respect to world income and relative export price at the aggregate level. Secondly, at a disaggregated level, only exports of manufactured goods, leather and cotton cloth are elastic to changes in world income. Similarly, demand for all export categories is inelastic with respect to relative export price. On the supply side, exports at both aggregate and disaggregated levels are significantly elastic to changes in domestic production capacity and relative price. The study concludes that demand and supply side factors are equally important in explaining the export behavior at the aggregate level, whereas at a disaggregated level, the supply side factors exercise relatively high impact on export performance.

Keywords: Demand and Supply Functions, Exports, Bound Testing Approach, Disaggregated Analysis

JEL Classification: F 100

Introduction

In today's globalized world, the economic performance of any economy depends crucially on the performance of its international trade and the developments in the global economy (particularly with the economic performance of the trading partners). Both the classical and modern liberal economists consider international trade as a major source of economic prosperity. Marshall (1890) argued that "a nation's economic growth and development relies heavily on international trade." Nurkse (1961) stated that international trade is an engine of economic growth. Given the pivotal part played by exports in international trade, export growth and economic growth are undeniably interconnected and have a very close relationship.

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The pace of economic growth, especially for developing countries, relies heavily on the proper understanding of the factors constraining the growth of exports. With the steady rise of globalization and the emergence of global competition, an understanding of the factors of export behavior has become a vital area of research in the contemporary world. Consequently, a number of empirical studies, including Kohli (1978), Goldstein and Khan (1978), Riedel (1988), Afzal (2005), Roy (2007), Jongwanich (2010), Zada et al. (2011), Anas et al. (2011) have identified the key factors that affect export growth. However, the conclusions reached by these empirical studies on the role of demand and supply side factors on export performance have, however, varied widely. For example, Kohli (1978) ascertained that for a small open economy, domestic supply conditions have played a vital role primarily determining the exports as compared to world income and prices. Similarly, Riedel (1988 for Hong Kong), Anas et al. (2011 for Indonesia), and Jongwanich (2010 for eight east South Asian economies [3]) also suggested that supply side factors have a substantial influence on export growth. On the contrary, Zada et al. (2011 for Pakistan) and Roy (2007 for India) asserted that demand side determinants are much more important for export development. Other studies, like Balassa et al. (1989) for developing countries argued that both supply and demand side factors have a significant effect on the growth of exports. All these empirical studies show the wide disagreement on the role of demand and supply side determinants explaining the export behavior across countries.

A relatively small number of empirical studies estimate the impact of both demand and supply side factors on export behavior at a disaggregated level across the globe. In the case of Pakistan, most of the empirical literature focuses on the estimation of aggregate export demand and supply functions. A few studies, like Khan and Aftab (1995) and Hussain (2010) have estimated the export demand model at a disaggregated level, but they ignored the estimation of export supply function. In fact, one can observe a bias in the focus of previous studies favoring the estimation of the demand side equation and ignoring the supply side elasticities. Second, the major weakness of the estimation of aggregate export demand and supply functions is that it does not allow us to know whether the role of supply and demand side factors on export performance is constant or changing across export categories. In addition, a better understanding of factors determining the export demand and supply and relevant elasticities at a disaggregated level is essential for suitable trade policy formulation, especially for policy decision in relation to export promotion strategies. In this context, this empirical study is an attempt to estimate the export demand and supply functions at both aggregate and disaggregated levels for Pakistan in order to contribute to the existing literature.

Literature Review

A large number of empirical studies evaluated the factors of export demand and supply across the globe. Kohli (1978) derived the aggregate export supply function for Canada and documented that for a small open economy, domestic economic conditions have played significant roles in determining the export performance as compared to world demand conditions. In addition, he argued

[3] "Included economies are China, Malaysia, Indonesia, Korea, Philippines, Singapore, Taipei and Thailand."

that investment goods, consumption goods, and exports are a substitute for each other in production, whereas the wage rate has a considerable influence on the increase of export price. Goldstein and Khan (1978) have made improvements in the previous literature and estimated the demand and supply functions within a simultaneous equation framework for eight industrial countries [4]. Their findings indicate that both demand and supply side factors have a substantial influence on export growth in all eight countries. Another attempt made by Newman et al. (1995) for Ivory Coast, examined the impact of various factors on exports with endogenous domestic prices. Their findings show that domestic and export goods are a substitute in production. In addition, the results clarify that domestic economic conditions are much more crucial for accelerating the export growth in Ivory Coast's case.

In the recent decade, Rahmaddi and Ichihashi (2012) argued that demand and supply side factors, including foreign income, relative export price, relative price, and domestic production have played a significant role in determining Indonesia's export performance. However, they suggest that Indonesia's exports are supply-driven as the magnitude of supply side elasticities is higher compared to demand side elasticities. Similarly, Jongwanich (2010) for eight East and Southeast Asian [5] economies suggested that production capacity, world income, and foreign direct investment have significant effects on export growth in all countries. However, the coefficients of domestic production capacity are very large in all eight economies, implying that supply side determinants are more significant for modeling export behavior for Asian economies.

With respect to the literature available in the case of Pakistan at the aggregate level, Atique and Ahmad (2003) argued that the exchange rate and world's real income have a significant effect on Pakistan's export growth. Moreover, the results explicate that relative price has no significant influence on the export performance, while potential output has made a significant difference in determining of export supply and its growth. Zada et al. (2011) use generalized methods of moments (GMM) to estimate the supply and demand equations for Pakistan and reported that both demand and supply side factors have significant effects on export performance. However, the results show that income and price elasticities on the supply side are relatively small, implying that demand side factors are relatively more important as compared to supply side factors in Pakistan. Similarly, Alam and Ahmed (2012) also reported that demand side factors, including world income, and relative export price have significant effects on the export performance of Pakistan. Recently, Gul and Redman (2014) evaluated the impact of supply and demand side factors on export performance and documents that relative price variable is statistically insignificant in both demand and supply equations. While other factors, including world income, domestic production capacity, and net national investment have significant effects on the export growth of Pakistan.

In the case of disaggregated exports, Riedel et al. (1984) for India ascertained that relative prices have significant effects in those sectors in which India's comparative advantage assumed to be strongest, whereas in other sectors the relative prices have insignificant effects on growth of

[4] "Included Industrial countries are Belgium, Germany, France, Japan, Italy, united Kingdom, United States and the Netherland".

[5] Included Asian economies are China, Malaysia, Indonesia, Korea, Philippines, Singapore, Taipei and Thailand.

manufactured exports. Similarly, Kohli (1998) documented that the export supply of industrial supplies of durable and nondurable goods, consumer durable goods, and other goods are highly elastic to changes in export price while the export supply of food, nondurable consumer goods, and capital goods are price-inelastic in the case of United States. Lawrence (1989) argued that export prices have a strong impact on export growth at the aggregate level, whereas, at a disaggregated level, export prices have a little effect on export supply in Canada's case. Riedel (1988) documented that manufactured exports of Hong Kong are faced an infinitely elastic demand in the foreign markets, whereas, the supply side factors have played a significant role in fostering manufactured export performance of Hong Kong. On the contrary, Balassa et al. (1989) ascertained that both demand and supply side factors have a significant influence on the growth of manufactured exports in developing countries namely, Greece and Korea.

In the recent decade, Roy (2007) for India analyzed the determinants of various components of manufactured exports and reported that demand side factors have a significant effect on the growth of India's manufactured exports. On the contrary, Anas et al. (2011) asserted that supply side factors play a greater role in explaining the export performance of Indonesia at both aggregated and disaggregated levels, while the world demand has a considerable influence on the growth of oil and gas exports only. Similarly, Sheridan (2012) stated that both manufactured and primary export categories are almost responded equally to changes in the various factors of exports in the selected countries.

In the case of Pakistan, Afzal (2005) investigated the impact of demand and supply side determinants on the export performance at a disaggregated level. His findings show that relative export price and world demand have a significant influence on the growth of aggregate, primary, and manufactured exports. In addition, the results clarify that the export supply of aggregate, primary, and manufactured exports is inelastic to relative price while highly elastic to changes in domestic production capacity. Hussain (2010) estimated price and world income elasticities for the demand of nine export categories for Pakistan. Results indicate that both price and world income elasticities have a correct sign for all export categories except textile yarn, but the magnitude of elasticities vary across categories. Finally, the study suggests that the demand side factors are not able to fully explain the export behavior of some export categories. In the end, we conclude that a look at empirical studies shows the wide disagreement on the role of demand and supply side factors on modeling of export performance across the countries and export categories.

Research Methodology

Model Specification

Theoretically, a number of micro and macroeconomic variables affect export demand and supply. Most of the researchers such as Goldstein and Khan (1978), Afzal (2005) and Anas et al. (2011) have used relative export price and world income as explanatory variables to estimate the export demand function. The same formulation has taken in this study, and considers that export demand is the function of world income and relative export price which can be written as follows:

$$X_d = f(WY, RXP) \qquad (1)$$

Where X_d is the export demand in period t, RXP is the relative export price in period t and WY is the level of world income in period t. It is expected that export demand will be negatively related to the relative price of exports. As the domestic export prices of any country are greater than the world export prices, then exports of that country become less competitive, which in turn will shrink the demand for particular country's exports (see Goldstein and Khan, 1978; Anas et al. 2011). And the export demand will be positively correlated with world income. As an increase in world aggregate economic activities or income would enhance the demand for various goods, which in turn leads to increase the demand for world exports (see Roy, 2007; Alam and Ahmed, 2012).

On the other side, export supply is defined as the function of relative price (the ratio of export price to domestic prices) and domestic production capacity which can be written as follows:

$$X_s = f(RP, DPC) \qquad (2)$$

Where X_s is the export supply in period t. RP is the relative price in period t and DPC is the domestic production capacity (measured by real GDP of Pakistan) in period t. The model embodies hypothesis that if the price of export of domestically produced goods in the international market is higher than domestic price; it will increase the relative profitability of producing exportable goods and firms have an incentive to shift the resources from non-tradable sector to exportable production, which in turn will enhance the amount of exports of the country, therefore, a positive estimate for the coefficient of relative price is expected (see Jongwanich, 2010). Similarly, export supply is also positively related to domestic production capacity. That is, an increase in the level of country's production capacity generates a surplus, hence, such surplus can be exported abroad and would increase the export volume of the country (see Atique & Ahmad, 2003 and Anas et al., 2011). Both equations of demand and supply for exports have been used in the log-linear form.

Estimation Technique

Recently, most of the researchers like Jongwanich (2010), Anas et al. (2011) and Alam and Ahmed (2012) emphasized on the use of cointegration techniques for estimation of export demand and supply functions in order to avoid the endogeneity and spurious regression problems. Keeping in view these problems, this study utilizes unrestricted autoregressive distributed lag (ARDL) model (Pesaran et al., 2001) to estimate export demand and supply functions for Pakistan. The rationale of using the ARDL model to cointegration instead of Engel-Granger (1987) and Johansen (1991) tests is that ARDL model has advantages over other techniques. First ARDL is most reliable and suitable model in the case of small sample size. Secondly, ARDL can be employed, whether underlying series are I(1), I(0) or mixed order. The specifications of unrestricted ARDL-ECM model for export demand and supply functions are obtained by transforming the equations 1 and 2 as follows:

$$\Delta lnX_{d,t} = \alpha_0 + \sum_{i=0}^{a} \alpha_{1i}\, \Delta lnRXP_{t-i} + \sum_{i=0}^{b} \alpha_{2i}\, \Delta lnWY_{t-i} + \sum_{i=0}^{c} \alpha_{3i}\, \Delta lnX_{d,t-i} + \varphi_1 lnRXP_{t-1} + \varphi_2 lnWY_{t-1} + \varphi_3 lnX_{d,t-1} + \varepsilon_t \qquad (3)$$

$$\Delta lnX_{S,t} = \alpha_0 + \sum_{i=0}^{a} \alpha_{1i}\, \Delta lnRP_{t-i} + \sum_{i=0}^{b} \alpha_{2i}\, \Delta lnDPC_{t-i} + \sum_{i=0}^{c} \alpha_{3i}\, \Delta lnX_{S,t-i} + \varphi_1 lnRP_{t-1} + \varphi_2 lnDPC_{t-1} + \varphi_3 lnX_{s,t-1} + \varepsilon_t \qquad (4)$$

Where Δ represents the first difference operator and ε_t is the error terms that are normally distributed with zero mean and constant variance. α_1, α_2, and α_3 are coefficients of short-run dynamics while φ_1 ,φ_2 and φ_3 are coefficients of long-run effects. The (a, b and c) are a number of lags used for each variable. In order to determine the cointegrating relationship, the bound testing procedure (Pesaran et al., 2001) has been employed. Under the bound test, the null and alternative hypotheses are:

H_0:φ_1= φ_2=φ_3=0 (No Co-integration)
H_a:φ_1≠φ_2≠φ_3≠0 (Co-integration)

In the case of evidence in favor of cointegration, then long-run equations based on the level of variables are calculated which is normalized by the coefficient of lagged exports. The general forms of long-run ARDL models are:

$$lnX_{d,t} = \alpha_0 + \sum_{i=0}^{a} \alpha_{1i}\, lnRXPY_{t-i} + \sum_{i=0}^{b} \alpha_{2i}\, lnWY_{t-i} + \sum_{i=0}^{c} \alpha_{3i}\, lnX_{d,t-i} + \varepsilon_t \qquad (5)$$

$$lnX_{S,t} = \alpha_0 + \sum_{i=0}^{a} Y_{1i}\, lnRP_{t-i} + \sum_{i=0}^{b} Y_{2i}\, lnDPC_{t-i} + \sum_{i=0}^{c} Y_{3i}\, lnX_{S,t-i} + \varepsilon_t \qquad (6)$$

The long-run elasticities of relative export price and world income for export demand obtained from equation (5) as - $\left(\frac{\alpha_1}{\alpha_2}\right)$ and - $\left(\frac{\alpha_2}{\alpha_3}\right)$ respectively. And for export supply the long-run elasticities of relative price and domestic production capacity obtained from equation (6) as - $\left(\frac{Y1}{Y3}\right)$ and - $\left(\frac{Y2}{Y3}\right)$ respectively.

Data and Variables

The study has used the time-series data from 1971 to 2015 and data on all variables in constant 2005 =100 price. Data for all variables were sourced from International Financial Statistics yearbooks [various years], Federal Bureau of Statistic of Pakistan [various issues], and world development indicators. This data further used for the estimation of different variables. Many studies have used the real value of exports as the quantity of exports demanded and supplied, hence, following the extant literature, the present study uses the current value of aggregate and disaggregated exports in Pak Rupee deflated by the export unit value index of Pakistan to measure the quantity of demanded and supplied for various export categories. However, the disaggregated exports, including primary, manufactured etc., was deflated by the same category of the export unit value index of Pakistan. Relative export price is obtained by dividing the unit value of exports of Pakistan in US$ to the unit value of exports of the world in US$. For disaggregated exports, the relative export price is calculated by dividing the export unit value index of the specific category of Pakistan to world consumer price index. Weighted real GDP in US$ (weighted by a share in Pakistan's exports) of major trade partners of Pakistan is used as a proxy for world income. For the supply equation, relative price is obtained by dividing the export unit value index of Pakistan to the wholesale price index of Pakistan, whereas the relative price for disaggregated exports is calculated by dividing the export unit value index of a specific export category to the same category of the wholesale price index. The current value of the gross domestic product (GDP) of Pakistan deflated by GDP deflator is used as a proxy for domestic production capacity. However, for disaggregated exports, the domestic production capacity is proxy by the sector-wise GDP.

Result and Discussion

In the time-series framework, it is crucial to test the order of integration of concerned variables. For this purpose, this study utilizes the Augmented Dickey-Fuller (ADF) test for the presence of a unit root in the individual time series. The statistical results in Table 1 explicate that the null hypothesis of a unit root cannot be rejected at the 1% level of significance for all variables in the level except relative price of all groups. However, after taking the first difference of the variables, the null hypothesis of unit root is rejected for all variables. Hence, the results signify that relative price variable for all groups are stationary in level and integrated of order zero I(0) while all other variables are stationary in the first difference or integrated of order one I(1). This gives a good justification to apply the conventional unrestricted ECM-ARDL model. Under such methodology, there is no restriction on the order of integration of time series either it should be I (1) or I(0) or mixed order.

Table 1

Results of the ADF test

	Level	First Difference	
Variables in natural log	t-Statistic value	t-Statistic value	Inference
World Income	-1.158	-8.641	I(1)
Relative Export Price	-2.250	-5.876	I(1)
Relative Export Price$_{FOOD}$	-1.804	-3.845	I(1)
Relative Export Price$_{Raw\ material}$	-0.860	-4.441	I(1)
Relative Export Price$_{Manufactured}$	-1.673	-7.899	I(1)
Real GDP$_{Pak}$	-1.733	-4.355	I(1)
Relative Price	-4.765*	-	I(0)
Relative Price$_{Food}$	-4.112*	-	I(0)
Relative Price$_{Raw\ Material}$	-4.521*	-	I(0)
Relative Price$_{Manufactured}$	-5.044*	-	I(0)
Aggregate Exports	-0.917	-7.278	I(1)
Primary Exports	-0.505	-7.944	I(1)
Rice Exports	-0.391	-7.970	I(1)
Raw Cotton	-2.113	-10.997	I(1)
Manufactured Exports	-0.786	-6.885	I(1)
Leather	-0.856	-7.318	I(1)
Cotton Yarn	-1.256	-10.270	I(1)
Cotton Cloth	-1.220	-7.671	I(1)

Note: The critical value of ADP at 1% and 5% are -3.61 and -2.94 respectively. ADF test performed without included trend. * represent the variable stationary in their level.

The calculation of bound testing is sensitive to the selection of lag length, therefore, the Akaike information criteria (AIC) and other diagnostic tests have been employed to determine the accurate specification of ARDL model. Different lag lengths for each variable and ARDL in the different specification was selected across the various export categories in accordance with gener-

al-to-specific methodology (Hendry, 1995). After the selection of the best-fit model, Wald test has been applied for the identification of cointegrating relationship among the examined variable. The results of the Wald test are reported with the corresponding equation in (Table 2 and 3). Since in all cases the computed F-statistic value of the Wald test is greater than the upper bound value I(1) of Pesaran et al. (2001) at a reasonable level of significance. These results confirm the existence of a cointegrating relationship among various factors of export demand and supply across aggregate as well as disaggregated exports. Moreover, the results of several diagnostic tests reported with the corresponding equation are also up to the mark and residual of each equation satisfy the classical assumption.

Export Demand Function

The estimated results reported in Table 2 show that the coefficients of world income and relative export price have correct signs and statistically significant for aggregate exports. The obtained long-run elasticities of world income (0.98) and relative export price (-1.29) for aggregate exports either exceeds or close to unity, suggesting that aggregate exports are highly responsive with respect to world income and relative export price. This is an agreement with Afzal's (2005) findings who has obtained the world income and relative export price elasticities for aggregate exports greater than unity for Pakistan.

Additionally, the results in Table 2 clarify that the coefficient of relative export price for primary exports is incorrectly signed but statistically insignificant. Although, the coefficient of world income for primary exports carried an expected positive sign and is statistically significant. The estimated long-run elasticity of world income (0.70) for primary exports is less than unity, indicating that primary exports are inelastic to world income in the long-run.

For rice export demand, the coefficients of both world income and relative export price are statistically significant and have the expected signs. Though, both income and price elasticities of rice exports are less than unity, implying that rice exports are inelastic to changes in world income and relative export price. Moreover, the estimations show that the coefficients of world income and relative export price for raw cotton exports have the expected signs. However, the magnitude of both world income and relative export price elasticities is less than unity and statistically insignificant. It signifies that world income and relative export price have no substantial influence on the growth of primary and sub-categories of primary exports in Pakistan's case.

Table 2

Long-run Elasticities of Export Demand Function

Export Category	Constant	RPX	WY	R-square	Wald Test	LM Test (F)	RESET (F)
Aggregate Exports	0.49 (1.27)	-1.29*** (1.94)	0.98*** (2.00)	0.44	4.03 [0.01]	0.76 [0.52]	0.39 [0.54]
Primary Exports	1.22 (1.12)	0.33 (1.06)	0.70* (2.72)	0.43	5.09 [0.005]	0.41 [0.53]	0.27 [0.61]
Rice	-2.71** (-2.77)	-0.77*** (-1.94)	0.64** (2.28)	0.49	5.23 [0.004]	2.08 [0.14]	0.03 [0.86]
Raw Cotton	14.77* (2.94)	-0.56*** (1.86)	0.81 (1.31)	0.44	6.46 [0.001]	0.97 [0.39]	0.28 [0.76]
Manufactured Exports	-0.31 (-0.57)	-0.48** (-2.37)	1.05** (2.28)	0.54	4.72 [0.01]	0.17 [0.85]	0.005 [0.94]
Leather	-3.21** (-2.28)	-0.36*** (-1.79)	0.99* (4.04)	0.43	7.66 [0.00]	1.27 [0.30]	2.46 [0.13]
Cotton Yarn	-6.43*** (-1.74)	-0.42*** [-1.81]	0.71** (2.32)	0.47	5.56 [0.003]	0.45 [0.72]	1.52 [0.23]
Cotton Cloth	-0.18 (-0.28)	- 0.54*** (-1.93)	0.94** (2.19)	0.48	3.97 [0.01]	0.83 [0.49]	0.016 [0.90]

Note: In parentheses ( ) are t-statistics values. Superscript *, ** and *** represent 1%, 5% and 10% level of significance respectively. Upper bound and lower bound values of Pesaran *et al*." (2001) at 1%, 5% and 10% level are (6.61, 4.29), (4.35, 3.23) and (3.77, 2.72) respectively.

Furthermore, the results of Table 2 show that the coefficients of world income and relative export price for the demand of manufactured exports are correctly signed and statistically significant. The obtained long-run elasticities of world income and relative export price for manufactured exports are 1.05 and -0.48 respectively. It signifies that demand of manufactured exports is income elastic while price inelastic. Similarly, the demand for leather and cotton cloth exports is also highly elastic to changes in world income as the estimated world income elasticity of demand for both leather and cotton cloth export categories either exceeds and close to unity. Whereas price elasticities for the demand of leather and cotton cloth export categories are significantly less than unity, suggesting that demand for leather and cotton cloth exports is inelastic to relative export price in the long-run. Finally, the demand for cotton yarn exports is less elastic to changes in both relative export price and world income as the estimated price and income elasticities for cotton yarn export demand are -0.42 and 0.71 respectively. These results are generally consistent with the Hussain's (2010) finding who has obtained the price and income elasticities for textile yarn exports on demand side less than unity for

Pakistan. Overall, these results signify that that world income plays a dominant role in the determination of demand for only value-added exports in the long-run from Pakistan.

Export Supply Function

The results of Table 3 explicate that the coefficients of domestic production capacity (represent by real GDP of Pakistan) and relative price have the correct signs for the export supply of aggregate as well as disaggregated exports with few exceptions. Though, the degree of the elasticities varies across the export categories. In addition, the findings clarify that aggregate export supply is highly elastic to changes in domestic production capacity and relative price as the estimated elasticities of relative price (1.25) and domestic production capacity (1.57) for aggregate exports are significantly greater than unity.

In the case of disaggregated exports, the supply functions of primary and sub-categories of primary exports are positively sloped. However, the relative price elasticity of primary exports is 0.79 and statistically significant. Moreover, the findings show that export supply of raw cotton is price-elastic as the estimated elasticity of relative price for raw cotton exports is statistically significant with a magnitude greater than unity. The results further indicate that the export supply of rice is less responsive with respect to relative price as the estimated relative price elasticity for rice export is less than unity and statistically insignificant. In addition, the results elucidate that the long-run elasticities of production capacity for total primary, rice, and raw cotton exports are greater than unity and statistically significant except raw cotton. It implies that domestic production capacity has a substantial influence on the evolution of export supply of primary and sub-categories of primary exports from Pakistan.

As can be seen from Table 3, the obtained elasticities of production capacity and relative price for manufactured exports are statistically significant and exceed the unity, indicating that the export supply of manufactured goods is highly elastic to changes in production capacity and relative price. Similarly, the leather export supply is also elastic with respect to production capacity and relative price as the obtained long-run elasticities of production capacity (1.02) and relative price (1.90) for leather export supply are greater than unity and statistically significant. Additionally, the findings clarify that the coefficient of relative price for cotton yarn exports is incorrectly signed but statistically insignificant. Although, the relative price elasticity of cotton cloth exports is correctly signed and statistically significant. Finally, the production capacity has emerged as a significant determinant of export supply of cotton yarn and cotton cloth as the estimated long-run elasticities of production capacity for both categories are significantly greater than unity. These results are generally consistent with Latif and Javed (2013)'s findings, they reported the similar results for textile and cloth exports of Pakistan.

Table 3

Long-run Elasticities of Export Supply Function

Export Category	Constant	RP	DPC	R-square	Wald Test	LM Test (F)	RESET (F)
Aggregate Exports	-3.86* (-3.42)	1.25* (2.37)	1.57** (2.76)	0.53	5.26 [0.004]	0.13 [0.72]	0.06 [0.80]
Primary Exports	-1.15 (-1.07)	0.79** (2.12)	1.08* (3.91)	0.64	6.49 [0.001]	0.75 [0.48]	0.83 [0.41]
Rice	-2.04*** (-1.73)	0.46 (1.25)	1.09** (2.68)	0.54	4.001 [0.016]	0.40 [0.68]	0.019 [0.89]
Raw Cotton	11.34 (1.25)	2.86*** (1.86)	1.24 (1.40)	0.46	6.52 [0.001]	1.47 [0.25]	0.57 [0.46]
Manufactured Exports	-2.58 (-1.57)	1.44*** (1.92)	2.04** (1.40)	0.59	4.62 [0.008]	0.28 [0.83]	0.54 [0.47]
Leather	-2.022 (-0.91)	1.90*** (1.81)	1.02** (2.30)	0.58	4.14 [0.014]	1.14 [0.35]	2.23 [0.15]
Cotton Yarn	-6.43*** (-1.74)	-0.81 [-0.59]	1.39* (3.20)	0.49	7.43 [0.00]	0.05 [0.81]	0.42 [0.52]
Cotton Cloth	-6.60* (-3.75)	2.28*** (1.75)	2.55* (3.94)	0.62	5.41 [0.004]	0.27 [0.77]	0.25 [0.80]

Note: In parentheses ( ) are t-statistics values. Superscript *, ** and *** represent 1%, 5% and 10% level of significance respectively. Upper bound and lower bound values of Pesaran *et al*." (2001) at 1%, 5% and 10% level are (6.61, 4.29), (4.35, 3.23) and (3.77, 2.72) respectively.

Conclusion

On demand and supply of export, the past research effort focused on demand side factors and estimation of supply side factors are neglected in favor of the export demand equation. For appropriate trade policies, both demand and supply elasticities are required. In this context, the present study estimates the impact of demand and supply side factors on the export performance of Pakistan at both aggregate and disaggregated levels by using "unrestricted autoregressive distributed lag" (ARDL) model for the period 1971 to 2015. The empirical results based on bound testing procedure showed a cointegrating relationship among aggregate exports, disaggregated exports and other important variables under study. Results further explore that exports are elastic to changes in world income and the relative export price at the aggregate level. At a disaggregated level, only exports of manufactured goods, leather and cotton cloth are highly elastic to changes in world income. While the demand for all other export categories is inelastic to changes in world income. Moreover, the findings show that

relative export price elasticities for all disaggregated export categories are significantly less than unity, suggesting that relative export price has no significant effect on the demand for disaggregated exports in Pakistan's case.

On the supply side, the coefficient of production capacity for aggregate as well as disaggregated exports exceeds unity, indicating that the supply of aggregate exports, as well as disaggregated exports, is highly elastic to changes in domestic production capacity. Likewise, relative price elasticities for aggregate exports and all disaggregated export categories except rice and cotton yarn exports are also greater than unity and statistically significant. This implies that, from the supply side perspective, the relative price has a significant effect on export growth at both aggregate and disaggregated levels. In conclusion, the results suggest that the magnitude of elasticities of relative price and domestic production capacity is relatively higher as compared to world income for disaggregated exports, implying that demand and supply side factors are equally important in explaining the export behavior at the aggregate level whereas, at a disaggregated level, the supply side factors exercise relatively high impact on export growth of Pakistan.

In general the outcomes of the study show that export demand of aggregate, manufactured goods, leather, and cotton cloth depend significantly on the world income. This signifies that world income has a relatively high impact on the export performance of value-added goods as compared to primary or low value-added goods. Therefore, the study recommends that diversification of exports from primary or a low value-added product to high value-added products is the best policy in order to benefit from the growing world demand. Lastly, it is suggested that the work on disaggregated export supply and demand functions can further improve by including the domestic demand pressure as the third variable in both supply and demand equations.

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