Determinants of Exports of Pakistan

A Country-wise Disaggregated Analysis

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Abstract

Given the importance of international trade and export performance in economic growth, this study attempts to examine the determinants of exports of Pakistan, using a time series data over the period 1975-2008. A simultaneous equation approach is followed and the demand and supply side equations are specified with appropriate variables. We country-wise disaggregated analysis of Pakistan versus its trade partners and the estimation strategy is based on two approaches. First we employ the Generalized Methods of Moments (GMM), which is followed by the Empirical Bayesian technique to get consistent estimates.

The GMM technique is believed to be efficient for time series data provided the sample size is sufficiently large. In case of small samples, the estimates might not be precise and might appear with unbelievable sign and insignificant magnitudes. To avoid the sample bias and other problems we employ the Empirical Bayesian technique which provides much precise estimates. The factual results obtained via the GMM technique are a little bit mixed, although most of the coefficients are found to be statistically significant and carry their expected signs. In order to compare and validate these results, the Empirical Bayesian technique is employed. This offers considerable improvement over the previous results and all the variables are found to be highly significant with correct sign across the countries concerned with the exception of a few cases. The price and income elasticities in both the demand and supply side equations carry their expected signs and significant magnitudes for the trading partners.

The findings suggest that exports of Pakistan are much sensitive to changes in world demand and world prices. This establishes the importance of demand side factors like world GDP, Real exchange rate, and world prices to determine the exports of Pakistan. On the supply side we find relatively small price and income elasiticities. The results reveal that demand for exports is relatively higher for countries in NAFTA, European Union and Middle East regions. The study recommends more concentration on the trade partners in these regions to improve the export performance.

Keywords: Exports, GMM, empirical bayesian method, Pakistan

1. Introduction:

Exports are believed to be the engine of economic growth, which facilitates the process of economic development. The country can win friends with trade relations which ensure the optimal allocation of the available resources. The country exports the goods following the comparative advantage principle under which each country produces and exports those goods which it can produce relatively, at low costs. The returns from trade depend on accelerating export and exploration of new markets. The exports performance of a country is determined by many factors. These factors can be categorized in terms of demand and supply side determinants. The demand side determinants include the capacity of the trading partners which is generally approximated by Gross Domestic Product (GDP) those economies, the prices of exportables, the prices of competing goods in export market and the exchange rate etc. However the political or policy factors also play a very crucial role in this regards. The supply side factors include 'domestic production capacity which, is generally measured by the gross domestic product (GDP), exchange rate, relative prices (price of exports relative to price of competing goods), wage rate and import of inputs etc'. On the demand side the world price and world income have an important role in explaining exports behavior. Some researchers like Muscatelli (1992) and Sinha Roy (2002), emphasize on significance of the demand side determinants like world demand and world prices in explaining export behavior while others attributes much importance to the supply side and other related constraints. For instance, Khan and Knight (1985) show that imports of inputs have significant influence on export performance in the long run. Some others like Mohanan (2006) highlight that the demand and supply side factors are equally important in explaining export behavior. This study is an attempt to examine the relative importance ofdemand and supply side determinants simultaneously, in explaining export behavior of Pakistan.

2. Review of Literature

Several studies have been conducted by different people to analyze the determinants of exports and to analyze their impact on export performance. Most of them have used single equation approach to exports model, incorporating both the demand and supply side determinants. Many others have relied on simultaneous equation approach, in which the demand and supply side functions are specified with appropriate variables and estimated in simultaneous equation framework. The consensus views about the demand and supply side influences vary among the researchers. Some studies establish the importance of demand side determinants while other attributes importance to the supply side factors. Lewis (1980), Reidel (1988) and Authokoral and Reidel (1990) have suggested insignificant income elasticity of export demand but significant and infinite price elasticity of export demand for LDC's, exports. This supports the small country hypothesis that developing countries are price takers at world market[1]. In addition some other studies like Gold Stein and Khan (1985), Muscatelli (1992), Sinha Roy (2002). Some of the studies which have used the simultaneous equation approach are briefly discussed below.

Afia (2000) has examined the determinants of textile and clothing exports of Pakistan, using a time series data over the period 1960-200. The demand and supply side exports equation have been estimated in a simultaneous equation frame-work, using co-integration. The coefficient on the price of textile exports and world income appeared with correct sign but found to be insignificant. All the variables on the supply side were found to be statistically significant with correct sign.

Sadia (2006) examined the relationship between Imports of Inputs and exports of Pakistan, using a time series data over the period 1973-2005. The exogenous variables in the exports function were GDP of Pakistan, world GDP, Nominal Exchange Rate (NER) and the imports of

[1] The small country hypothesis assumes that the small economies are the price takers at world market and can not influence the world price. The exports from these economies follow the world prices and they face very high price elasticities of demand.

inputs. The simple ordinary least square was employed and all the variables carried their expected sign and reasonable magnitudes.

Mohanan (2007) has employed the three stage least square (3SLS) to estimate the demand and supply side exports equations in a simultaneous equation frame-work for India over the period 1980-2005. The coefficients on real exchange rate and world demand appeared with their expected sign and significant magnitudes. The price of exports and skilled labour on the supply side were found to be correctly signed with plausible magnitudes.

Majeed and Ahmed (2006) have focused on the determinants of exports, using panel data ranging from 1970 to 2004 over 75 developing countries. The exports equation was specified with FDI, GDP, GDP growth rate, real effective exchange rate, Communication facilities, indirect taxes and labour force as exogenous variables. The estimation strategy was based on the random effect model. All the variables carry significant magnitudes with correct sign except FDI which is insignificant although it carries its expected sign.

Reidel (1988) has used the simultaneous equations approach to examine the demand and supply side determinants of exports quarterly time series data over the period 1972-1984. Export prices, price of competing goods in world market and world demand have been used as exogenous variables in the demand side equation while the domestic price of exports, price of raw material, industrial inputs and time trend have been used as independent variables in the supply side equation. The results showed infinite price and income elasticities of exports demand which support the small country hypothesis. All the parameters of the wage and the supply side exports equations appear with correct sign and significant magnitudes except the time trend variable ‘t’ which carry insignificant coefficient although correctly signed.

Sinha (2002) has employed Full Information Maximum Likelihood method to estimate the demand and supply side exports equations over the period 1960-2000. The dynamic error

correction model has been estimated in which the error correction representation in the demand side equation carried significant and lager magnitude, indicating that the demand side factors significantly explain the short run dynamics of the export performance. All the other variables in the model have been found to be significant except the scale variable of the supply side which insignificant although correctly signed.

Sinha (2007) has estimated the demand and supply functions of the manufactured exports for india, using a time series data over the period 1960-2004. The FIML has been used to estimate the demand and supply side exports for six different categories of manufactured exports including cloths and garments, chemical and machinery, transport equipments, steel and the iron and the leather manufacturers. The findings suggest importance of all demand side factors for exports performance. On the supply side, the variables produced mix results in terms of significance and some variables like world GDP and exports volume turned out to be insignificant for textile and iron-steel exports respectively.

Funk and Holly (1992) have employed the Full Information Maximum Likelihood method to estimate the demand and supply functions of the determinants the West German's exports, using quarterly time series data over the period 1961-1987. The demand and supply side equations have been specified with the prices of exports, producer price of foreign exports, world demand, the domestic price of exports, price of non-exportable goods, prices of industrial inputs and total costs to the industry as exogenous variables. All the demand and supply side elasticities carried significant magnitudes with correct sign except the price elasticity of export demand which carried insignificant magnitude.

Reidel et al (1994) have examined the determinants of exports of Hong Kong to test the small country hypothesis, using a quarterly time series data ranging from 1977:1 to 1984:4. The price dependent export demand equation has been specified with volume of exports, price of competing goods at world market and world income as independent variables. The results

showed significant and infinite income and price elasticities of export demand, implying that Hong Kong is a smal price taker economy.

Muscatelli et al (1992) have employed the Modified OLS to examine the determinants of the Hong Kong's exports, using quarterly time series data over the period 1972-1984. The export demand equation has been specified with price of exports, price of competing goods and world income, while the price of export, price of raw materials input and unit labor costs have been used as exogenous variables in the supply side equation. The findings suggested significant but relatively small price elasticity and significant but relatively high income elasticity of export demand. On the supply side, only the wage rate turned out to be insignificant.

Muscatelli et al (1995) have examined the determinants of exports of the newly industrialized Asian economies, including Hong Kong, Korea, Taiwan, Singapore, Malaysia and Thailand, using a time series data over the period 1967-1987. Full Information Maximum Likelihood method has been employed and the results suggested significant income and price elasticities of exports demand for all the countries, rejecting the small country hypothesis that world demand is irrelevant in explaining export behavior of the newly industrialized economies.

3. Rationale for the study:

Numerous empirical studies on exports are available with reference to Pakistan, following different estimation approaches and methodologies. Most of these studies have relied on single equation export function, incorporating both the demand and supply side determinants of exports mixed together. This approach has often led to misleading results due to the aggregation of different classes of variables. The robust and precise estimates can be obtained only if the demand and supply side equations are carefully specified with appropriate variables. Since there are two endogenous variables in export function, i-e quantity and the price of exports, these have to be determined simultaneously. If we do not account this, it will give rise to simultaneous

equation bias and yield misleading results. This study is an attempt to examine the relationship between exports and its determinants and to estimate the demand and supply side equations in a simultaneous equation framework. This is the first which attempts to rely on the region-wise disaggregated analysis since no study is available on this pattern. Another significant contribution of the study is incorporation of the import of inputs in the supply side equation. We intend to test the hypothesis that import of inputs i-e import of industrial raw material and capital goods, increases the export potential of country leading to favorable balance of trade. Moreover to examine the impact of the America led Afghanistan war (2001-02) on our exports behavior; a dummy variable is introduced in the demand side equation. Another significant contribution of this study is the application of the Empirical Bayesian Estimator to test the reliability of the ordinary estimates. We find no study which has used the Empirical Bayesian estimator up till now. The Empirical Bayesian Estimator is based on additional information that is added to the model which give much precise and reliable estimates than other estimator.

4. Analytical Frame and methodology

Different studies on exports have taken the issue of model specification on priority basis. The foreign trade models are specified by different people following different approaches. However there is a general consensus in literature about the empirical form of demand and supply functions for exports. The standard approach is the "imperfect substitute model". Under this approach the demand function is specified, assuming that the demand for exports in the trading partners' economies depends on the level of their economic activity, the foreign price of exports and price of competing goods at world market[2]. Likewise the specification of the supply side-export equation is straightforward with the 'imperfect substitute model' assuming that export supply depends on the productive capacity and relative prices i-e foreign price of exports

[2] It is equivalent to say that the demand for exports depends on the level of foreign economic activity and the Real Exchange Rate. Because the RER is calculate in terms of price of exports and price of competing goods at world market

relative the domestic price of exports. We follow Gold Stein and Khan *(1985)* and specify the export demand and supply side export functions with two necessary extensions. First, in the demand side equation we introduce a dummy "D01" to capture the impact of America led Afghanistan war (2001). Second, on the supply side, the standard form of the supply side function is extended by including the "import of inputs" to examine its impact on our export performance. The demand and supply side equations in the extended form are specified as follows;

4.1. The Standard Export Model

Export Demand Equation $$X^d_t = \alpha_0 + \alpha_1 RER_t + \alpha_2 Y^w_t + \boldsymbol{\alpha_4} D01 + U_t \quad (1)$$

Export Supply Equation $$X^s_t = \beta_0 + \beta_1 RP_t + \beta_2 Y^d_t + \beta_3 M_t + V_t \quad (2)$$

X^d- the quantity of export demanded, *RER*- real exchange rate and is written as; $RER = P^x/eP^w$, where 'P^x' is the foreign price of exports, 'P^w' is the price of competing/substitute goods and '*e*' is the nominal exchange rate of domestic economy with respect to the trading partners' economies. We use the export unit value of Pakistan and the import unit values of our trade partners to measure *'P^x'* and *'P^w'* respectively[3]. 'Y^w' is the world demand for domestic exports which is approximated by Gross Domestic Product (GDP) of our trading partners[4]. '*D01'is* the dummy which captures the impact America led, Afghanistan war (2001) on our exports behavior. '$X^{s'}$ in (2) is the supply of exports. '*RP'* is the relative price of exports i-e the price of exports relative to the domestic price of exports, that is '*RP'* = $\frac{P^x}{P^d}$. 'P^x' is the price of exports at world market. 'P^d' is the domestic price of exportable and is proxied by the 'whole price index'

[3] Gold Stein and Khan (1978), Mscatelli (1992) and Sinha Roy (2002) have used the export unit value for the price of exports and import unit value of the trading partners to measure the price of the foreign substitute.

[4] Stein and Khan (1988) have used the real GDP of the trading partners to measure the world demand. Reidel (1988) has used real GNP. Muscatelli et al (1992) have used the real GDP while Sinha Roy (200, 2007) has used the aggregate imports of the trading partners to measure the world demand for exports.

(WPI) of Pakistan[5]. 'Y^d' is the supply side scale variable which is proxied by Gross Domestic Product of Pakistan (GDP). '*M'* is the imports of inputs. We take the log transformation and rewrite the demand and supply function as follows;

$$logX^dt = \alpha_0 + \alpha_1 logP^x_t + \alpha_2 loge.P^w_t + \alpha_3 logYwt + \alpha_4 D01 + Ut \quad (3)$$

$$logX^s_t = \beta_0 + \beta_1 logP^x_t + \beta_2 logP^d_t + \beta_3 logY^d t + \beta_4 logM_t + V_t \quad (4)$$

Where $X^d_t = X^s_t = X$ (5)

The coefficients α_i and β_i are elasticities with respect to the variables concerned. The coefficients 'α_2', 'α_3', 'β_1' β_3 and β_4 are expected to appear with positive signs; that is α_2, α_3, β_1, β_3, $\beta_4 > 0$, while α_1, α_4, and β_2 are expected to carry negative signs; that is α_2, α_3, $\beta_1 < 0$. This model is an equilibrium model and there are two endogenous variables in it, i-e export quantity and exports prices which have to be jointly determined.

4.2 Normalizing the Demand and Supply Functions;

Estimation of simultaneous equation model needs the equations to be normalized i-e restricting the coefficient of one of the variable to 1[6]. The normalization procedure is found different in different studies. *J M Reidel (1988)* has normalized the export demand function with export price and export supply function with export quantity[7]. *Muscatelli (1992)*, Sinha Roy (2002, 2007) and Funk and Holly (1992) used the opposite type of normalization i-e the export demand equation by quantity and export supply equation by price. We normalize the demand and supply functions, using the second approach i-e the demand function by export quantity and supply

[5] Gold Stein and Khan (1985) have used CPI, while Muscatelli et al (1992), Funk and Holly (1992) and Sinha Roy have used 'WPI' to measure the domestic price of exports.

[6] The detail methodology is found in W. Green,

[7] Reidel (1988) argued that normalizing export demand equation with price and supply equation by quantity, yield results which support the small country hypothesis. Muscatteli et al (1992) show that it does not matter, how you normalize the demand and supply function but if one employ a system estimation method rather single equation method, one would get significant income and price elasticities of export demand.

equation by export price. The quantity dependent export demand equation and the price dependent export supply function or the inverse supply functions are written as follows;

$$logX^d_t = \alpha_0 + \alpha_1 log\, P^x_t + \alpha_2 log\, e\, .P^w_t + \alpha_3\, logY^w_3 + \alpha_4 D01 + u_t \qquad (6)$$

$$logP^x_t = \gamma_0 + \gamma_1 logX^s_t + \gamma_2 logP^d_t + \gamma_3 logY^d_t + \gamma_4 logM_t + v_t \qquad (7)$$

Where, $\gamma_0 = -\frac{\beta 0}{\beta 1}$, $\gamma_1 = \frac{1}{\beta 1}$, $\gamma_2 = -\frac{\beta 2}{\beta 1}$, $\gamma_3 = -\frac{\beta 3}{\beta 1}$, $\gamma_4 = -\frac{\beta 4}{\beta 1}$,

Equation (5) is a volume adjustment equation and equation (6) is a price adjustment equation. X^d is seen as dependent variable in equation (5) and P^x is seen as dependent variable in equation (6). X^d and P^x are said to be the two endogenous variables in the system which have to be determined simultaneously. This means that the two equations are interdependent and none can be estimated independently. To estimate this type of model, the reduced form of the model is obtained which is estimated via Indirect Least Square to avoid the possible simultaneity problem. The second approach is to estimate the demand and supply functions in the simultaneous equations framework. We avoid the reduce form approach and use the simultaneous equation approach to estimate the set of equations.

4.3. The Estimation Strategy/Methodology

Before any regression analysis on time series data, it is necessary to check the series for the order of integration or to check the series for stationarity. It is believed that most of the time series have a unit root i-e they are non-stationary which can be transformed into stationary series through differencing. We use the Augmented Dickey Fuller test to see the order of integration among the variables concerned.

Two or more variables are said to be co-integrated if they have a long run relationship among them. If the variables do not have a long relationship, there remains no economic concern. Therefore it is necessary to check weather the variables in a regression equation are cointegrated

or not. Different people have proposed different tests to check co-integration among the variables. We use the Johenson cointegration test to check co-integration among the variables.

Engel and Granger (1987) had proposed the Static OLS to estimate the system of equations like above. But this procedure suffers due to two problems as pointed out by Benergy (1989). Second: endogeneity in regressors. Phillips and Hansen (1991) have justified the use of Modified OLS which can overcome both of these problems. Sinha Roy (2002) employed the Two Stage Least Square (2SLS) to estimate the system of equations like above. The system estimation methods like the Three Stage Least Square (3SLS), The Full Information Maximum Likelihood (FIML) and the Generalized Method of Movements (GMM) are among the preferred methods to estimate the system of equations. Keeping in view the small size of the sample, we use the Empirical Bayesian procedure to estimate the system of equations. The Empirical Bayesian procedure is believed to provide efficient and much precise estimates than all of the above[8]. But before employing the empirical Bayesian technique, we use the GMM to estimate the set of equations and the estimates obtained are then utilized to develop the Empirical Bayesian formula. Both of these techniques are discussed below.

4.4. The Generalized Method of Movements:

The Generalized Method of Moments is believed to be efficient among other estimators as it can overcome many problems like endogeneity in regressors etc. This procedure is widely used by the researchers but in small samples, it yields misleading results. We do not purely rely on the GMM, therefore there do not go into detail. Our main focus is on the performance of the Empirical Bayesian technique but we employ the GMM so that the results might be utilized to develop the Empirical Bayesian formula.

[8] This is due to the additional information that is added to model which allow getting reliable and precise estimates of the variables.

4.5. The Empirical Bayesian Estimator:

The Empirical Bayesian Procedure is considered to be efficient over the other classical estimators especially in small samples. It has several advantages over the other estimators and allow for much precise and reliable estimates than other estimator. The Bayesian technique assumes the information about the unknown parameters to be represented in the form of a density, that is;

$$\tilde{\beta}_i \,/\, \beta_i \;\sim\; N\;(\,\beta_i,\;\; \textstyle\sum_i\,), \qquad (8)$$

$\tilde{\beta}_i$ are the estimated values of the parameters and β_i are the true values of the parameters. Equation (8) represents that given the true values of the parameters, the 'estimated values' of the parameters has a normal distribution with mean β_i, and variance '$\sum_i$'. Given the data density above, the Empirical Bayesian Estimator is calculated by assuming that 'β_i' has a normal prior distribution of the form;

$$[\;\beta_i|\;\; \mu,\;\; \Omega\;] \;\sim\;\;\; N\,(\,\mu,\;\; \Omega) \qquad (9)$$

This implies that β_i has normal distribution with mean 'μ' and variance 'Ω'. Where, 'Ω' is the variance of the prior density and calculated from the GMM results, that is;

$$\Omega \;=\;\;\; [\;\textstyle\sum_{i=1}^{10}\;\; \sum_i^{-1}\;\;\;]^{-1} \qquad (11)$$

The variance of the prior density 'Ω' is simply the weighted average of the variance covariance matrices of the GMM estimates[9]. We follow Corrington and Zaman (1994) to calculate the variance covariance matrices of the parameters using the estimated standard errors of the GMM estimates, restricting the off-diagonal element of the covariance matrix to be zero assuming no prior covariance across the parameters. 'μ' in (9) is the mean of the prior density and is given by

[9] The inverse of the variance covariance matrix is also called the precision of matrix in Bayesian calculation. See the "Statistical Foundation for Econometric techniques" by Asad Zaman pp: 44

$$\mu = \Omega^{-1}\left[\sum_{i=1}^{10} \sum_{i}^{-1} \widehat{\beta}_{i}\right] \quad (10)$$

Equation (10) implies that utilizing the GMM results and the variance of the prior density, we arrive at the mean of the prior density. Once we obtained the means and variance of the prior density, we proceed to find the mean and variance of the posterior density to arrive at the Empirical Bayesian formula. The posterior density of the data is given by

$$\beta_i \; / \; \widehat{\beta}_i = \sim \; N \; (m, \; V \;) \quad (12)$$

Equation (3.6) implies that 'm' in (12) is the mean of the posterior density and "V" is the variance of the posterior density which is given by

$$V = (\sum_{i}^{-1} + \Omega^{-1})^{-1} \quad (13)$$

Having obtained the variance of the posterior density, we arrive at the mean of the posterior density which is given by

$$m = V\left(\sum_{i}^{-1} \hat{\beta}_i + \Omega^{-1}\mu\right) \quad (14)$$

In equation (14) '$\widehat{\beta_i}$' are the GMM estimates and μ and V are the mean and variance of the prior density respectively. This means that the mean of the posterior density is going to utilize the data information in the form of the GMM estimates and the prior information in the form of prior means and prior variance. The Empirical Bayesian formula which is obtained from the posterior density is given by;

$$\hat{\beta}^{EB} = V\left(\sum_{i}^{-1} \hat{\beta}_i + \Omega^{-1}\mu\right) \quad (15)$$

Where, "V" is the empirical Bayesian estimate of the posterior covariance matrix of the parameters. The standard errors of the Empirical Bayesian estimates are obtained by using the variance of the posterior density 'V'.

4.6. Sample Size and the Data

Annual data for the period of 1975-2008 has been considered for the analysis over a sample of 10 countries. The countries included in the sample are *USA, UK, France, Germany, Malaysia, Kuwait, Bangladesh, Mauritius, Korea and Hong Kong*. The demand and supply side equations of exports of Pakistan versus its trade partners are estimated individually for each country. The demand side exports function of the relative trading partner is estimated simultaneously with the supply side exports function.

Data on Pakistan's exports to the trading partners has been taken from Statistical Supplement published by the Finance Division/Ministry of Finance. Likewise data on GDP, exchange rate and imports has been taken from the world development indicator (WDI). Data on the import unit value, export unit value, *CPI* and *WPI* have been obtained from International Financial Statistics (IFS).

7. Results and Discussion

In this section we discuss and compare the results of the two estimation techniques like the GMM and the Empirical Bayesian technique. Before employing these techniques, we have employed the Augmented Dickey Fuller test to see the order of integration among the variables concerned. All the variables have been found to be integrated of order one i-e *I(1)*. We have used the Johenson cointegration technique to test the cointegration among the variables. The results showed that all the variables are cointegrated and they have long run relationship among them[10].

[10] The results have not been shown here, the results of the unit root test, cointegration test and the empirical bayes results are available from the author on demand.

7.1. Results Discussion of the GMM— Demand Side Equation

Referring to table '5.2' the numbers in parenthesis are the estimated "t" values of the respective parameters. 'P^x' in the demand side equation is the price of domestic exports at world market which has been proxied by the export unit value of Pakistan. 'P^w' is the price of competing/substitute goods at world market 'Y^w' is the scale variable in the demand side which is proxied by the Gross Domestic Product (GDP) of our trading partner. The first and important point to be noted, that the scale elasticity on the demand side carried a significant co-efficient with correct sign in most cases except Canada and Malaysia. The income elasticity of demand in case of UK and Germany appears with correct sign but not significant even at 10 percent[11]. The price elasticity of demand with respect to the price of exports is found to be significant with correct sign and carries plausible magnitudes with the exception of a few cases. The price elasticity of export demand with respect to the price of substitute or competing goods at export market, is smaller in magnitude as compared to the price elasticity of export demand for all the countries. This means that our exports are much sensitive to changes in price of exports as compared to the price of competing or substitute goods at our country export market. The dummy variable "D01" takes '0' before 2001 and '1' thereafter. It carried significant coefficient with negative sign for the USA only and turned out to be insignificant for all other countries. This implies a negative and significant impact of the America-led Afghanistan war on our exports flow to USA.

[11] The results on the income elasticities are in accordance to Khan and Night (1978), Muscatelli (1992) and Sinha Roy (2002) who find positive and significant income elasticities of demand for exports.

Table 5.4.:--GMM of the demand side export equation

Countries	α_0	α_1	α_2	α_3
USA	-12.10 (-10.41)	-- 1.10 (-4.35)	0.67 (6.70)	2.13 (10.4)
France	-1.24 (-1.43)	-- 1.21 (-3.67)	0.35 (4.20)	0.53 (5.30)
UK	0.95 (0.65)	-- 2.17 (-2.36)	1.39 (2.62)	0.10 (0.32)
Canada	11.71 (1.80)	-- 1.58 (-2.82)	0.78 (1.11)	-1.14 (-2.38)
Korea	-12.95 (-2.10)	-0.20 (-0.21)	1.99 (1.79)	1.54 (1.90)
Kuwait	-2.14 (-3.40)	-0.59 (-1.59)	0.42 (1.24)	0.90 (6.24)
Malaysia	-3.46 (-1.20)	--1.49 (-0.71)	3.10 (1.15)	-- 0.35 (-0.27)
Mauritius	-6.18 (-5.62)	--1.04 (-1.96)	1.03 (2.34)	2.14 (4.86)
Germany	3.13 (1.01)	-- 0.86 (-3.74)	-- 0.32 (-0.67)	0.32 (0.91)
Bangladesh	-4.68 (-3.66)	-- 0.50 (-1.19)	0.01 (0.05)	1.62 (4.15)

The numbers in parenthesis are the estimates "t" statistics,

7.2. Results Discussion of the GMM— Supply Side Equation

The income elasticity of exports supply or equivalently the supply side scale variable appears to be with correct sign and significant magnitudes for all the countries except France and Germany and lies around unity. The price variables in the supply side equation provide mix results in terms of sign and significance of the variables. The price elasticity of export supply with respect to the price of exports turned out to be significant for all the countries except US, UK and Germany although it differs significantly across the countries in terms of magnitudes. It appears with unexpected sign for Germany and Kuwait. The price elasticity of exports supply with respect to the *domestic price of exports* produces significant and relatively high magnitudes across the countries. This implies that the export supply much sensitive to the changes in domestic price of exports. The import of inputs carries significant magnitudes with positive sign with the exception of a few cases. This means that import of inputs have a positive impact on exports performance.

The GMM estimator is considered to be efficient among other estimators, but is found valid only in special cases and in case of large sample. In small sample, the parameters are extremely imprecise and the parameter specific standard errors are significantly larger many a time[12]. Therefore some of the parameters appeared with unbelievable signs and some carried very high and other very small magnitudes in our case. So keeping all these thinks in view, we can not rely on the GMM estimator. Our second approach is to use the Empirical Bayesian Estimator to get consistent estimates of the variables concerned.

Table 5.4.:--GMM of the supply side Export equation

Countries	β_0	β_1	β_2	β_3	β_4
USA	-0.81 (-1.76)	0.02 (0.05)	-- 0.96 (-0.79)	1.71 (2.76)	-0.46 (-2.42)
France	0.52 (2.48)	0.63 (4.20)	1.95 (6.10)	-- 0.54 (-3.00)	–0.16 (-1.60)
UK	0.29 (0.72)	0.26 (0.68)	--1.63 (-2.12)	1.01 (2.73)	0.19 (-1.27)
Canada	-0.81 (-2.70)	1.48 (4.84)	-2.96 (-4.10)	0.68 (1.89)	0.27 (2.25)
Korea	-3.36 (-2.51)	4.64 (2.27)	-3.42 (-2.25)	0.87 (1.24)	1.10 (2.56)
Kuwait	0.22 (0.26)	-1.83 (1.66)	-0.68 (-0.32)	1.69 (1.67)	0.11 (0.38)
Malaysia	-2.80 (-3.32)	3.15 (3.54)	-6.10 (-3.37)	1.71 (2.19)	0.74 (2.31)
Mauritius	-2.35 (-3.18)	2.31 (2.52)	-5.74 (-3.51)	2.56 (4.27)	0.31 (1.99)
Germany	18.75 (2.32)	-0.21 (-0.53)	0.40 (0.28)	-3.45 (2.83)	0.16 (0.60)
Bangladesh	-3.28 (9.94)	2.54 (6.20)	-4.42 (5.10)	1.03 3.10	1.30 (11.80)

The numbers in parenthesis are the estimated 't' statistics

8. Empirical Bayesian Findings

The demand side equation is specified with price of exports *"P^x"*, price of competing or substitute goods at world market "P^w" and GDP "Y^w" of our trading partners. 'α_1' is price elasticity of export demand with respect to the foreign price of exports.

[12] This clear if we look in to the table of the GMM results.

$'\alpha_2'$ is the elasticity of export demand with respect to the price of competing goods at world market and $'\alpha_3'$ is the elasticity of demand with respect to the GDP of our trading partners. The Empirical Bayesian estimates of the demand side export equation are reported in table 2 below.

8.1. Results Discussion of the Empirical Bayes— Demand Side Equation

Table 5.3, reports the Empirical Bayesian results of the demand side exports equation. This offers very much improvement over the GMM estimates. The first and most important point to be noted, that the estimated standard errors of the Empirical Bayesian estimates are much smaller than their GMM counterparts. The price and income elasticities of export demand carry statistically significant magnitudes with correct sign for all the countries. This is actually due to the addition of prior information to the model. The elasticity of export demand with respect to price of domestic exports is found to be clustered around unity which implies that a 1 percent change in the price of exports cause the export demand to change nearly by same 1 percent.

Table:5.3. -----Empirical Bayesian results of the Demand side Export Equation:

Countries	α_0	α_1	α_2	α_3
USA	-3.93 (0.37)	-0.97 (0.11)	0.50 (0.05)	0.96 (0.06)
France	-2.33 (0.35)	-1.02 (0.12)	0.42 (0.05)	0.75 (0.05)
UK	-2.77 (0.37)	-1.00 (0.13)	0.46 (0.06)	0.81 (0.07)
Canada	-2.97 (0.38)	-1.01 (0.12)	0.45 (0.06)	0.80 (0.06)
Korea	-3.10 (0.38)	-0.97 (0.12)	0.47 (0.05)	0.84 (0.06)
Kuwait	-2.97 (0.33)	-0.94 (0.12)	0.48 (0..06)	0.85 (0.04)
Malaysia	-3.15 (0.36)	0.98 (0.11)	0.43 (0.06)	0.83 (0.07)
Mauritius	-3.37 (0.36)	-0.96 (0.12)	0.46 (0.06)	0.86 (0.06)
Germany	-2.93 (0.39)	-0.91 (0.11)	0.44 (0.06)	0.82 (0.05)
Bangladesh	-3.16 (0.37)	-0.93 (0.12)	0.41 (0.05)	0.80 (0.06)

Note: Numbers in parenthesis are the estimated standard errors

The price elasticity of exports demand with respect to the foreign price of exports is greater than the price elasticity with respect to the price of competing goods at world market. This implies that world demand for exports, is much sensitive to changes in the foreign price of domestic exports.

8.2. Results Discussion of the Empirical Bayes— Supply Side Equation

Table: 5.4 reports the results of the Empirical Bayesian estimates of the supply side export equation. The supply side export equation is specified with the price of exports 'P^x', domestic price of exports 'P^d', the domestic GDP 'Y^d' and the import of inputs 'M'. The elasticities "β_is" have been directly calculated from γ_i's which are the coefficients of the variables in the inverse supply equation. The price elasticity of export supply with respect to the foreign price of exports in case of USA is found to be 0.74 which means that a 10 percent increase in the foreign price of exports, export flow to United State rises only by 7.4 percent. The price elasticity of export supply with respect to the domestic price of exports turns out to be insignificant and carries very small magnitudes in nearly for all the countries concerned. This means that the supply of exports is not too much sensitive to changes in the domestic price of exports. Likewise, the income elasticity of export supply carries reasonable magnitudes across the countries but not that much as one would expect and it is less in magnitude than the scale elasticity of export demand across the countries. This implies that world demand is more significant than the domestic production capacity in explaining exports behavior. As far as the import of input variable is concerned, its coefficient is highly significant even at 1 percent and appears to be with correct and expected positive sign with reasonable magnitudes for all the trading partners. The coefficients of this variable do not differ too much across the countries like the GMM estimates but found to be between 0.20 and 0.50. The positive and significant coefficient on this variable confirms the Hypothesis that import of inputs leads the export flow to rise significantly in long run and its negative impact on export flow is of transitory nature and can be found only in short run.

Table 5.4.:--The Empirical Bayesian Estimates of the supply side Export equation

Countries	β_0	β_1	β_2	β_3	β_4
USA	-0.43 (0.13)	0.74 (0.11)	-0.10 (0.24)	0.37 (0.12)	0.23 (0.05)
France	-0.24 (0.11)	0.73 (0.10)	0.70 (0.19)	0.10 (0.10)	0.19 (0.05)
UK	-0.45 (0.12)	0.74 (0.11)	-0.17 (0.23)	0.38 (0.12)	0.23 (0.05)
Canada	-0.58 (0.12)	0.85 (0.11)	-0.32 (0.23)	0.35 (0.12)	0.28 (0.06)
Korea	-0.56 (0.13)	0.79 (0.11)	-0.10 (0.24)	0.23 (0.12)	0.29 (0.06)
Kuwait	-0.51 (0.13)	0.75 (0.11)	-0.10 (0.24)	0.33 (0.12)	0.27 (0.04)
Malaysia	-0.58 (0.13)	0.82 (0.11)	-0.13 (0.23)	0.35 (0.12)	0.29 (0.07)
Mauritius	-0.59 (0.12)	0.80 (0.11)	-0.14 (0.24)	0.40 (0.12)	0.28 (0.06)
Germany	-0.53 (0.13)	0.71 (0.10)	-0.01 (0.24)	0.27 (0.12)	0.26 (0.05)
Bangladesh	-0.90 (0.12)	-0.91 (0.11)	0.34 (0.23)	0.40 (0.12)	0.46 (0.04)

The numbers in parenthesis are the estimated errors. The coefficients β_i's have been Calculated from the Υ_I's which are the coefficients in inverse export supply equation

9. Conclusion and Policy Implications

9.1. Conclusion

We have attempted to examine the importance of demand and supply side determinants in explaining the export performance of Pakistan, using a time series data over the period 1975-2008. The export demand function has been specified with price and income variables to see the relative importance of the export price and the price of competing goods at world market and to test the small country hypothesis. Likewise the traditional export supply function has been augmented by introducing the import of inputs to see its impact on exports behavior. Initially we have employed the GMM technique to estimate the two equations. In order to validate and compare the results, we have employed the Empirical Bayesian technique. The Empirical Bayes technique has shown very much improvement over the GMM estimator. The study establishes the importance of demand side factors in explaining export performance. This is because of the

highly significant and greater magnitudes of the price and income elasticities of exports demand. Another significant finding of the study is that the price elasticity of export demand carried small but significant magnitude for all the countries. This is in contrast to the J M Reidel's hypothesis that small countries face infinite price elasticity but finite income elasticity of exports demand at world market. The positive and significant coefficient of import of inputs variable is in confirmation to the hypothesis that imports of input are the critical inputs in export production. This strongly rejects the import compression policy which can adversely affect the export production and the production of the import substitute goods.

9.2. Policy Implications/Recommendation

It is evident that the commodity composition of the Pakistan exports has been changed significantly over the study period with an increase in the share of manufactures and a fall in the share of primary goods although few items still having a lion share in total exports. No single factor or determinant can explain this long run changing behavior of exports rather a number of demand and supply side factors have a significant rule in explaining such a long run behavior of exports. This is exactly that all the variables in demand and supply functions have carried significant magnitudes with correct sign for all the countries except few cases. The income and price elasticities of export demand have carried relatively larger and highly significant magnitudes. This means that the demand side factors play significant role in explaining export behavior. *Therefore the importance to be given to the demand side determinants rather than relying purely on the removal of supply-side constraints in providing viable strategy towards exports growth.*

Further is the question of relative effectiveness of the relative prices and the world demand on the demand side. The real exchange rate or equivalently the relative prices is not too much significant as world demand in explaining exports behavior. This means that world demand has a significant influence on exports behavior. The real exchange rate, unless depreciated

continuously, has a short term and minimal effect on exports performance. Although the world demand has grown over the period but due to the poor market access and other restrictions, the growth in exports has not yet been matched with the growth in world demand. *Thus for a sustainable export growth, better market access has to be ensured with the addition of diversification in exports base towards value-added and manufactured goods and the diversification in exports directions.*

The supply side determinants are less important as compared to the demand side determinants in explaining exports behavior. This leaves enough room to improve the share of the value-added in exports which would improve the technology upgradation of exports. *The positive and significant coefficient of the import of inputs in all cases indicates that the import of inputs are themselves considered to be the critical inputs in to the production of exports. This strongly rejects the strategy of adjustment through import compression to have surplus in international trade.*

As the demand side income and price elasticities have been appeared with significant and reasonable magnitudes for all the countries although they carry relatively greater magnitudes for USA, UK and Kuwait. Therefore the desirable strategy to promote exports should be such that to diversify the export market with the priority to rely largely on the NAFTA, EU and Middle East regions where the demand for Pakistani textile is sufficiently large. The income and price elasticities of exports demand have been appeared with reasonable and significant magnitudes for the African countries as well, although they bear very small share in our exports. *The study recommends enough concentration on the African countries and to have better market access to these markets.*

Most of the researchers rely purely on 2SLS, Instrumental Variable and 3SLS etc to estimate the simultaneous equation model. But each of these techniques suffers due to many problems which may lead misleading results and the results might not be precise. The validity of these

techniques requires the sample to be sufficiently large. To overcome this and to provide consistent and reliable estimates, there need valid prior information, which is to be incorporated in to the model. The 'Empirical Bayesian technique' adopted, following Corrington and Zaman (1994), is based on valid prior information, which allow getting consistent and precise estimates of the parameters. *This research motivates the researchers to use the Empirical Bayesian technique wherever it is applicable.*

REFERENCES

Prasad (2000) Department of Economic Research, Reserve Bank of Fiji, 'determinants of exports demand, incorporating Agriculture Supply Side Shock'

Rahman and Samad (2006) "determinants of the mediam fiberboard (MDF)" Malaysia'

Ghafoor and Haneef (2005) "Trade Pattern of Pakistan, The Past trends and Future Prospects"

Atique and Ahmad (2003) "Analysis of the supply side and demand side determinants of exports of Pakistan"

Mustafa and Nishat (2004) "Volatility of Exchange Rate and Export growth of Pakistan" AERC Karachi,

Afia (2004) "Demand for Textile and Clothings of Pakistan", prospect of Pakistani textile and clothing Exports of Pakistan,

Mohanan (2007), "determinants of the Indian Machine tools exports", Jawaharlal Nehru University India

Majeed and Ahmed (2006), "determinants of exports of developing countries", Quaid-e-Azam University Islamabad,

Haq and Kemal (2007) "impact of export subsidies on exports performance of Pakistan', Pakistan Institute of Development Economics,

Nazia (2009) "Trade Potential of Pakistan, the Gravity model", Islamabad University Islamabad,

Athukorola and Reidel (1994) "demand and supply factors in the determination of NIE's exports, the economic journal vol: no. 104, pp 1411 to 1415,

Muscatelli et al (1995) “modeling aggregate manufactured exports in NIE’s” the review of economics and statistics, volume: no 77 pp: 147 to 155,

Sinha Roy (2002) “determinants of Indian exports, a simultaneous error correction model”

Sinha Roy (2007) “demand and supply factors in the determination of Indian disaggregated manufactured exports” a simultaneous error correction model,

Reidel (1988) “the demand for LDC exports of manufacturers” the economic journal: volume no 98. Pp: 138-198,

Utkulu et al (2005) “export supply and trade reforms, an evidence from the Turkish exports,

Funk and Holly (1992) “the determinants of exports of west Germany, an integrated demand and supply model” volume no 128 pp:498- 512,

Muscatelli et al (1992) “demand and supply factors in the determination of NIE’s exports, the economic journal, vol; no. 102,pp 1457-1477,

Moran, 1988, “a structural model for developing countries, manufactured exports” the World Bank economic review, vol. 3, pp 321-340,

Sinha Roy, 2009, “the determinants of Indian exports” ‘international trade research series’ Londborg (1981) “elasticities of supply and demand for Swedish exports in a simultaneous model” the journal of economics Vol.83 pp: 444-448,

Khan and Knight, 1985 “import compression and export performance in developing countries” the review of economics and statistics, Vol: 70, pp: 315-321,

Corrington and Zaman “Interindustry Variations in the Costs of Job Displacement” *Journal of Labor Economics,* Vol. No. 2 (April 1994), pp. 243-275