DETERMINANTS OF EXPORTS OF PAKISTAN
A COUNTRY-WISE DISAGGREGATED ANALYSIS

By

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1- Export credit

2. Industrial credit

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We accept the work contained in this thesis entitled "Determinants of Exports of Pakistan, A Country-wise Disaggregated Analysis" as a confirmation to the required standard for fulfillment of the Degree of the Master of Philosophy/Subject in Economics.

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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. This is country-wise disaggregated analysis of Pakistan versus its trade partners. 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. The Empirical Bayesian technique offers considerable improvement over the preceding 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 meaningful magnitudes.

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 values of price and income elasiticities. However, the positive and significant coefficient of import of inputs confirm the fact that import of inputs i-e import of Machinery, Equipments and raw material etc are crucial to enhance the country's potential to export. 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 so as to improve the export performance of Pakistan.

Dedicated
To
My lovely Grand Mother

ACKNOWLEDGEMENTS

It is ALLAH (SWT) Who helps me in all respects of life and gets solved my problems especially regarding studies with unbelievable sources, so I am thankful to Almighty ALLAH and thereafter to his creature,

First and foremost I would like to thank who deserves, to be prayed and praised, Dr. Hafiz Muhammad Yasin my supervisor. His comments, critiques and ability to detect errors while going through the various drafts, made this work what it is to date.

It is pleasure and honour to express my sincere thanks to Dr. Asad Zaman (Director General IIIE) who provided me extensive support, especially in employing the Empirical Bayesian technique.

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Declaration

I hereby declare that this thesis, neither as a whole nor as a part thereof, has been copied out from any source. It is further declared that I have carried out this research by myself and have completed this thesis on the basis of my personal efforts under the guidance and help of my supervisor. If any part of this thesis is proven to be copied out or earlier submitted, I shall stand by the consequences. No portion of work presented in this thesis has been submitted in support of any application for any other degree or qualification in International Islamic University or any other university or institute of learning.

Naseeb Zada

CHAPTER 1
Introduction

1.1 Background

Exports are believed to be the engine of economic growth. A nation can win friends through trade relations and ensure an optimal allocation of the available resources. Following the comparative advantage principle, each country is likely to export those goods which can be produced at relatively low costs. The returns from trade depend on enhancing domestic production, ensuring international standards and exploring new markets for exports. The export performance of a country is determined by many factors, which can be categorized in terms of demand and supply side determinants. The demand side factors include capacity of the trading partners, the prices of exportable goods, the prices of competing/substitute goods in the world market and the exchange rate etc. However the political and social factors also play a very crucial role in this regards. The supply side factors include domestic productive capacity, exchange rate, relative prices (prices of exports relative to prices 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 export performance, whereas on the supply side, the domestic productive capacity and the availability of inputs are important.

Some researchers emphasize on significance of the demand side determinants while others attribute more importance to the factors on supply side. In this context, the magnitudes of price and income elasticities on demand side need due consideration. Muscatelli (1992) finds the income and price elasticities of export demand to be significant but finite; whereas J M Reidel (1988) considers these elasticities to be significant and infinite. Apart from income and relative price responsiveness to exports, the predominant views indicate the importance of supply side and other related constraints. For instance, Khan and Knight (1985) show that import of inputs have significant influence on export performance in the long run. Sinha Roy (2002, 2007) and Muscatelli (1992, 1995) consider the relative prices (foreign prices of exportable goods relative to the domestic prices) to play a significant role in this context. Majeed and Eatzaz (2006) also highlight the importance of some supply side determinants. Given the differences in views of researchers, there is sufficient rationale to examine the relative importance of the demand and supply side determinants simultaneously so as to arrive at some meaningful conclusions about the exports performance of Pakistan.

1.2 Rationale/Relevance of 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 models, 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. This may lead to simultaneous equations bias and yield misleading results if not handle properly.

This study is the first of its kinds that attempts to rely on the country-wise disaggregated export analysis since no study is available on this pattern. Keeping in view the share of each partner in our exports and availability of the data on the variables concerned, a moderate sample of eleven countries is selected for the purpose. This includes USA, UK, Germany, France, Korea, Kuwait, Mauritius, Malaysia, Canada, Bangladesh and Saudi Arabia. A significant contribution of this study is incorporation of the import of inputs in the supply side equation. We intend to test the hypothesis that import of inputs (industrial raw material and capital goods) increases the export potential of the country and lead to favorable balance of trade. The study also examines the impact of Kuwait-Iraq war (1991) and Afghanistan war (2001-02) on our exports performance. It is generally argued that the flow of Pakistan's exports to European and NAFTA regions has been adversely affected due to these wars. Another contribution of this study is the application of the Empirical Bayesian technique to test the reliability of the ordinary estimates.

1.3 Objectives of the Study

The research is intended to achieve the following objectives.

1: The foremost objective of this study is to determine the nature of relationship between exports and their determinants, taking into consideration both the demand and supply sides.

2: After having studied a vast literature, it is revealed that most studies have relied on demand side determinants of exports since they assume the supply side to be infinitely elastic. Several other justify significance of the supply side determinants. An associative

objective is to see the relative importance of the demand and supply side determinants in explaining export performance of Pakistan.

3: Many developing countries including Pakistan are facing persistent deficit in balance of payments due to heavy import bill. They have adopted commercial policies to suppress imports and to get rid of the resulting deficit in trade account. But this could be at the cost of reduction in country's potential for exports, since the import of raw material and equipments is believed to be critical for export production. This may deepen further the deficit in BOP. Thus one of the objectives is to evaluate the importance of import of inputs in explaining exports behavior.

4: The recently fought American-led two wars i-e the Kuwait-Iraq war (1991) and Afghanistan war (2001) are considered to have seriously affected the trade relations among countries with in the region and off the region. The export destination and export flows have been adversely affected. Therefore another objective of the study is to see the impact of these wars on our export performance.

1.4 Methodology of Research

Some studies rely on single equation techniques like two stage least square (2SLS) and instrumental variable, while other use system estimation methods like GMM, three stage least square (3SLS) and full information maximum likelihood (FIML) but no study has employed the Empirical Bayesian technique which has its own advantages. All of the usual estimation methods depend on the completeness and authenticity of the data only. The Empirical Bayesian method utilizes all the information provided by the model as well as the extra information added to the model. Thus having more information, the Empirical Bayesian Estimator is believed to allow for highly precise and robust estimates of the export determinants.

1.5 Organization of the Study

We provide an overview of the structure of Pakistan's exports in Chapter 2. This contains a brief discussion of Pakistan's export performance during 2010-11 with an overview of the exports composition, direction and concentration. Similarly we provide a brief overview of the trade policy '2009-12'. In Chapter 3, a general review of some of the important studies on exports' determinants is undertaken. Chapter 4 discusses the model, methodology and the

data sources. We refer to two empirical techniques that have been employed to estimate the demand and supply side export functions, namely the Generalized Method of Moments (GMM) and the Empirical Bayesian technique. Chapter 5 is reserved for analysis of the results that enjoys a central position in the research. As usual, the final Chapter is meant for conclusion and policy recommendations.

CHAPTER 2
Export Performance of Pakistan: An Overview

2.1 The Current Scenario of Pakistan's Exports

The exports of Pakistan showed considerable improvement during the last year. The total merchandise exports increased from 15.8 billion dollars during 2009-10 to 20.2 billion during 2010-11 showing an absolute increase of 4.4 billion dollar in one year with an excellent growth of 27.8 percent. Each group in exports has shown excellent performance with positive and significant growth but the textile sector is on the top. Like the past, it enjoyed the central position and contributed 55.3 percent in total exports against 53.5 percent during the last year. This increasing trend in growth is due to the rise in international price of cotton-based textile exports as well as higher demand from European countries and United State. The food group, which consists of fish and fish products, vegetables, wheat, meat (raw and processed) contributed 18.1 percent in total exports and grew with an average rate of 29.1 percent. The export of petroleum products rose by 32.5 percent. However, the export of cement witnessed a negative growth of 8 percent. This was primarily due to the fall in demand from the Middle East region and due to the tough competition from Saudi Arabia. Likewise, the export of rice couldn't sustain its previous level and its share in total exports declined by 2.1 percent during 2010-11. This decrease is due to violent floods, which have adversely affected rice production in the previous year and will do so in the current year as well.

2.2 The Behavior of Exports

In this section we examine the general behavior of exports using the three aspects of exports; namely, the Composition, Destination/Direction and Concentration. We divide the study period (1970-2008) into four sub-periods. The first covers the period 1970-80, the second covers the period 1981-90 and so on. The objective of this exercise is to compare the growth rate and share of each trade partner, export items and their composition in total exports over the decades or sub-periods. We have selected the top eleven trading partners and the top nine items of exports for this purpose. The exports are categorized into three components i-e the primary exports, semi-processed and manufactured exports to examine their behavior. This

exercise will help in understanding the destination and diversification in exports base and export market over the study period.

2.2.1 The Composition of Exports

The period-wise growth rate and share of each component in total exports are reported in Table 2.1. The growth rate and share of each component in total exports have changed significantly over the whole period. Although the share of primary goods shows a persistent decline with a falling growth rate over the period but the share of manufactured exports has increased significantly over the period from 44.14 percent during 1970-80 to 76.78 percent on average during 2000-08 which is a healthy sign[1]. This sharp increase in the share of manufactured exports is attributed to the rapid growth in technological innovation and improvement in international trade environment. The behavior of the manufactured and semi manufactured exports over the past thirty years, shows diversification in exports structure i-e from primary goods to manufactured and semi-processed exports.

Table 2.1 **Composition of Exports** *Growth rate and Share percent*

Items	1971-1980		1981-1990		1991-2000		2001-2008	
	Growth %	Share %	Growth %	Share %	Growth %	Share %	Growth %	Share %
Primary Goods	15.63	39.73	5.31	28.36	0.83	13.23	22.38	12.00
Semi-Manufac..	12.65	16.13	12.74	18.13	-1.00	19.85	7.76	11.23
Manufactures	21.80	44.14	12.74	53.52	4.82	66.92	13.90	76.78
Total exports	16.47	100	10.91	100	2.59	100	14.05	100

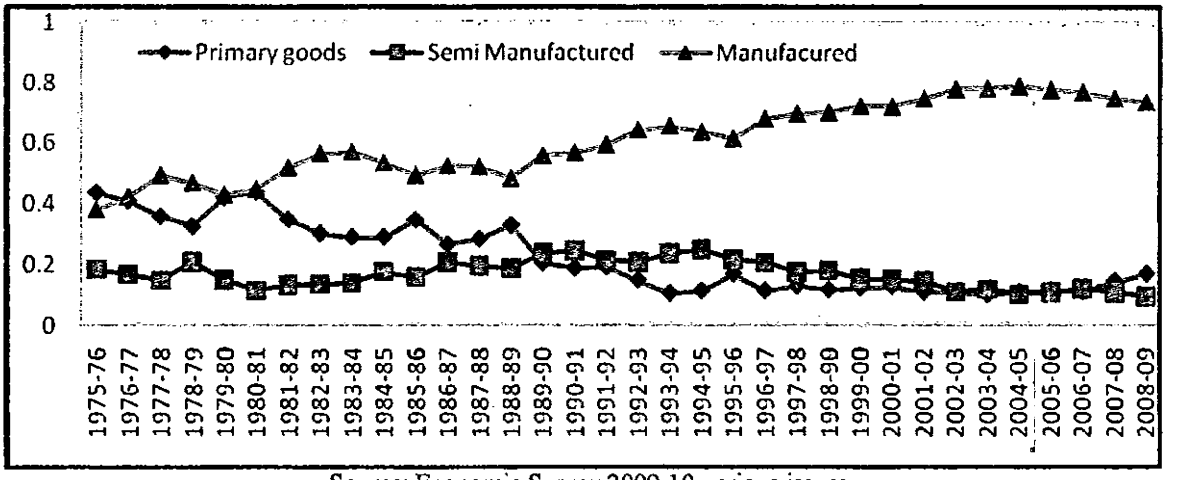
Source: Economic Survey 2010-11

The behavior of each composition can best be explained with the help of the following graph. The share of manufactured goods in total exports shows an increasing trend over the whole period and it counted for about 70 percent of the total exports by 2008 against 38 percent by 1975. On the other hand, the share of primary goods has been declining persistently and reaches to a minimum level of 18 percent of the total exports by 2008. Likewise, the share of semi-manufactured goods shows a little bit mixed trend i-e initially its share increased but

[1] The percent share and growth rate is the average of the annual share and growth rate over the decade. The data have been expressed in terms of dollars.

after 1995, it share in total exports has been on decline and it accounted for about 10 percent of the total exports in 2008.

Figure -1 **The Share of Each Composition in Total Exports**



Source: Economic Survey 2009-10-various issues

2.2.2 Direction of Exports

Table 2.2 reports the average growth rate and the compound percent share of the flow of exports to our top eleven trading partners over 1970-2008,

Table 2.2 **Direction of Exports** ***Growth rate and share percent***

Countries	1971-1980		1981-1990		1991-200		2001-2008	
	Growth %	Share %	Growth %	Share %	Growth %	Share %	Growth %	Share %
USA	23.00	5.67	17.94	9.93	9.64	18.18	9.89	23.03
UK	12.77	6.09	15.23	6.07	3.33	6.87	7.98	6.18
Germany	11.63	5.54	18.55	6.19	-0.88	6.84	11.85	4.59
Hong Kong	7.44	7.24	28.73	3.79	0.19	7.19	2.48	3.87
France	20.03	2.24	17.60	2.84	-1.00	3.38	7.50	2.30
Saudi Arab	25.83	5.23	9.87	5.91	1.60	3.06	11.36	2.66
Canada	11.04	0.60	26.58	1.08	2.82	2.00	3.78	1.38
Bangladesh	53.42	1.84	10.43	1.93	0.21	1.50	28.18	1.51
Kuwait	14.10	2.24	16.81	1.08	10.45	0.41	14.18	0.57
Malaysia	17.97	0.13	57.38	0.38	-1.00	0.57	20.61	0.55
Iran	88.04	4.74	46.39	4.38	24.97	0.63	58.57	1.04

Source: Economic Survey and Statistical Supplement 2009-10

The table reveals that the share of USA in our exports has increased significantly over the study period from 5.67 percent on average during 1970-80 to 23.03 percent during 2000-08. This implies that USA is still absorbing a lion share of our exports. It is followed by the United Kingdom, which accounts for 6.18 in 2000-08 percent against 6.09 percent during 1970-80. Germany is the third largest market for the exports of Pakistan, accounting for 5 percent during 2000-08 against 5.54 percent during 1970-80. On the other hand, the shares of Saudi Arabia, Iran and Bangladesh in total exports have been on decline over the past few decades. This is rather serious matter and needs consideration. The growth of exports flow to most of the trading partners shows a declining trend over the decades. However, this does not mean that Pakistan has successfully diversified its exports market. Still there is dire need for Pakistan to diversify its exports, not only in terms of market but also in terms of structure.

2.2.3. Concentration of Exports

Unfortunately the exports of Pakistan have been concentrated in few items like cotton and textile[2], leather, synthetic items, rice and sports goods. The concentration of exports has deepened intensively and only few items constitute the lion share in total exports. Like the past, the share of the three items, i-e the textile manufactures, leather and ready made garments, is very large. The share of other items in total exports is 26.7 percent in 2010-11 against 33.7 percent in 2005-06. This means that the share of other items in total exports declined by 7 percent over the last 5 years. Referring to Table 2.3, the share of cotton exports is 21 percent on average during the period 2001-08 against 31.3 percent during 1971-80. The share of ready-made garments in total exports increased significantly and it remained 18.8 percent on average over the period 2001-08 against 1.9 percent during 1971-80. The share of rice in total exports grew by 8.9 percent during 2010-11 against 11.5 percent over the last period. The rice exports exhibited an outstanding performance during the period 2000-08, and grew by 30 percent against 11 percent during 1970-9-80. However it recorded only 3 percent growth during 1990-2000. On the other hand, the petroleum group showed excellent performance over the decades and grew by 31 percent during 2000-08.

[2] The cotton group includes raw cotton, cotton waste, cotton yarn, cotton threads and cotton cloths. The other components of cotton have not been considered.

Table 2.3 **Commodity Composition of Exports** *Growth rate and percent share*

Exports by Commodities	1971-1980		1981-1990		1991-2000		2001-2008	
	Growth %	Share %	Growth %	Share %	Growth %	Share %	Growth %	Share %
Cotton exports	16.69	31.30	13.81	35.12	-1.41	31.75	10.12	20.96
Rice exports	11.48	19.91	5.32	9.50	3.40	5.67	30.01	7.02
Leather exports	17.31	5.29	9.65	5.33	0.46	2.85	7.72	2.04
Fish Group	20.51	2.56	5.15	2.62	2.10	1.88	14.82	1.19
Sports goods	9.58	1.38	17.39	1.66	9.63	3.07	2.61	2.25
Petroleum	62.87	4.29	56.29	1.80	19.67	0.99	31.26	3.91
Ready-made garment	50.24	2.60	25.64	9.50	4.84	16.90	12.28	18.78
Synthetic exports	92.14	1.13	111.09	3.73	2.02	6.50	8.61	2.93
Drug & Surgical Inst	6.45	2.01	12.92	1.68	8.29	1.94	27.04	3.72

Source: Economic Survey 2009-10

2.3. The Structure of Imports

In this section, we briefly analyze the behavior of import compositions over the period 1970-2008 since it is important for the present study. The four items of imports i-e the industrial raw material for capital goods as well as consumer goods, the import of capital goods and consumer goods are considered for this analysis. The period-wise growth rate and share of each ingredient is reported following in Table 2.4.

Table 2.4 **Composition of Imports** *Growth rate and Share percent*

Items	1971-1980		1981-1990		1991-2000		2001-2008	
	Growth %	Share %	Growth %	Share %	Growth %	Share %	Growth %	Share %
RM for Capital G	26.77	6.32	4.32	6.50	2.57	5.60	28.08	7.29
RM for Consumer G	28.59	41.97	3.43	43.88	6.83	45.61	17.96	49.49
Capital goods	17.55	33.33	6.06	33.54	3.45	34.33	21.52	32.61
Consumer goods	15.36	18.18	5.64	16.01	3.78	14.46	20.33	10.60
Total	21.44	100	4.23	100	4.73	100	19.40	100

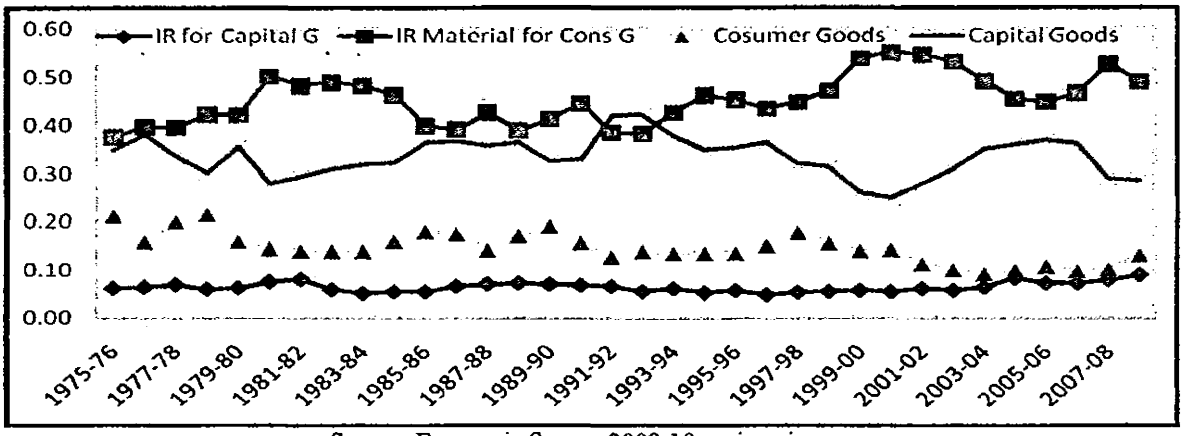
Source: Economic Survey 2009-10

The analysis reveals that each item in the same composition, witnessed high growth during the sub periods 1970-80 and 2001-08. The import of capital goods increased by 17 percent during 1970-80 against 21 percent during 2001-08 whereas the consumer goods increased by 15 percent against 20 percent over the same periods. Likewise the import of raw material for capital as well as consumer goods increased by 27 percent and 29 percent respectively during 1970-80. However, the growth rate of each component is small over the period 1980-2000 i-e the capital goods like the other items increased by 6 percent and 3 percent on average over the period 1980-90 and 1990-2000 respectively.

The industrial raw material is on the top and it accounted for about 42 percent and 49 percent of the total import on average during 1970-80 and 2001-08 respectively. It is followed by the capital goods, which accounted for about 33 percent and 32 percent on average over the same sub-periods. This means that our imports largely consist of industrial raw material and capital goods. On the other hand, the share of raw material and consumer goods in total imports is not too much and they accounted for about 7 percent and 10 percent shares respectively over the period 2001-08.

The share of each component of this specific composition can be viewed through the graph (Figure 2). It is evident that the share of industrial raw material for consumer goods in total imports is on the top and showing a little bit increasing trend over the period. This is followed by the capital good imports, showing somewhat constant trend, whose share lies between 30-40 percent over the period. The share of consumer goods shows a declining trend over the period 1970-2008 and accounts for about 15 percent during 2008-09.

Figure 2 The Share of each Component in Total Imports



Source: Economic Survey 2009-10-various issues

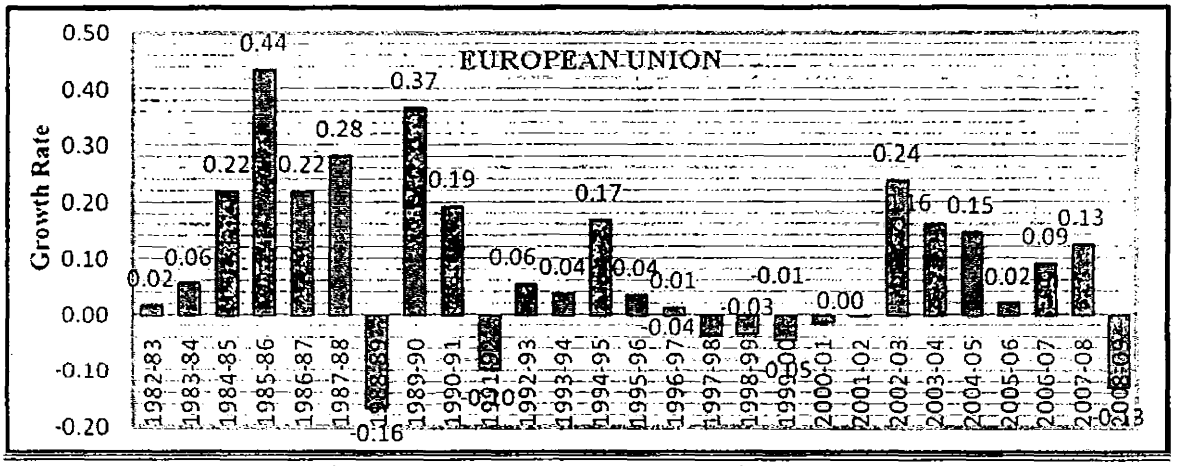
2.4 The Region-wise Behavior of Exports

This section outlines the flow of exports to different regions across the period that the study covers. The growth rate has been calculated on chain base, using the data on exports to each region expressed in terms of dollars. The analysis reveals that the growth rate of exports across the regions is decreasing over the study period. Initially the exports from Pakistan were concentrated in few markets but later on it depicted diversification in destination. The growth rate of exports to SAARC, the African and Arab League regions seems to be somewhat constant over the period 1975-2008. In contrast, the growth rate of exports to NAFTA, European Union and other regions show a decreasing trend. This might be explained by tough competition from other countries in these markets and also by imposition of tough standards/restrictive conditions by these countries. The growth rates of exports to different regions over the study period are given in the following graphs.

2.4.1.The Behavior of Exports to the European Union

The member countries in the European Union are UK, Belgium, Bulgaria, Chez Republic, Denmark, Finland, France, Germany, Greece, Hungry, Italy, Netherlands, Poland, and Portugal. Figure 3 shows a declining trend in the growth rate of exports to European Union.

Figure 3 The Behavior of Exports to European Union

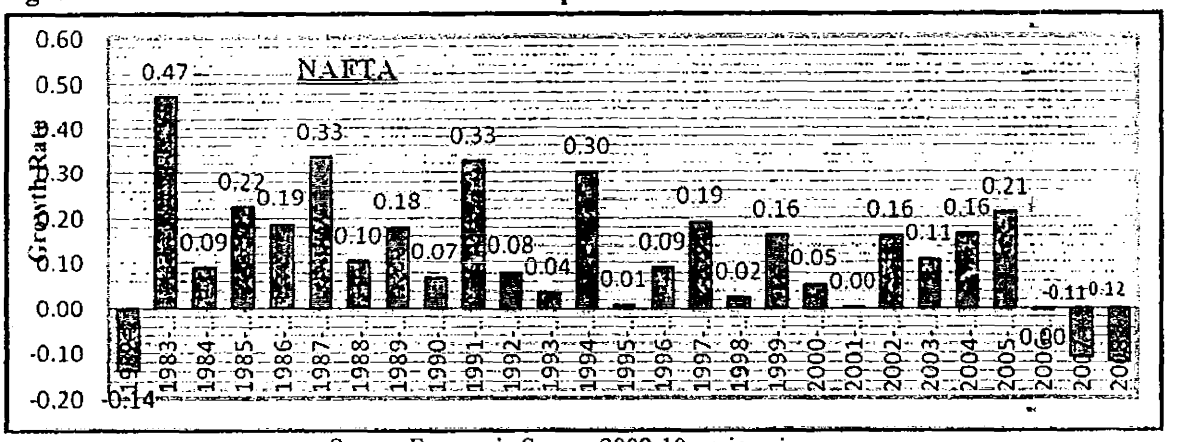


Source: Economic Survey 2009-10, various issues

2.4.2 The Behavior of Exports to NAFTA

The member countries included in the region are USA, Canada and Mexico. The growth rate of exports shows more or less a constant or slightly declining trend over the period concerned as depicted below.

Figure 4 The Behavior of Exports to NAFTA

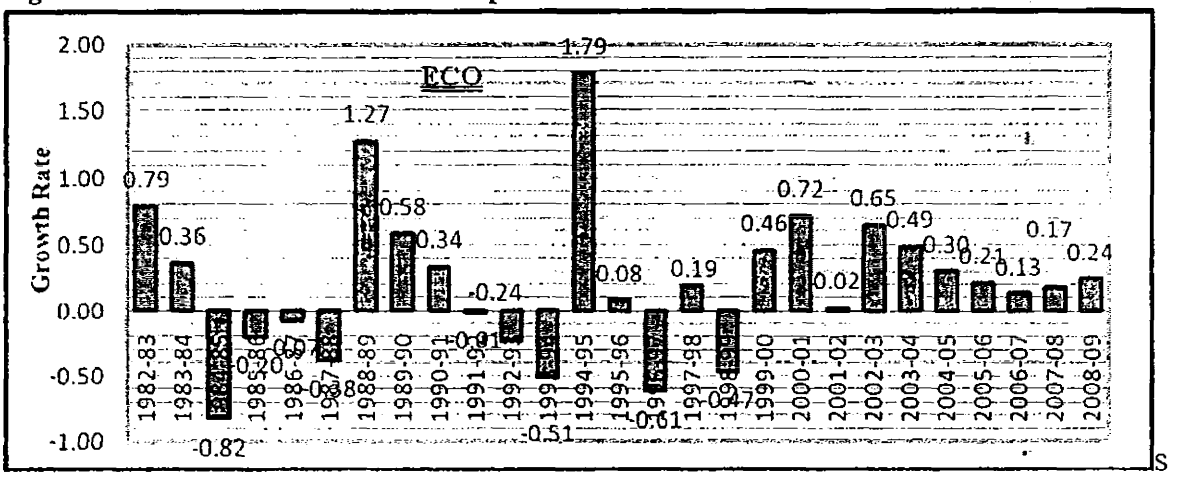


Source Economic Survey 2009-10-various issues

2.4.3 The Behavior of Exports to ECO

The member countries included are: Iran and Turkey. Figure 5 depicts that the growth rate of exports to ECO member countries shows very much fluctuation significantly till 1995. However, after 1994-95, the growth rate is more or less constant, though it shows a declining trend.

Figure 5 The Behavior of Exports to ECO

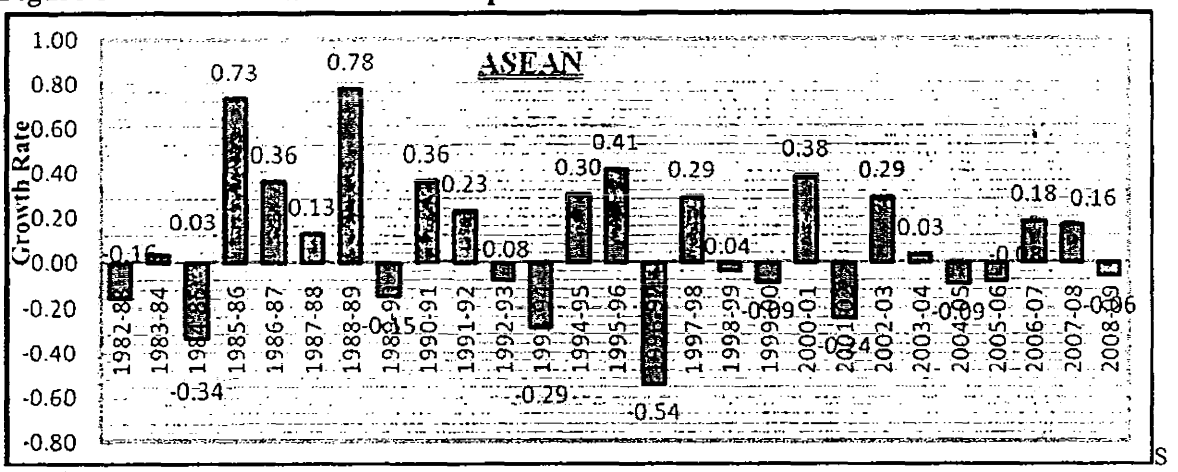


Source Economic Survey 2009-10-various issues

2.4.4 The Behavior of Exports to ASEAN

The member countries include Malaysia, Singapore, Indonesia, Thailand and Philippine. The growth rate shows very much fluctuation over the whole period. Figure 6 reflects the situation.

Figure 6 The Behavior of Exports to ASEAN

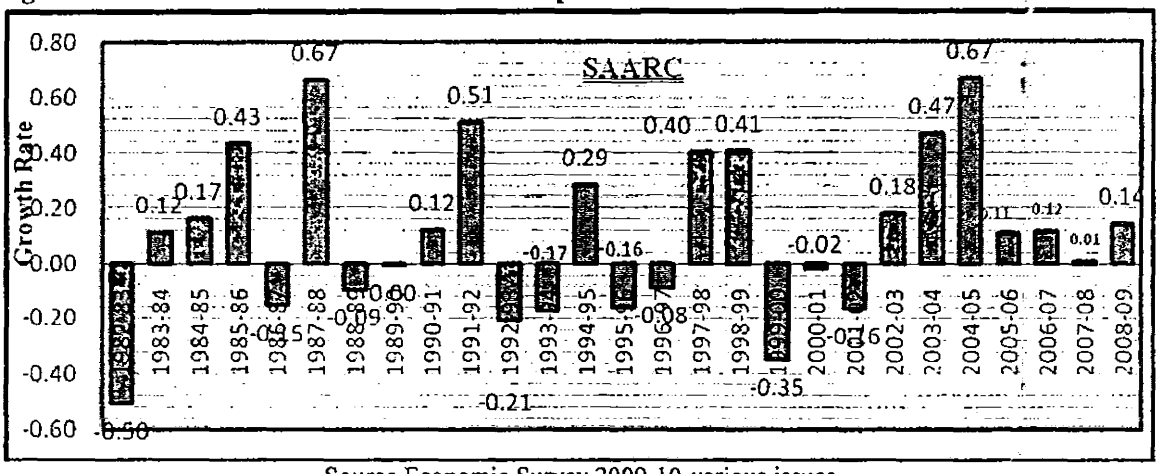


ource Economic Survey 2009-10-various issues

2.4.5 The Behavior of Exports to SAARC

The member countries include Bangladesh India, Maldives, Nepal and the Sri-Lanka. The growth rate of exports to the SAARC region varies significantly across the years under consideration, as shown in Figure 7 below

Figure 7 The Behavior of Exports to SAARC

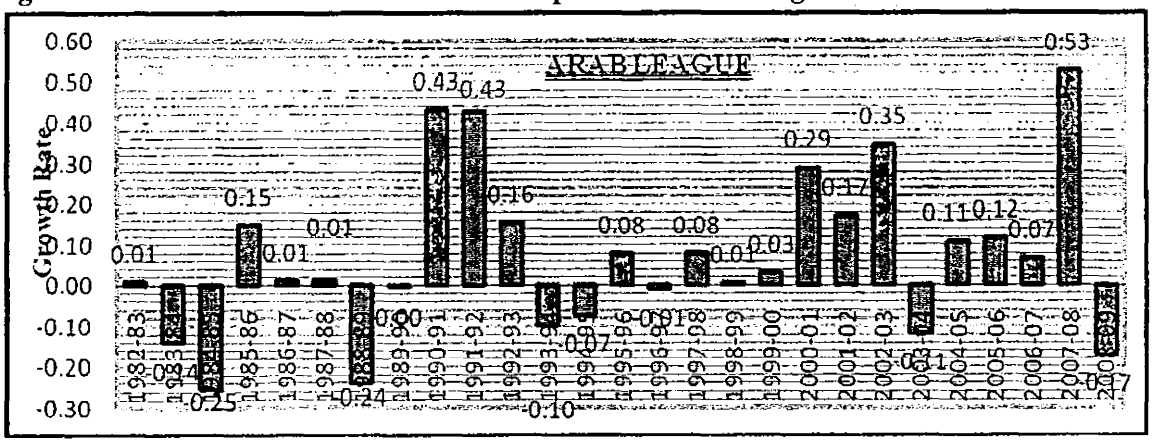


Source Economic Survey 2009-10-various issues

2.4.6 The Behavior of the Exports to Arab League

The member countries included are, Algeria, Bahrain, Iraq, Jordan, Kuwait, Lebanon, Libya, Oman, Qatar, Saudi Arabia, Somalia, UAE, Yemen, and the Syria. The growth rate of exports to this region is not too much fluctuated like other regions, though it varies significantly. Figure 8 depicts the factual position.

Figure 8 **The Behavior of Exports to Arab League**

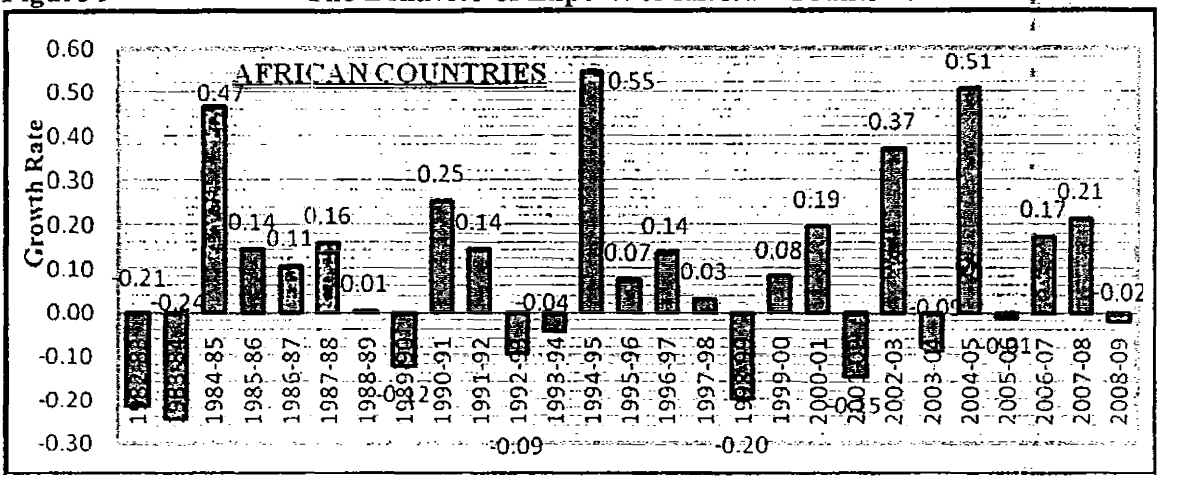


Source Economic Survey 2009-10-various issues

2.4.7 The Behavior of Exports to African Countries

The member countries are Liberia, Ghana, Kenya, Mauritius, Nigeria, Tanzania, Malawi, Egypt, Cameron and Siralune. The growth rate to African countries remained very low although, it is constant over the period as shown in Figure 9.

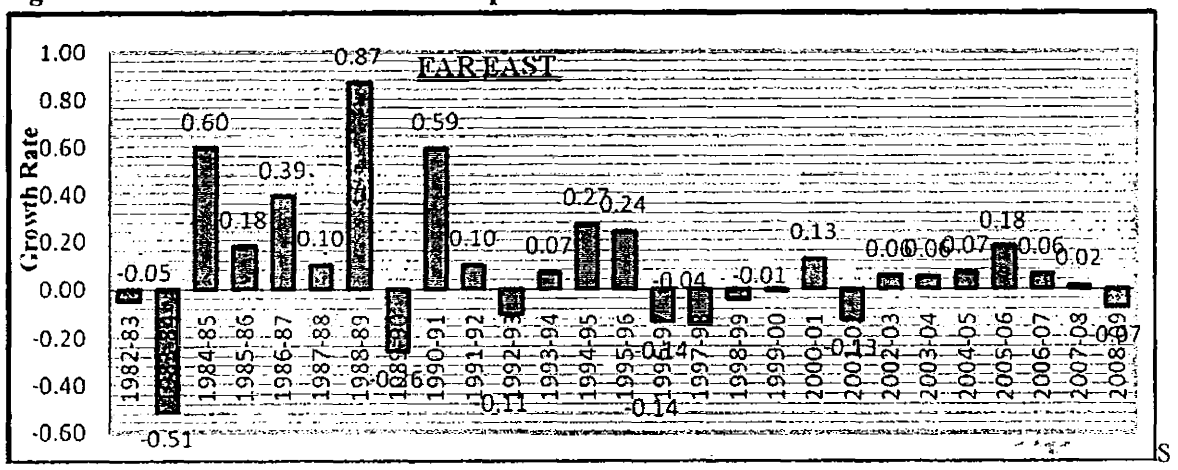
Figure 9 **The Behavior of Exports to African Countries**



2.4.8. The Behavior of Exports to Far East

The member countries are China, Hong Kong, North Korea, South Korea, Japan and Myanmar. The growth rate remained around 10 percent after 1990 and shows a constant trend as shown in the following figure.

Figure.10. The Behavior of Exports to the Far East



ource Economic Survey 2009-10-various issues

2.5 An Overview of Pakistan's Trade Policy

Since the very beginning, the exports of Pakistan have exhibited somewhat complex performance. In early years, the potential of available resources could not be exploited efficiently. During 1960, with the initiatives for establishment of industrial base and adoption of new technology, the exports gained momentum with the passage of time. Initially the exports of Pakistan were concentrated in few items like raw cotton, raw wool and other primary and agro-based commodities. However, in 1960's the share of manufactured and semi-processed goods in total exports, gradually increased. By 1970, the share of manufactured and semi-processed goods in total exports was 44 percent and 24 percent respectively, which increased to 57 percent and 25 percent respectively by 1990's. This was primarily due to improvement in technical know-how and international trade environment.

The government has been keeping a constant focus on export performance and providing various incentives regularly. Various schemes have been launched from time to time to promote exports. Two major schemes, namely, the Export Finance Scheme (EFS) and Export

Rebate/Refund (Duty Drawback) Scheme were initiated to boost exports and to minimize the deficit in the balance of payments. These schemes are briefly discussed below.0

2.5.1. Export Promotion Strategies

From the very beginning, Pakistan has adopted different strategies with the sole objective to promote exports via provision of different incentives.

(i) Export Finance Scheme (EFS)

The Export Finance Scheme was announced by the State Bank of Pakistan in 1973. The objective behind this scheme was to promote and encourage exports of non-traditional and newly emerging commodities. Initially the manufactured goods were not included in the scheme. After four years, all the manufactured goods got included in the scheme and the exporters were allowed to get concessionary credit. The scheme was not applicable for the export of raw cotton, rice, wool, hides and skins. The Scheme gradually improved the EFS-GDP ratio which was a positive sign. The ratio continued to rise rapidly but in 1985 it declined to 3.62 percent. The said ratio fluctuated from time to time and in 1998 it was 4.75 percent on average. After 1999, the ratio declined further and it was associated with a fall in exports financing as percentage of the total exports. This time, the decline in the ratio of exports was associated with FE-25 scheme which was introduced in 1998 to facilitate home remittances and to mobilize foreign exchange resources. The overall performance of the Exports Finance Scheme was not satisfactory and had no significant impact on export performance[3].

(ii) The Export Rebate/Refund Scheme

This scheme was launched in early 1960's, announcing the refund of custom duty, sales tax and excise duty paid on the import of raw material subject to the condition that the final product using the raw material were meant for exports. The main objective of the scheme was to encourage the import of industrial raw material and other related goods so that the share of manufactured and semi-manufactured goods in total exports could be increased. After launching this scheme, the exports showed an increasing trend quickly. The exports got momentum after the trade liberalization was initiated in 1981. The ratio of the scheme to

[3] Nadeem-ul-Haq and Muhammad Ali Kemal have empirically examined the impact of these two schemes on exports performance.

GDP was 0.60 percent in 1981-82, 0.64 percent in 1987-88 and 0.77 percent in 1992-93. However the ratio declined significantly in 1994 and it reached to a bare minimum of 0.42 percent. This sharp decrease in the ratio was due to the reduction in tariff and excise duty on imports. The Export Rebate/Refund Scheme had a positive impact on export performance and witnessed an increasing trend each year.

2.5.2. The Trade Policy of Pakistan 2009-12

According to WTO estimates, Pakistan's share in total world market declined to 0.13 percent in 2009 from 0.21 percent in 1999. The exports of Pakistan have been largely concentrated in textiles while the share of non-textile exports has been on decline mainly due to an explosion of manufactured goods exports from the competitor's economies. The principal reason for the weak performance of Pakistan's exports at global market is the lack of competitiveness of exports and less ability of the manufacturers to improve product diversification.

The trade performance of Pakistan during 2008-09 remained unsatisfactory during 2008-09. The total merchandized exports witnessed a negative growth rate of 3 percent and decreased to 14.7 billion dollar in 2008-09 from 15.14 billion 2007-08. This decline was mainly due to the 'decrease in consumption in our major export markets like United State and European Union as well as due to the global recession. Likewise, our imports declined by 13 percent and amounted 34.9 billion dollar as compared to 40.4 billion dollar during in 2007-08. All the particulars of exports showed a declining trend over the period. For instance, the leather products registered negative growth rate of 24 percent followed by the synthetic textile, which declined by 22 percent. The readymade garments declined by 21.7 percent. Likewise the cotton yarn decreased by 15 percent but the rice exports grew by 8.2 percent during 2007-08.

Keeping in view this weak performance of the external sector during 2008-09, the government had sufficient rationale to revise the Trade Policy 2008-09. Keeping focus on strengths and limitations of the foreign trade sector, the government has formulated a new Trade Policy for the period 2009-12 to meet the challenges. The policy was based on the following fundamental principles[4];

- Growth to be ensured along with equity and gainful employment
- Sound macro-economic framework to promote the trade environment

[4] The details of these policy initiatives have been taken from the trade policy 2009-12' s speech

- Eradication of poverty and environmental protection
- Raising investment in human resources
- Promotion of the private sector, particularly the small scale production
- Setting of the target to alleviate the poverty

The major objectives of the Trade policy 2009-12 were to enhance exports competitiveness along with production of more sophisticated products and to ensure greater market access and geographical diversification. Obviously, this is a long term policy and needs to overcome the following challenges:

- Severe energy crises for the last few years throughout the country
- Poor innovation and technological backwardness, resulting into weak competitiveness
- Low productivity of the labour and poor potential
- Poor standard and low level of value addition
- Poor incentives for the flow of FDI to export sector
- Low level of diversification both in terms of product and destination"

The government has decided to encourage structural transformation in the manufacturing industry so as to ensure mobility of capital and labour across the sectors. This would raise the production of highly competitive and sophisticated goods. However, to enhance competitiveness of domestic exports in the world market, the government has announced the following initiatives:

- To overcome the constraints like energy crises and to minimize the cost of capital
- To encourage new investment in the textile sector along with the installation of modern machinery to raise competitiveness of textile exports in the world market.
- To ensure diversification in exports market as well as exploration of new markets.
- To promote and upgrade labour skills, with emphasis on working women skill in the leading institutions.
- To produce highly sophisticated goods and to meet the world demand, the government has announced the following policy initiatives in the trade policy;
- To upgrade and promote the domestic capacity of producing exportable and import substitute goods, following the global supply chain
- To adopt and introduce new technology in the leading sectors so that the production can be transformed from traditional to the modern technology oriented products.

- To set up a special fund, namely the 'EEF' to promote enterprise and entrepreneurship in selected sectors.
- To promote the import of technical services to ensure innovation and technology up-gradation.

As one of the leading objectives of the trade policy 2009-12 is to promote the product diversification, the commerce ministry intends to undertake the following measures:

- To promote and enhance the Chemical and Pharmaceutical sectors
- To promote the export of meat products and to overcome their supply side constraints
- To improve and facilitate the Foreign Direct Investment along with mineral sector
- To enhance the agro-based exports and to promote the light engineering sectors
- To encourage the exports of gems and jewelry through suitable policy initiatives

The commerce ministry intended to achieve the export growth rate of 6 percent during the year 2009-10 which would be increased to 13 percent in the coming years. Likewise, the competitiveness 'ranking' of the country was announced to be improved to '75' by 2012, which was '101' during 2008-9. Similarly the government intended that the share of engineering goods in total exports would be increased to 5 percent as compared to 1.5 percent during 2008-09. The policy devised particular initiatives to enhance trade with the regional countries and it was announced that the share of the regional trade would be increased to 25 percent by 2012 against 17 percent during 2008-09.

Initially the policy was not much effective and exports grew with 8 percent only and amounted 15.9 billion dollar 2009-10 against 14.7 billion dollar during 2008-9. It was due to the world recession and fall in the demand for textiles at international market. However, the exports witnessed an amazing growth rate of 27.8 percent and rose to 20.2 billion dollar during July-April 2011 as compared to 15.9 billion dollar during the last year. All the particulars of exports exhibited positive growth rate with the exception of rice, which declined by 2.1 percent.

2.6 International Trade Relations of Pakistan

Being a member of the organization, Pakistan has been actively participating in all WTO ministerial level conferences. WTO is playing a positive role in promoting trade among the member countries. Pakistan wants to have a successful conclusion of "WTO Doha

Development Agenda Negotiations[5]" since the multilateral proposals can lead Pakistan towards progressive trade liberalization. Pakistan has adopted a dual trade strategy i.e. Multilateralism and Regionalism. This is based on two fundamental ideas; that trade reforms are beneficial at any level and that each venue of trade liberalization offers unique opportunities. Multilateral agreements bind every country in a process of mutual trade reforms. On the other hand, the Regional agreements are exclusive and discriminatory but these are capable of much deeper trade reforms since their adherents are fewer, more like-minded and often linked geographically.

Free trade agreement between two or more countries involves a preferential treatment to be given to one another so far as market access is concerned. It is the legal binding on the countries concerned to liberalize trade and to facilitate the flow of goods and capital (investment) across borders. The very aim of FTA is to remove the barriers to trade and investment. Many countries are signing bilateral trade agreements now-a-days, which are variants of FTA. By negotiating such trading agreements, Pakistan can strengthen its trade relations with different countries in South and East Asia, South America and pacific. Pakistan has the following objectives in perusing bilateral and regional preferential free trade agreements.

- Seeking of better market access,
- Facilitation and promotion of trade and investment,
- Enhancing the comparative value of Pakistan's exports, and
- Building capacities in targeted areas through technical cooperation and collaboration.

Pakistan is one of the fast growing economies in Asia. This is revealed by the fact that our economy has been growing with an average rate of 6.6 percent over the past six years. Our foreign trade has been growing over and above 15 percent per annum, which has in turn given a boost to government revenues as well. As stated above, Pakistan has adopted an export-led strategy, which demands a greater market access for its products abroad. In this connection, the Government of Pakistan has initiated negotiations with its trading partners on

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5 WTO Development Round started in Doha, Qatar in November, 2001.The main objective of Doha round was to minimize the trade barriers around the world and to allow free trade between the countries of varying prosperity.

the global front. The present FTA's are not restricted only to liberalization of trade and market access measures, they also include the flow of investment, intellectual property rights, economic cooperation in science and technology, information, research and development and SME development etc.

2.6.1 Trade Agreements of Pakistan

Pakistan has already concluded some FTAs and PTAs with different countries and regions. Examples are Srilanka (June: 2005), China (July: 2007), SAFTA agreement (Jan: 2006), Early Harvest Program (a prelude to FTA) with Malaysia (Jan: 2006), PTA with Iran (Oct: 2006) and D-8 countries (July: 2007). The nature of these agreements is discussed briefly:

(i) Pakistan has a full FTA with Srilanka, operational from June 12, 2005. Both countries are offering preferential market access to each other's exports by granting tariff concessions[6]. Presently the FTA between Pakistan and Srilanka comprises in goods, which will further be broadened to cover services and investment.

(ii) Pakistan has very successful economic linkages with China. The bilateral free trade agreement between Pakistan and China includes trade in goods and investment. Pakistan negotiated an Early Harvest program with China, which was put into operation on 1st January 2006 and which evolved overtime into the bilateral free trade agreement. This agreement will enable Pakistan to get market access at zero duty on all items of export. China will also reduce its tariff by 50 percent on fish, dairy sectors, frozen orange juice, plastic products, rubber products, leather, knitwear and woven garments, etc[7].

(iii).Besides bilateral FTAs, Pakistan is also focusing on ASEAN countries for developing a strong economic relation. ASEAN Free Trade Agreement (AFTA) has proved to be the most successful in Asia. Therefore it is in the interest of Pakistan to pursue FTA with ASEAN and government of Pakistan has already initiated negotiations with Malaysia, Indonesia, Singapore and Laos for bilateral FTAs. Malaysia has entered with Pakistan into a closer economic partnership agreement (MPCEPA) 2008-2014 from 1st January

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6 Free Trade Agreements between Pakistan and Srilanka, Regional/Bilateral Trade Agreements, Government of Pakistan, Ministry of Commerce,

7 Free Trade Agreement between Pakistan and China, Ministry of Commerce, Government of Pakistan (2008)

2008 and it is the first full-fledged and comprehensive FTA between the two Muslim countries. Prior to this, the Early Harvest program was successfully negotiated and signed in December 2005 with Malaysia, which had provided market access to a limited number of products. The MPCEPA incorporates trade in goods and services along with investment and economic cooperation. Now Pakistan has eliminated tariff on 23 percent of the current imports from Malaysia whereas Malaysia has eliminated tariff on 78 percent of imports from Pakistan.

(iv).Middle East is another important region with whom Pakistan has a closer religion and cultural linkages. Our major imports of crude oil and petroleum products flow from these countries. A successful bilateral FTA with Middle East countries can play a significant role in the expansion of markets for Pakistan's exports. The government is negotiating with Gulf Cooperation Council (GCC) for a bilateral FTA. These negotiations, when concluded, will be a great success for Pakistan, since GCC and EU are also negotiating an FTA and as such Pakistan can have an indirect link with EU. Pakistan has also concluded a PTA with Iran that is operational from September, 2006. Pakistan is also pursuing FTA with Iran, Afghanistan, Turkey and six Central Asian States under an ECO trade agreement.

(v) Pakistan has also signed a framework agreement on trade with MERCOSUR[8] in July 2006[9]. Similarly FTA's with Jordan, Thailand, Singapore and Russia are in various stages of completion, whereas FTA with USA is linked with signing of the Bilateral Investment Treaty (BIT). However the negotiations on BIT between the two countries have been controversial due to some technical issues[10].

(vi).Pakistan is negotiating FTA under the auspices of D-8 countries, which include Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan and Turkey. These countries have signed PTA during the D-8 summit in Bali held in 2006.

[8] MERCOSUR is a Regional Trade Agreement (RTA) among Argentina, Brazil, Paraguay and Uruguay founded in 1991.
[9] www.bilateral.org, August: 2006
[10]The American Government is applying NAFTA standards to sign BIT with Pakistan and this is very unfavorable to Pakistan.

(vii) Pakistan and Mauritius have decided to give each other preferential treatment under bilateral PTA effective from November 2007. PTA will apply to a large number of products traded between two countries. Pakistan has granted 50 percent margin of preferences in the existing tariff rates to 64 products and this will increase to 100 percent from November 30, 2008. The goods include flowers, fruits, tea, sugar, seafood and soap. In contrast, a preference margin from 35-50 percent will be granted on 66 textiles and readymade garments. In comparison, the reference margin given by Mauritius for Pakistani products is ranging from 15-30 percent for the first year of the PTA that will increase to 50-100 percent from November 30, 2008[11].

(viii).The South Asian countries have initiated various steps to increase regional economic integration under the umbrella of South Asian Association for Regional Cooperation (SAARC). The ultimate goal was to form a free trade area. The Free Trade Agreement (SAFTA) was signed in January, 2004 by all SAARC member countries (Bangladesh, Pakistan, India, Srilanka, Bhutan, Nepal and Maldives). The proposal was formally approved and implemented with effect from January 1st, 2006. It can help to switch trade from informal to formal channels (the bulk of India – Pakistan trade is routed through Dubai, which is costly). Thus SAFTA can lead toward closer regional cooperation and help eliminate the restrictions on trade, increase investment and growth by reducing the infrastructure constraints and transaction costs.

[11] Pakistan and Mauritius signed FTA. www.bilateral.org

CHAPTER 3
Review of Literature

Several studies have been conducted by different people to pinpoint the determinants of exports and to analyze their impact on export performance. Most of the researchers have used single equation export models, incorporating both the demand and supply side determinants. Many others adopted the simultaneous equation framework, in which the demand and supply side functions are specified with appropriate variables. However there is seldom consensus in their views about the demand and supply side influences. Some studies establish the importance of demand side determinants while others attribute more importance to the supply side factors. Lewis (1980), Reidel (1988) and Authokoral and Reidel (1990) have suggested significant and infinite income and price elasticity of export demand for LDC's, exports. This supports the small country hypothesis that developing countries gain in trade as price takers in world markets12. In addition some other studies like Gold Stein and Khan (1985), Muscatelli (1992) and Sinha Roy (2002) have found these elasticities to be significant but finite. Some of the studies on exports determinants are briefly discussed below.

3.1 International Studies on Exports

(i). Khan and Night (1988) have employed the Two Stage Least Square (2SLS) to examine the relationship between import of inputs and export performance for a sample of 34 of developing countries, using time series data over the period 1971-80. The export demand and supply functions were specified with income and relative prices with the addition of import of inputs in the supply side equation. Likewise the import demand function was specified with income, relative prices (price of imports relative to domestic prices) and the foreign exchange availability. The findings revealed that import of inputs had a positive and significant impact on export performance whereas the foreign exchange reserves had a negative but relatively less significant impact on imports.

(ii). Reidel (1988) 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 were used as

[12] The small country hypothesis claims that small economies are the price takers at world market and can not influence the world price.

exogenous variables in the demand side equation while the domestic price of exports, price of raw material, industrial inputs and time trend were used as independent variables in the supply side equation. The results showed infinite price and income elasticities of exports demand, which supported the small country hypothesis. All the parameters of the wage as well as supply side export equations appeared with correct signs and significant magnitudes except the time trend variable 't' which carried insignificant coefficient, although correctly signed.

(iii). Funk and Holly (1992) have employed the Full Information Maximum Likelihood method to estimate the demand and supply side export functions for three different categories of exports i-e the total manufactured exports, mechanical engineering and motor vehicle exports of the West Germany. The quarterly time series data was applied over the period 1961-1987. The demand equation was specified with the prices of exports, prices of competing/substitute goods at world market, worid demand (proxied by the OECD's exports). The supply side equation was specified with domestic price of exportable goods, foreign prices of exports, total costs and capital stock. All the demand and supply side elasticities carried significant magnitudes across the categories except the price elasticity of export demand which was found to be insignificant for the total manufactured and mechanical engineering goods exports.

(iv). 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 prices of exports, prices of competing goods and world income, while the prices of exports, the prices of raw materials and unit labor costs have been used as exogenous variables in the supply side equation. The findings suggest 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.

(v). Reidel et al (1994) have examined the determinants of exports of Hong Kong to test the small country hypothesis, using quarterly time series data ranging from 1977:1 to 1984:4. The price dependent export demand equation has been specified with volume of exports, prices 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 small price taker economy.

(vi). 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 and employed the Full Information Maximum Likelihood method for estimation. The results suggest significant income and price elasticities of exports demand for all the countries, thus rejecting the small country hypothesis that world demand is irrelevant in explaining export behavior of the newly industrialized economies.

(vii). Sinha (2002) has employed Full Information Maximum Likelihood method to estimate the demand and supply side exports equations for India over the period 1960-2000. The dynamic error correction model was estimated in which the error correction representation in the demand side equation carried significant and lager magnitude, indicated that the demand side factors significantly explain the short run dynamics of the export performance. All other variables in the model were found to be significant except the scale variable of the supply side, which was insignificant although correctly signed.

(viii). Majeed and Ahmed (2006) have focused on the determinants of exports, using panel data for a coss section of 75 developing countries over a range of 35 years (1970-2004). The exports equation was specified with FDI, GDP, GDP growth rate, real effective exchange rate, communication facilities, indirect taxes and labour force as explanatory variables. The estimation strategy was based on the random effect model. All the coefficients carried significant magnitudes with correct signs except FDI which turned out to be insignificant.

(ix). Jangwanish (2007) analyzed the determinants of exports for the East and South East Asian economies, using a quarterly time series data over the period 1990-2006. The export equation was specified with real exchange rate, production capacity and world demand as independent variables. Three different categories of exports were used i-e total merchandise exports, manufacturing exports and exports of machinery and transport equipments as dependent variables. The general to specific modeling methodology was employed. The findings revealed that the relationship between real exchange rate and exports performance has been weakened due to the diversification in exports destination. The world demand and domestic production capacity appeared with correct sign and carried relatively larger

magnitudes across the categories. The real exchange rate was found to be negatively signed but less significant.

(x). Mohanan (2007) 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.

(xi). 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 cloth and garments, chemicals and machinery, transport equipments, steel and iron, and the leather manufactures. 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.

3.2 Export Determinants Studies in Pakistan

(i). Atique and Ahmed, (2003) have empirically analyzed the determinants of exports of Pakistan. The export demand and supply functions were specified and estimated separately. The explanatory variables comprised world economic activity and real exchange rate in the export demand function while relative prices, domestic GDP and wage rate per worker were employed to explain the export supply function. REER and industrial production index (proxy for world economic activity) were found to be significant in the long run, although current and lagged values of REER were found to be insignificant. On the supply side, the cumulative effect of wage rate was found to be significant but not so at individual level. The domestic production capacity on the supply side appeared with positive and significant coefficient.

(ii). Afia (2004) 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 were estimated in a simultaneous equation frame-work. The coefficient on the price of textile exports and world income appeared with correct signs but turned out to be

insignificant. All the coefficients on the supply side were found to be statistically significant with correct sign.

(iii). 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 import of inputs. The simple ordinary least square was employed and all the coefficients carried their expected signs and reasonable magnitudes.

Keeping in view the above discussion, it is evident that studies regarding the determinants of exports in Pakistan are very rare. The available studies like Atique and Ahmed (2003), Afia (2004) and Afzal (2005) etc are not comprehensive and suffer from methodological and estimation weaknesses. In contrast, there are only few international studies that have followed comprehensive approach in specification of both demand and supply side. The present study is intended to fill up the gaps in specification and estimation. We develop a simultaneous equation framework and test the demand for and supply of export functions separately for a number of export partners of Pakistan. Another distinction is the way we attempt to estimate the concerned equations. We employ the GMM technique in the first step and use the information in the second step of Bayesian estimation framework. The estimates so obtained are likely to be more consistent and reliable.

CHAPTER 4
Model Specification
Estimation Strategy and Data Description

4.1 Model Specification

The foreign trade models are specified by different researchers following different approaches. However there is a general consensus in literature about the empirical form of demand for and supply functions of exports. The standard approach is the "imperfect substitute model", which assumes that neither imports nor exports are perfect substitutes of domestic goods13. Keeping this in view, the consumers in the trading partners' economies are assumed to maximize their utility subject to budget constraint. The resulting demand function depends on the level of income in the economies concerned, the price of exports and price of substitute goods in the world market14. The specification of supply-side export equation is also straightforward within the 'imperfect substitute model'. The producers in the domestic economy are assumed to maximize their profits subject to cost constraint. This yields export supply function, depending on the productive capacity and relative prices i-e foreign prices of exports relative to the domestic prices of exportable goods.

We follow Gold Stein and Khan (1985) and specify the export demand and supply functions with two necessary extensions. First, we introduce two dummies in the demand side equation to examine the impact of US-Iraq war (1991) and US-led Afghanistan war (2001). Second, we include the import of inputs in the supply side equation to see their impact on export performance of Pakistan. The demand and supply side equations in the extended form are specified as follows;

4.1.1. The Demand and Supply Export Functions

Export Demand Equation $X_t^d = \alpha_0 + \alpha_1 RER_t + \alpha_2 Y_t^w + \alpha_4 D_t + U_t$ (4.1)

Export Supply Equation $X_t^s = \beta_0 + \beta_1 RP_t + \beta_2 Y_t^d + \beta_3 M_t + V_t$ (4.2)

[13] See Gold Stein and Khan (1985)

[14] 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

Xd- is the world demand for our exports, RER- real exchange rate and is written in terms of price indices of the domestic economy and the trading partners' economies. More specifically, RER = Px/ePw where 'Px' is the price of domestically produced goods meant for exports. 'Pw' is the price of competing goods at world market and 'e' is the nominal exchange rate of domestic country viz-a-viz the trading partners. 'Yw' reflects income level of the trading partners, proxied by Gross Domestic Product (GDP) of the trading partners. 'D' is the dummy variable used to capture the impact of US-Iraq war (1991) and US-led Afghan war (2001). 'Xs' is the supply of exports. 'RP' is the relative prices of the domestically produced goods i-e domestic price of exportable goods and the foreign price of exports. More specifically, the 'RP' = p^x/p^d , where 'Px' is the price of exports in world market which is proxied by the 'export unit value' of Pakistan and 'Pd' is the price of exportable in domestic market, proxied by 'wholesale price index' (WPI) of Pakistan. 'Yd' is the supply side scale variable, which is proxied by Gross Domestic Product (GDP) of Pakistan. 'M' is the imports of inputs (import of capital goods and industrial raw materials). The demand and supply side equations are written in logarithmic and the price separation format as follows;

$$log X_t^d = \alpha_0 + \alpha_1 log\ P_t^x + \alpha_2 log\ e.P_t^w + \alpha_3 log\ Y_t^w + \alpha_4 D_{91} + \alpha_5 D_{01} + u_t \qquad (4.3)$$

$$log X_t^s = \beta_0 + \beta_1 log\ P_t^x + \beta_2 log\ P_t^d + \beta_3 log\ Y_t^d + \beta_4 log\ M_t + v_t \qquad (4.4)$$

The coefficients αi and βi 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, while α_1, α_4, and β_2 are expected to carry negative signs. This is an equilibrium model with two endogenous variables i-e export quantity and price which have to be jointly determined, i.e. $X_t^d = X_t^s$.

The estimation of simultaneous equation model needs the equations to be normalized i-e restricting the coefficient of one of the variable to unity. However, different studies have followed different normalization procedures. For instance J M Reidel (1988) has normalized the export demand function with price and export supply function with quantity. He pointed out that estimation of a quantity dependent export demand function furnishes results that do not support the small country hypothesis i-e the small country is a price taker and can not influence world prices. Rediel pointed out that if the opposite normalization is used i-e if the

demand function is specified as price dependent export demand function and the supply function is specified as quantity dependent export supply function, or equivalently if the demand function is normalized with export prices and supply function is normalized with export quantity, the results obtained will support the small country hypothesis. Muscatelli (1992), Funk and Holly (1992) and Sinha Roy (2002) have used the opposite sequence of normalization i-e they have normalized the demand equation with quantity and supply equation with export prices. Muscatelli et al (1992) showed that normalization problem is automatically solved if one employs system estimation techniques like GMM, 3SLS and FIML instead of single equation methods like 2SLS and instrumental variable methods. Following Goldstein and Khan (1978), Muscatelli et al (1992) and Sinha Roy (2002), we use the second approach to normalization, i-e we normalize the demand equation with export quantity and the supply equation by export prices. Our quantity dependent export demand and price dependent export supply functions are specified as follows;

$$\log X_t^d = \alpha_0 + \alpha_1 \log P_t^x + \alpha_2 \log e . P_t^w + \alpha_3 \log Y_t^w + \alpha_4 D_{91} + \alpha_5 D_{01} + u_t, \qquad (4.6)$$

$$\log P_t^x = \gamma_0 + \gamma_1 \log X_t^s + \gamma_2 \log P_t^d + \gamma_3 \log Y_t^d + \gamma_4 \log M_t + v_t \qquad (4.7)$$

Equation (5) is a volume adjustment equation and equation (6) is a price adjustment equation. X_t and P^x are the two endogenous variables in the system which are to be determined simultaneously. It is evident that the two equations are interdependent and estimation of the equations independently will lead to inappropriate and misleading results. The standard procedure for this type of model is to transform the system into reduced form and then to apply the indirect least square (ILS) method to avoid the simultaneity problem. However this approach has been severely criticized in earlier studies on exports. The critics of this approach argue that since the model includes both the demand and supply side determinants, therefore it is difficult to isolate the individual effects of the determinants concerned. The second approach is to use the simultaneous equation model in which each equation is separately specified with appropriate variables. Estimation of each equation in the system needs information of the other to avoid the simultaneity problem. We use the second approach and estimate the structural equations in simultaneous equations framework.

4.1.2 Definitions of the Variables

(i) Real Exchange Rate

A fall in the real exchange rate makes domestic goods cheaper in international market and thus causes demand for exports to expand, while an increase in the real exchange rate makes domestic goods expensive relative to the foreign substitute. This reduces the country's profitability to sell in foreign market. Generally, the real exchange rate is calculated in terms of price indices of the domestic and foreign economy. However, an alternative way is to use the prices of exports of the domestic economy relative to the prices of competing goods at world market[15]. More specifically, $RER = \frac{P^x}{eP^w}$, where 'P^x' is the price of exports, 'P^w' is the price of competing goods in the world market and 'e' is the nominal exchange rate of domestic economy with respect the trading partners' economies. The export and import unit values are usually used to measure the foreign prices of exports and the prices of competing goods respectively at the world market[16]. These unit values are calculated to measure changes in the prices of export and import, which can used to evaluate the country's foreign competitiveness and its terms of trade (TOT). A unit value index, which is used for the price comparison in the current period "t" with reference to period '0' is given by;

$$UV = \left(\frac{\sum_{i=1}^{m} p^t_m w^t_m}{\sum_{m=1}^{m} w^t_m} \Big/ \frac{\sum_{i=1}^{n} p^0_n w^0_n}{\sum_{n=1}^{n} w^0_n} \right) \qquad (4.8)$$

Where, 'UV' is the unit value index, used to measure the price change over the period (from the reference period 't" to the current period '0'). p^t_m and w^t_m are the price and quantity of "m" items in the period 't' and P^0_n and w^0_n are the price and quantity of "n" items in the period '0'. "m" and "n" are the quantities in period "t" and in period "0" respectively.[17]

[15] Sinha Roy (2002) and Mohana (2007) have calculated the RER in terms of relative prices of exports.

[16] Gold Stein and Khan (1978), Mscatelli (1992) and Sinha Roy (2002) have used the export unit value index for the price of exports and import unit value index of the trading partners to approximate the price of the foreign substitute. J M Reidel (1988) has used the weighted average of the three major trading partners for Hong Kong.

[17] The detailed methodology of constructing the Unit values is given in the statistical year book published by the United Nation (2004).

(ii) Income of the Trading Partners

We use GDP_i of our trading partners as indicators of their incomes. Usually three different concepts are used to proxy the trading partners' demand for exports i-e aggregate imports of the trading partners, GNP or GDP and industrial production index of the trading partners[18]. Following Gold Stein and Khan (1985), we use the real GDP of our trading partners to measure the trading partners' demand for our exports. If the Gross Domestic Product (GDP) of our trading partners' economies increases, their demand for our exports increases and vice versa. Therefore we expect positive coefficient of this variable.

(iii) Relative prices,

The relative prices are used to measure the country's profitability while selling abroad. This refers to the prices of exports in the world market relative to the domestic prices of exportable. That is $RP = \frac{P^x}{P^d}$, where 'P^x' is the price of exports and 'P^d' is the domestic price of exportable goods. Export supply is positively related to changes in the prices of exports while change in domestic prices of exportable has a negative impact on export supply. We expect a positive coefficient of the 'price of exports' whereas the 'domestic price of export' is expected to appear with negative sign. The wholesale price index is usually used as proxy to measure domestic price of exportables. Gold Stein and Khan (1985) have used the consumer price index to proxy the domestic price of exports. Following Sinha Roy (2002) and Muscatelli (1992), we use the wholesale price index of Pakistan to proxy 'domestic price of exportables'. The wholesale price index is computed to predict changes in the prices of a group of items and to measure the inflation. The whole price index is calculated by the following formula;

$$WPI = \frac{\sum_{i=1}^{n} (P_n / P_0) w_i}{\sum_{i=1}^{n} w_i} \times 100 \qquad (4.9)$$

Where WPI = wholesale price index

P_n = price of the item in period n.

P_0 = price of the item in the base period.

w = the weight or quantity of an item in period n.

[18] Gold 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.

(iv). Gross Domestic Product

GDP is used as a proxy for the supply side scale variable. A rise in Gross Domestic Product is believed to increase the country's export potential whereas a decline in GDP works the opposite. We expect a positive and significant coefficient of the GDP.

(v). Import of Inputs

This refers to the import of capital goods and industrial raw material. As it is believed that the imports of small economies largely consist of raw material, machinery, spare parts and other equipments, which may lead to make the current account position worse-off of these economies. These economies use tariffs and quotas to have a sharp reduction in their imports to improve their current account position. This reduction of imports through direct control like Tariff and Quotas referred to as import compression policy. Since import of raw material and machinery are essential for export production, therefore a reduction in imports may adversely affect export performance. We intend to test the hypothesis that import of inputs is critical to export production, i-e it enhances the export potential of the country. We expect a positive and significant coefficient for this variable.

4.2. The Estimation Strategy/Methodology

Before any regression analysis on time series data performed, it is necessary to check the series for the order of integration or to check the series for stationarity. It is generally believed that almost every time series has a unit root i-e most of the time series are non-stationary. Such series can be transformed into stationary variables through successive differencing. The testing procedure is given below.

4.2.1. Test for Unit Root

The Dickey Fuller (DF) test is an appropriate and simple method for testing the order of integration. The test is outlined as follows. Consider the auto-regressive model of the form.

$$\Delta y_t = \delta y_{t-1} + \varepsilon_t, \qquad (4.10)$$

Where, "ε_t" represents the errors which are identically distributed and stationary variables. The null hypothesis which is to be tested in the DF test is that; H_0: $\delta = 1$ against the

alternative hypothesis that H_1: $\delta < 1$. The test is valid only if the errors (ε_t) are white noise. However, if errors are not white noise, then the DF test is not valid. To avoid this problem, Dickey and Fuller (1997) have proposed the Augmented Dickey Fuller (ADF) test instead, which is obtained by adding a number of lag values of left hand dependent variable to the Dickey Fuller regression. This gives the following specification of the ADF test;

$$\Delta y_t = \alpha + \delta y_{t-1} + \sum_{i=1}^{m} \delta \Delta y_{t-i} + \varepsilon_t \qquad (4.11)$$

In equation (4.11), "Δy_{t-1}" represents the lagged left-hand variable to approximate the autocorrelation. We use the ADF test to see the order of integration among the variables concerned.

4.2.2. Co-integration Testing

Two or more variables are said to be co-integrated if they have a long run relationship among them. Such variables said to have the same order of integration. If the variables do not have a long run relationship, they can not be integrated of the same order and they have no economic concern. Therefore it is necessary to check whether the variables in a regression are co-integrated or otherwise. Different people have proposed different techniques to check co-integration among the variables. We use the Johanson Co-integration test for the purpose.

4.2.3. The estimation Strategy

Engel and Granger (1987) had proposed the Static OLS to estimate simultaneous equations model. However, Benergy (1989) pointed out that this procedure suffers from two problems, i-e: the small sample bias and endogeneity in regressors. Phillips and Hansen (1991) justified the use of Modified OLS, which can overcome both the problems. However, since it is a single equation method and each equation in the system is estimated independently of the other in turn, therefore it does not take into account the simultaneity problem. Sinha Roy (2002) employed the Two Stage Least Square (2SLS) to estimate the system of equations like above. Although this is also single equation method and each equation in the system is estimated independently but utilizes information of other equations in form of instruments used. This method also suffers from some deficiencies despite its validity even when the variables in the system are not stationary or co-integrated. Therefore, the system estimation

methods like the Three Stage Least Square (3SLS), Full Information Maximum Likelihood (FIML) and Generalized Method of Moments (GMM) are among the preferred methods to estimate the system of equations. Keeping in view these considerations, we adopt a two-stage strategy to get consistent estimates. In the first stage, we use the GMM procedure to estimate the set of equations. However, due to the small sample size, it may yield misleading results. The Empirical Bayes procedure is believed to provide efficient and much precise estimates. Therefore, in the second stage, we confine the model to Bayesian technique that will utilize information, obtained in the first stage. We discuss both the procedure briefly as under;

4.2.4. The Generalized Method of Moments

Generalized Method of Moments (GMM) is an estimation procedure that allows economic models to be specified while avoiding often unwanted or unnecessary assumptions, such as specifying a particular distribution for the errors. This lack of structure means GMM is widely applicable, although this generality comes at the cost of a number of issues like the small sample performance.

The classical method of moments, or simply method of moments, uses sample moments to estimate the unknown parameters. Generalized Method of Moments (GMM) extends the classical setup in two important ways. The first is to formally treat the problem of having two or more moment conditions which have information about unknown parameters. GMM allows estimation and inference in systems of Q equations with P unknowns, $P \leq Q$. The second important generalization of GMM is that quantities other than sample moments can be used to estimate the parameters. It exploits laws of large numbers and central limit theorems to establish regularity conditions for many different "moment conditions" that may or may not actually be moments. These two changes produce a class of estimators that is broadly applicable.

GMM specifications fall in to three categories which include 'under identified', 'just-identified' and 'over identified'. Under identified models are those where the moment conditions are fewer. The consequence of this is obvious: the problem will have many solutions. Just-identified specification have $q = p$ i-e the number of equations are equal to the number of parameters to be estimated while over identified GMM specifications have $q > p$.

4.2.5. The Empirical Bayesian Estimator

The Empirical Bayesian Procedure is believed to be efficient over a class of other estimators especially in small samples. It has several advantages over other estimators that lead to much precise and reliable estimates. This assumes that the priori information about the unknown parameters to be represented in the form of a density function;

$$\hat{\beta}_i / \beta_i \sim N(\beta_i, \Lambda_i), \qquad (4.12)$$

'$\hat{\beta}_i$' is the estimated elasticities whereas 'β_i' is the true values of the elasticities. Equation (8) states that the 'estimated values' of the parameters has a normal distribution with mean β_i, and variance 'Λ_i' given the true values of the parameters. The Empirical Bayesian Estimator is obtained by assuming that 'β_i' has a normal prior distribution of the form;

$$[\beta_i | \mu, \Omega] \sim N(\mu, \Omega) \qquad (4.13)$$

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

$$\Omega = \left[\sum_{i=1}^{n} \Lambda_i^{-1} \right]^{-1} \qquad (4.14)$$

The variance of the prior density 'Ω' is simply the weighted average of the variance covariance matrices of the GMM estimates[19]. We follow Corrington and Zaman (1994) to calculate the variance covariance matrices of the parameters using the estimated standard errors of the GMM estimates obtained in the first stage, restricting the off-diagonal element of the covariance matrix to be zero and assuming no prior covariance across the coefficients. 'μ' in (9) is mean of the prior density and is given by

$$\mu = \Omega^{-1} \left[\sum_{i=1}^{n} \Lambda_i^{-1} \hat{\beta}_i \right] \qquad (4.15)$$

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 obtain the mean and variance of the prior

[19] 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

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

$$\beta_i / \hat{\beta}_i = \sim N(m, V) \quad (4.16)$$

'm' and 'V' in (12) are respectively the mean and variance of posterior density. The variance 'V' is simply calculated from the variance covariance matrices 'Λ_i' and variance of the prior density 'Ω". That is;

$$V = (\Lambda_i^{-1} + \Omega^{-1})^{-1} \quad (4.17)$$

Having obtained the variance of the posterior density, we can estimate the mean of this density by using 'V' and parameters of the prior density as under;

$$m = V(\Lambda_i^{-1}\hat{\beta}_i + \Omega^{-1}\mu) \quad (4.18)$$

In equation (14) '$\hat{\beta}_i$' are the GMM estimates and μ and V are the mean and variance of the prior density respectively. It is evident that the posterior density utilizes the data information and the prior information in the form of prior density. The Empirical Bayesian estimator, which is obtained from the posterior density, is given by;

$$\hat{\beta}^{EB} = V(\Lambda_i^{-1}\hat{\beta}_i + \Omega^{-1}\mu) \quad (4.19)$$

Equation (15) is the Empirical Bayesian formula of the parameters estimates. The standard errors of the estimates are obtained from the variance of the posterior density 'V'.

4.3. Data Description

Annual data for the period 1975-2008 has been considered for the analysis over a sample of 11 countries. Data on Pakistan's imports and exports to the trading partners has been taken from different issues of the Statistical Supplements to the Economic surveys 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).

Appendix; Model Specification and Methodology

Derivation of the Empirical Bayesian Formula

The data density = $f(\beta|\theta) \sim N(\theta, \sum)$, Prior density = $f(\theta|\mu) \sim N(\mu, \Omega)$.

The Data and the Prior Density can also be written as follows;

$$f(\beta|\theta) = (2\pi)^{\left(\frac{-n}{2}\right)} [\det \sum]^{\frac{-1}{2}} \exp\left[\frac{-1}{2} \{(\beta-\theta)'\sum^{-1}(\beta-\theta)\}\right]$$

$$f(\theta|\mu) = (2\pi)^{\left(\frac{-n}{2}\right)} [\det \Omega]^{\frac{-1}{2}} \exp\left[\frac{-1}{2} \{(\theta-\mu)'(\Omega)^{-1}(\theta-\mu)\}\right]$$

As we know that;

$f(\beta, \theta) = [f(\beta|\theta) * f(\theta|\mu)]$, then;

$$f(\beta,\theta) = \left[(2\pi)^{\left(\frac{-n}{2}\right)} [\det(\sum)^{\frac{-1}{2}}] \exp\left[\frac{-1}{2}(\beta-\theta)'\sum^{-1}(\beta-\theta)\right]\right] \times \left[(2\pi)^{\left(\frac{-n}{2}\right)} [\det(\Omega)]^{\frac{-1}{2}} \exp\left[\frac{-1}{2}\{(\theta-\mu)'(\Omega)^{-1}(\theta-\mu)\}\right]\right]$$

$$f(\beta,\theta) = (2\pi)^{-n} [\det\sum]^{\frac{-1}{2}} [\det \Omega]^{\frac{-1}{2}} \exp\left[\frac{-1}{2}\{(\beta-\theta)'(\sum)^{-1}(\beta-\theta) + (\theta-\mu)'(\Omega)^{-1}(\theta-\mu)\}\right]$$

$$f(\beta,\theta) = (2\pi)^{-n} [\det\sum]^{\frac{-1}{2}} [\det \Omega]^{\frac{-1}{2}} \exp\left[\frac{-1}{2}\{\beta'\sum^{-1}\beta - \beta'\sum^{-1}\theta - \theta'\sum^{-1}\beta + \theta'\sum^{-1}\theta + \theta'\Omega^{-1}\theta - \theta'\Omega^{-1}\mu - \mu'\Omega^{-1}\theta + \mu'\Omega^{-1}\mu\}\right]$$

$$f(\beta,\theta) = (2\pi)^{-n} [\det\sum]^{\frac{-1}{2}} [\det \Omega]^{\frac{-1}{2}} \exp\left[\frac{-1}{2}\{\beta'\sum^{-1}\beta + \mu'\Omega^{-1}\mu\}\right] \exp\left[\frac{-1}{2}\{-\beta'\sum^{-1}\theta - \theta'\sum^{-1}\beta + \theta'\sum^{-1}\theta + \theta'\Omega^{-1}\theta - \theta'\Omega^{-1}\mu - \mu'\Omega^{-1}\theta\}\right]$$

As $\beta'\sum^{-1}\theta$, $\theta'\sum^{-1}\beta$, $\theta'\Omega^{-1}\mu$ and $\mu'\Omega^{-1}\theta$ are (1×1) Scalars, then,

$$f(\beta,\theta) = (2\pi)^{-n} [\det\sum]^{\frac{-1}{2}} [\det \Omega]^{\frac{-1}{2}} \exp\left[\frac{-1}{2}\{\beta'\sum^{-1}\beta + \mu'\Omega^{-1}\mu\}\right] \exp\left[\frac{-1}{2}\{\theta'\sum^{-1}\theta + \theta'\Omega^{-1}\theta - 2\theta'\Omega^{-1}\beta - 2\theta'\Omega^{-1}\mu\}\right]$$

$$f(\beta,\theta) = (2\pi)^{-n} [\det\sum]^{\frac{-1}{2}} [\det \Omega]^{\frac{-1}{2}} \exp\left[\frac{-1}{2}\{\beta'\sum^{-1}\beta + \mu'\Omega^{-1}\mu\}\right] \exp\left[\frac{-1}{2}\{\theta'(\sum^{-1}\theta + \Omega^{-1}\theta) - 2\theta'(\Omega^{-1}\beta - \Omega^{-1}\mu)\}\right]$$

$$f(\beta,\theta) = (2\pi)^{-n} [\det\sum]^{\frac{-1}{2}} [\det \Omega]^{\frac{-1}{2}} \exp\left[\frac{-1}{2}\{\beta'\sum^{-1}\beta + \mu'\Omega^{-1}\mu\}\right] \exp\left[\frac{-1}{2}\{\theta'(\sum^{-1} + \Omega^{-1})\theta - 2\theta'(\sum^{-1}\beta - \Omega^{-1}\mu)\}\right]$$

Let $p = (\sum^{-1} + \Omega^{-1})$

$$f(\beta,\theta) = (2\pi)^{-n} [\det\sum]^{\frac{-1}{2}} [\det \Omega]^{\frac{-1}{2}} \exp\left[\frac{-1}{2}\{\beta'\sum^{-1}\beta + \mu'\Omega^{-1}\mu\}\right] \exp\left[\frac{-1}{2}\{\theta'(\sum^{-1} + \Omega^{-1})\theta - 2\theta'(p)(p)^{-1}(\sum^{-1}\beta - \Omega^{-1}\mu)\}\right]$$

Assuming $m = p^{-1}(\sum^{-1}\beta - \Omega^{-1}\mu)$

$$f(\beta,\theta) = (2\pi)^{-n} [\det\sum]^{\frac{-1}{2}} [\det \Omega]^{\frac{-1}{2}} \exp\left[\frac{-1}{2}\{\beta'\sum^{-1}\beta + \mu'\Omega^{-1}\mu\}\right] \exp\left[\frac{1}{2}\{m'pm\}\right] \exp\left[\frac{-1}{2}\{\theta'p\theta - 2\theta'pm\}\right] \exp\left[\frac{-1}{2}\{m'pm\}\right]$$

$$f(\beta,\theta) = (2\pi)^{-n} [\det\sum]^{\frac{-1}{2}} [\det \Omega]^{\frac{-1}{2}} \exp\left[\frac{-1}{2}\{\beta'\sum^{-1}\beta + \mu'\Omega^{-1}\mu\}\right] \exp\left[\frac{1}{2}\{m'pm\}\right] \exp\left[\frac{-1}{2}\{\theta'p\theta - \theta'pm - \theta'pm + m'pm\}\right]$$

As $\theta'pm$ and $m'p\theta$ are scalars

$$f(\beta,\theta) = (2\pi)^{-n}\,[\det\textstyle\sum]^{\frac{-1}{2}}\,[\det\,\Omega]^{\frac{-1}{2}}\exp[\tfrac{-1}{2}\{\beta'\textstyle\sum^{-1}\beta+\mu'\Omega^{-1}\mu\}]\exp[\tfrac{1}{2}\{m'pm\}]\exp[\tfrac{-1}{2}\{\theta'p\theta - m'p\theta - \theta'pm + m'pm\}]$$

$$f(\beta,\theta) = (2\pi)^{-n}\,[\det\textstyle\sum]^{\frac{-1}{2}}\,[\det\,\Omega]^{\frac{-1}{2}}\exp[\tfrac{-1}{2}\{\beta'\textstyle\sum^{-1}\beta+\mu'\Omega^{-1}\mu\}]\exp[\tfrac{1}{2}\{m'pm\}]\exp[\tfrac{-1}{2}\{(\theta'-m')p\theta - (\theta'-m')pm\}]$$

$$f(\beta,\theta) = (2\pi)^{-n}\,[\det\textstyle\sum]^{\frac{-1}{2}}\,[\det\,\Omega]^{\frac{-1}{2}}\exp[\tfrac{-1}{2}\{\beta'\textstyle\sum^{-1}\beta+\mu'\Omega^{-1}\mu\}]\exp[\tfrac{1}{2}\{m'pm\}]\exp[\tfrac{-1}{2}\{(\theta'-m')p(\theta-m)\}]$$

$$f(\beta,\theta) = (2\pi)^{-n}\,[\det\textstyle\sum]^{\frac{-1}{2}}\,[\det\,\Omega]^{\frac{-1}{2}}\exp[\tfrac{-1}{2}\{\beta'\textstyle\sum^{-1}\beta+\mu'\Omega^{-1}\mu\}]\exp[\tfrac{1}{2}\{m'pm\}]$$

$$(2\pi)^{\frac{n}{2}}\,[\det\,p]^{\frac{n}{2}}(2\pi)^{\frac{-n}{2}}\,[\det p]^{\frac{-1}{2}}\exp[\tfrac{-1}{2}\{(\theta'-m')p(\theta-m)\}]$$

$$f(\beta,\theta) = (2\pi)^{-n}\,[\det\textstyle\sum]^{\frac{-1}{2}}\,[\det\,\Omega]^{\frac{-1}{2}}\exp[\tfrac{-1}{2}\{\beta'\textstyle\sum^{-1}\beta+\mu'\Omega^{-1}\mu - m'pm\}](2\pi)^{\frac{n}{2}}\,[\det\,p]^{\frac{n}{2}}$$

$$\left[(2\pi)^{\frac{-n}{2}}\,[\det p^{-1}]^{\frac{-1}{2}}\exp[\tfrac{-1}{2}\{(\theta'-m')(p^{-1})^{-1}(\theta-m)\right]$$

$$f(\beta,\theta) = (2\pi)^{-n}[\det\textstyle\sum]^{\frac{-1}{2}}\,[\det\,\Omega]^{\frac{-1}{2}}\,(2\pi)^{\frac{n}{2}}\,[\det\,p]^{\frac{n}{2}}\exp[\tfrac{-1}{2}\{\beta'\textstyle\sum^{-1}\beta+\mu'\Omega^{-1}\mu - m'pm\}]\left[(2\pi)^{\frac{-n}{2}}\,[\det p^{-1}]^{\frac{-1}{2}}\exp[\tfrac{-1}{2}\{(\theta'-m')(p^{-1})^{-1}(\theta-m)\right]$$

$$f(\beta,\theta) =$$

$$\left[(2\pi)^{-\frac{n}{2}}\,[\det(\textstyle\sum \mathrm{p}\,\Omega)]^{\frac{-1}{2}}\;\exp[\tfrac{-1}{2}\{\beta'\textstyle\sum^{-1}\beta+\mu'\Omega^{-1}\mu - m'pm\}]\right]\left[(2\pi)^{\frac{-n}{2}}\,[\det p^{-1}]^{\frac{-1}{2}}\exp[\tfrac{-1}{2}\{(\theta'-m')(p^{-1})^{-1}(\theta-m)\right]$$

As $(\sum \mathrm{p}\,\Omega) = \sum(\sum^{-1}+\Omega^{-1})\,\Omega = \sum\sum^{-1}\Omega + \sum\Omega^{-1}\,\Omega = \sum\sum^{-1}\Omega + \sum\Omega^{-1}\,\Omega = (\sum + \Omega)$

$$f(\beta,\theta) =$$

$$\left[(2\pi)^{-\frac{n}{2}}\,[\det(\textstyle\sum + \Omega)]^{\frac{-1}{2}}\;\exp[\tfrac{-1}{2}\{\beta'\textstyle\sum^{-1}\beta+\mu'\Omega^{-1}\mu - m'pm\}]\right]\left[(2\pi)^{\frac{-n}{2}}\,[\det p^{-1}]^{\frac{-1}{2}}\exp[\tfrac{-1}{2}\{(\theta'-m')(p^{-1})^{-1}(\theta-m)\right]$$

$$f(\beta,\theta) = \mathrm{m}(\beta)\;\times\;\mathrm{f}(\beta\,|\theta)$$

$$f(\beta,\theta) =$$

$$\left[(2\pi)^{-\frac{n}{2}}\,[\det(\textstyle\sum + \Omega)]^{\frac{-1}{2}}\;\exp[\tfrac{-1}{2}\{(\beta-\mu)'(\textstyle\sum+\Omega)^{-1}(\beta-\mu)\}]\right]\left[(2\pi)^{\frac{-n}{2}}\,[\det p^{-1}]^{\frac{-1}{2}}\exp[\tfrac{-1}{2}\{(\theta'-m')(p^{-1})^{-1}(\theta-m)\right]$$

$$m(\beta) = \left[(2\pi)^{-\frac{n}{2}}\,[\det(\textstyle\sum + \Omega)]^{\frac{-1}{2}}\;\exp[\tfrac{-1}{2}\{(\beta-\mu)'(\textstyle\sum+\Omega)^{-1}(\beta-\mu)\}]\right]$$

$$m(\beta)\sim N[\mu,(\textstyle\sum + \Omega)]$$

$$f(\theta/\beta) = \left[(2\pi)^{\frac{-n}{2}}\,[\det p^{-1}]^{\frac{-1}{2}}\exp[\tfrac{-1}{2}\{(\theta'-m')(p^{-1})^{-1}(\theta-m)\right]$$

$f(\theta/\beta)\sim N(m,p^{-1})$ Where $\mathrm{p} = (\sum^{-1}+\Omega^{-1})$ and $\mathrm{m} = p^{-1}(\sum^{-1}\beta - \Omega^{-1}\mu)$ or

$f(\theta/\beta)\sim N[p^{-1}(\sum^{-1}\beta - \Omega^{-1}\mu), (\sum^{-1}+\Omega^{-1})^{-1}]$

Note: Mean of the posterior density is the Bayesian Estimator, that is $\mathrm{m} = p^{-1}(\sum^{-1}\beta - \Omega^{-1}\mu)$ or

Hence the Bayes Formula;

$$(\textstyle\sum_i^{-1}+\Omega^{-1})^{-1}(\sum_i^{-1}\beta i - \Omega^{-1}\mu)$$

$(\sum_i^{-1}+\Omega^{-1})^{-1}$ is variance of the posterior density.

CHAPTER 5
Results and Discussions

Before applying estimation techniques, the data has been checked for the order of integration among the variables concerned. We have applied the ADF test using both intercept and trend and the results are reported in appendix 1. The results revealed that all the variables are found to be integrated of the order 1, i-e I(1). However to see whether the variables are co-integrated or not, we have employed the Johanson Co-integration technique. The results are reported in appendix 2. The results of Johnson Co-integration confirm that all the variables are cointegrated i-e they have a long run equilibrium relationship. The trace statistics in all the cases are greater than their critical values. This strongly rejects the null hypothesis of no cointegration among the variables.

5.1. The GMM Estimates

'α_1' is the price elasticity of export demand,'α_2' is the cross price elasticity 'α_3' is the elasticity of demand with respect to the GDP of our trading partners. Likewise 'β_1', 'β_2' and 'β_3' are the prices and income elasticities of exports supply. 'β_4' is the elasticity of export supply with respect the imports of 'inputs'.

The country-wise disaggregated structural demand and supply side export functions have been estimated initially with Generalized Method of Movements (GMM) and the results are reported in Table 5.1.

5.1.1. Analysis of the Results (GMM) — Demand Side Equation

The first and important point to note is that the coefficient of the world GDP (GDP of the trading partners) on the demand side carries significant and correct sign in most cases except for UK, Malaysia and Germany where is insignificant. The coefficients on the income elasticity of demand appear with a wide range of values across the countries concerned i-e the highest coefficient is 2.13 for USA and the lowest is 0.10 for UK. The income elasticity

of demand in case of UK and Germany appears with correct sign but it is not significant even at 10 percent[20].

Table 5.1 GMM Results of the Demand and Supply export Functions

$X^d_t = \alpha_0 + \alpha_1 P^x_t + \alpha_2 e.P^w_t + \alpha_3 Y^w_3 + \alpha_4 D_{91} + \alpha_5 D_{01}$ $\quad X^s_t = \beta_0 + \beta_1 P^x_t + \beta_2 P^d_t + \beta_3 Y^d t + \beta_4 M_t$

Trade Partner	Export Demand Function						Exports Supply Function				
Coeff:	α_0	α_1	α_2	α_3	D_{91}	D_{01}	β_0	β_1	β_2	β_3	β_4
United State	-12.10* (-10.41)	- 1.10* (-4.35)	0.67* (6.70)	2.13* (10.4)	-	-0.33** (2.5)	-0.81*** (-1.76)	0.02 (0.05)	- 0.96 (-0.79)	1.71** (2.76)	-0.46** (-2.42)
	$R^2 = 0.99$ D.W statistics = 1.60						$R^2 = 0.98$ D.W statistics = 1.68				
France	-1.24 (-1.43)	- 1.21* (-3.67)	0.35* (4.20)	0.53* (5.30)	-	-	0.52** (2.48)	0.63* (4.20)	1.95* (6.10)	- 0.54* (-3.00)	- 0.16 (-1.60)
	$R^2 = 0.98$ D.W statistics = 1.62						$R^2 = 0.99$ D.W statistics = 1.97				
UK	0.95 (0.65)	- 2.17** (-2.36)	1.39** (2.62)	0.10 (0.32)	-	-	0.29 (0.72)	0.26 (0.68)	-1.63** (-2.12)	1.01** (2.73)	0.19 (-1.27)
	$R^2 = 0.88$ D.W statistics = 1.82						$R^2 = 0.97$ D.W statistics = 2.50				
Canada	9.71*** (1.80)	- 1.58** (-2.82)	0.78 (1.11)	-1.14** (-2.38)	-	-	-0.81** (-2.70)	1.48* (4.84)	-2.96* (-4.10)	0.68*** (1.89)	0.27** (2.25)
	= 0.97 D.W statistics = 1.47						$R^2 = 0.97$ D.W statistics = 2.32				
Korea	-12.95** (-2.10)	-0.20 (-0.21)	1.99** (1.79)	1.54*** (1.90)	-	-	-3.36** (-2.51)	4.64** (2.27)	-3.42** (-2.25)	0.87 (1.24)	1.10** (2.56)
	$R^2 = 0.85$ D.W statistics = 1.49						$R^2 = 0.88$ D.W statistics = 2.02				
Kuwait	-2.14* (-3.40)	-0.59*** (-1.69)	0.42 (1.24)	0.90* (6.24)	-0.89** (2.38)	-	0.22 (0.26)	-1.83** (2.76)	-0.68 (-0.32)	1.69 (1.67)	0.11 (0.38)
	$R^2 = 0.58$ D.W statistics = 1.98						$R^2 = 0.47$ D.W statistics = 2.04				
Malaysia	-3.46 (-1.20)	-1.49 (-0.71)	3.10 (1.15)	- 0.35 (-0.27)	-	-	-2.80* (-3.32)	3.15* (3.54)	-6.10* (-3.37)	1.71** (2.19)	0.74** (2.31)
	$R^2 = 0.91$ D.W statistics = 1.89						$R^2 = 0.85$ D.W statistics = 2.17				
Mauritius	-6.18* (-5.62)	-1.04*** (-1.96)	1.03** (2.34)	2.14* (4.86)	-	-	-2.35* (-3.18)	2.31** (2.52)	-5.74* (-3.51)	2.56* (4.27)	0.31** (1.99)
	$R^2 = 0.78$ D.W statistics = 2.06						$R^2 = 0.75$ D.W statistics = 1.90				
Germany	3.13 (1.01)	- 0.86* (-3.74)	- 0.32 (-0.67)	0.32 (0.91)	-	-	18.75** (2.32)	-0.21 (-0.53)	0.40 (0.28)	-3.45* (2.83)	0.16 (0.60)
	$R^2 = 0.97$ D.W statistics = 1.74						$R^2 = 0.95$ D.W statistics = 2.35				
Bangladesh	-4.68* (-3.66)	- 0.50 (-1.19)	0.01 (0.05)	1.62* (4.15)	-	-	-3.28* (9.94)	2.54* (6.20)	-4.42* (5.10)	1.03* 3.10	1.30* (11.80)
	$R^2 = 0.81$ D.W statistics = 2.61						$R^2 = 0.84$ D.W statistics = 2.06				
S Arabia	-1.65** (-2.47)	-0.80*** (-1.84)	0.49 (1.12)	0.61* (4.40)	-	-	-2.18* -3.34	1.64* 3.28	-1.72** -1.87	-0.35 -0.69	0.85** 2.69
	$R^2 = 1.91$, D.W statistics 1.91						$R^2 = 0.59$ D.W Statistics: 1.64				

The numbers in parenthesis are the estimated "t" values of the respective coefficients. (*), (**) and (***) indicate significance at 1, 5 and 10 percent respectively.

[20] 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.

The own price elasticity of export demand is found to be significant in most cases with correct sign and plausible magnitudes with the exception of a few cases. This parameter also differs in terms of significance and magnitudes across the countries like the income elasticity. The estimated elasticities are insignificant for Korea, Malaysia and Bangladesh. The cross price elasticity of export demand is found to be smaller in magnitude as compared to the price elasticity across all the countries under study. This means that our exports are much sensitive to changes in prices of exports in the world market as compared to the prices of competing or substitute goods at our country export market. Besides the income and price variables, two dummies (D91 and D01) have been introduced in the demand side export equation to examine the impact of Kuwait-Iraq war (1991) and Afghanistan war (2001) on our export behavior[21]. The Dummy variable "D91" is assigned '0' before 1991 and '1' thereafter while the dummy variable "D01" takes '0' before 2001 and '1' thereafter. The coefficient of dummy "D91" carries significant magnitude and negative sign only in case of Kuwait. This implies that the Kuwait-Iraq war had a negative impact on exports flow of Pakistan to Kuwait. The coefficient of dummy "D91" is insignificant across all other countries although it carries its expected negative sign. The dummy "D01" is found to be negatively signed in almost all cases but turns out to be significant only for the United State. This indicates that the Afghanistan war (2001) has a negative impact on our exports flow to the United States.

5.1.2. Analysis of the Results (GMM) — Supply Side Equation

The concerned elasticities have been calculated from the supply function (4.7)[22]. The income elasticity of exports supply appears to have correct sign and significant magnitudes for all the countries except France and Germany. This is found to be greater than unity in all cases which indicates that 1 percent increase in national income brings more than 1 percent increase in export supply. The price variables in the supply side equation provide mix results in terms of sign and significance of the variables. The foreign price elasticity of export

[21] We have not considered the dummies in other equations since they were found to be insignificant. We have re-estimated equations after the omission of the two dummies.

[22] The elasticities of export supply with respect to the variables concerned have been indirectly calculated from the supply function. It may be recalled that we have normalized the export supply function in terms price of exports. The elasticities of the supply side equation have been calculated as follows.

$$\beta_0 = -\frac{\gamma_0}{\gamma_1},\ \beta_1 = \frac{1}{\gamma_1},\ \beta_2 = -\frac{\gamma_2}{\gamma_1},\ \beta_3 = -\frac{\gamma_3}{\gamma_1},\ \beta_4 = -\frac{\gamma_4}{\gamma_1}$$

supply turns out to be significant across all the countries except for US, UK and Germany, although it differs significantly in magnitudes across the countries. It appears with unexpected sign for Germany and Kuwait. The own price elasticity of exports supply carries significant and relatively high magnitudes across the countries. This implies that the export supply is much sensitive to changes in domestic prices of exports. The signs are unexpected only in case of France and Germany and the magnitudes are insignificant only for USA and Kuwait.

The import of 'industrial inputs' indicates significant magnitudes with positive signs in most cases with the exception of a few. This means that import of inputs have a positive impact on exports performance.

The GMM estimator is considered to be efficient among other estimators in case of large samples. However in small sample, the estimates may be imprecise and the specific standard errors are likely to be very large. Therefore some of the coefficients appeared with unbelievable signs and some carried very high or very small magnitudes. In view of these imprecise results, it seems appropriate to refer the data to some more reliable technique. As discussed earlier, our second approach is to use the Empirical Bayesian Estimator to get consistent estimates. This exercise should pinpoint the strength and weaknesses of the results obtained through the GMM estimates.

5.2. Empirical Bayesian Findings

The Empirical Bayesian estimates of the demand and supply functions are given in Table 5.2 below. The important points are discussed below.

5.2.1. Analysis of the Results (Empirical Bayes)— Demand Side Equation

The first column of Table 5.2, reports the Empirical Bayesian results of the demand side exports equation. This offers very much improvement over the GMM estimates. The foremost point to be noted, here is that the estimated standard errors are much smaller than their GMM counterparts. The improvement in precision is noticeable if we look in-to the signs of the parameters. All the demand side elasticities appear to be highly significant with correct signs for all the trading partners. This is actually due to the addition of prior information to the model. The magnitudes of the income and price elasticities are smaller

than the respective GMM estimates across the countries concerned. The own price elasticity of export demand is found to be clustered around unity which implies that 1 percent change in the price of exports cause the export demand to change nearly by the same change.

Table 5.2 Empirical Bayes Results of the Demand and Supply functions

$X^d_t = \alpha_0 + \alpha_1 P^x_t + \alpha_2 e.P^w_t + \alpha_3 Y^w_3$					$X^s_t = \beta_0 + \beta_1 P^x_t + \beta_2 P^d_t + \beta_3 Y^d_t + \beta_4 M_t$				
Trade Partners	Export Demand Function				Exports Supply Function				
coefficients	α_0	α_1	α_2	α_3	β_0	β_1	β_2	β_3	β_4
Unite State	-3.39* (-10.60)	-0.98* (-9.17)	0.50* (10.21)	0.90* (16.08)	-0.49* (-4.02)	0.78* (7.38)	-0.16 (-0.70)	0.33** (2.77)	0.24* (4.98)
France	-2.17* (-6.99)	-0.98* (-8.82)	0.42* (9.01)	0.73* (14.46)	-0.29** (-2.70)	0.76* (8.61)	0.60* (3.16)	0.02 (0.24)	0.20* (4.45)
UK	-2.49* (-7.68)	-0.97* (-8.29)	0.46* (8.17)	0.77* (13.47)	-0.51* (-4.22)	0.78* (7.49)	-0.26 (-1.15)	0.35* (3.02)	0.24* (5.09)
Canada	-2.63* (-7.92)	-0.98* (-8.47)	0.45* (8.01)	0.77* (13.26)	-0.63* (-5.35)	0.89* (8.61)	-0.40*** (-1.78)	0.32** (2.77)	0.29* (6.21)
Korea	-2.71* (-8.14)	-0.94* (-8.02)	0.45* (8.02)	0.80* (13.75)	-0.62* (-4.89)	0.83* (7.70)	-0.17 (-0.74)	0.29** (2.47)	0.30* (6.05)
Kuwait	-2.56* (-8.69)	-0.92* (-8.16)	0.45* (8.04)	0.82* (15.89)	-0.58* (-4.57)	0.80* (7.39)	-0.14 (-0.59)	0.30** (2.47)	0.29* (5.77)
Malaysia	-2.68* (-8.11)	-0.95* (-8.09)	0.45* (7.96)	0.79* (13.62)	-0.64* (-5.11)	0.86* (7.96)	-0.23 (-0.99)	0.31** (2.60)	0.30* (6.09)
Mauritius	-2.97* (-9.31)	-0.96* (-8.29)	0.46* (8.17)	0.82* (14.17)	-0.65* (-5.13)	0.84* (7.83)	-0.24*** (-1.73)	0.36** (3.09)	0.29* (5.92)
Germany	-2.61* (-7.88)	-0.93* (-8.88)	0.44* (7.81)	0.78* (13.61)	-0.59* (-4.65)	0.75* (7.19)	-0.12 (-0.51)	0.24** (2.00)	0.28* (5.59)
Bangladesh	-2.80* (-8.69)	-0.92* (-8.08)	0.41* (7.63)	0.81* (14.11)	-0.94* (-7.93)	0.93* (8.92)	-0.43*** (-1.87)	0.36* (3.17)	0.47* (10.21)
S Arabia	-2.47* (-8.29)	-0.94* (-8.26)	0.45* (8.02)	0.77* (14.29)	-0.65* (-5.22)	0.86* (8.12)	-0.23 (-1.01)	0.24** (2.08)	0.31* (6.15)

The numbers in parenthesis are the estimated 't' values of the respective coefficients, while (*), (**) and (***) indicate significance at 1, 5 and 10 percent respectively.

The elasticity of export demand with respect to the prices of competing goods is found to be significant with correct sign. It does not differ too much in terms of magnitude across the countries when compared to the GMM estimates (where we found too much fluctuation). It

lies in the range of 0.40 and 0.50 across the countries and it is smaller than the own price elasticity of export demand. This implies that export demand is less responsive to changes in the prices of competing goods in the world market as compared to changes in the own price of exports. The income elasticity of export demand has plausible magnitudes and correct signs, and is found to be less than unity for all the countries. This elasticity varies slightly across the countries which is natural. The highest income elasticity of export demand is 0.90 for USA and the smallest is 0.73 for France. For Saudi Arabia, the income elasticity of export demand is 0.77. This is another significant improvement shown by the Empirical Bayesian Estimator over the GMM estimator.

5.2.4 Analysis of the Results (Empirical Bayes) — Supply Side Equation

The second column of the Table: 5.2 reports the results of the Empirical Bayesian estimates of the supply side export equation. The price elasticity of export supply with respect to the world prices of exports in case of USA is found to be 0.78 which means that a 10 percent increase in the foreign prices, export flow to United State rises only by 7.8 percent. The highest price elasticity of export supply is found to be 0.93 for Bangladesh followed by 0.89 for Canada whereas the smallest is 0.75 for Germany. The price elasticity of export supply with respect to the domestic prices of exportable goods turns out to be insignificant and carries very small magnitudes for most of the trading partners. This means that the supply of exports is not much sensitive to changes in the domestic prices of exportable goods. Likewise, the income elasticity of export supply carries reasonable magnitudes across the countries but not too high as one would expect. It is smaller in magnitude than the income elasticity of export demand across the countries. This implies that world demand is more significant than the domestic income level in explaining exports behavior. The income elasticity of export supply is 0.36 for both Mauritius and Bangladesh whereas for USA, it is 0.33 only. As far as the import of input variable is concerned, its coefficient is highly significant even at 1 percent and appears with expected positive and reasonable magnitudes for all the trading partners. The coefficient of this variable does not vary too much across the countries like the GMM estimates and it lies between 0.20 and 0.50. The positive and significant coefficient on this variable confirms the hypothesis that import of inputs leads to

improve export performance significantly in long run. Alternatively, its negative impact on export flow is of transitory nature and can be found only in the short run.

5.3. The Composite Elasticities

In this section, we attempt to estimate the composite elasticities or equivalently the elasticities of export demand and supply as a whole. So far we have analyzed the determinants of exports at country-wise disaggregated level and we have found different elasticities across the countries, i-e the responsiveness of export demand and supply to a change in any one determinant differs among the countries. Thus keeping in view this situation, we can not correctly specify the relative importance of each determinant in export performance. However, the composite elasticities will depict the over all picture of export behavior and will help in determining the relative importance of each factor in explaining exports behavior. These are simply the weighted averages of the individual elasticities across the trading partners. The shares of each trading partners in our exports have been interpreted as weights. The weights have been multiplied with concerned elasticities and the sum of these products across the countries has been divided by the sum of weights to get the composite elasticity. More specifically, we have used the following formula to calculate the composite elasticities of export demand and supply.

$$\eta_i = \frac{\sum_j^n W_j \times C_j}{\sum_j^n W_j} \qquad (5.1)$$

Where, 'η_i' is the elasticity of export demand and supply with respect to the '*ith*' determinant i-e price and income etc. 'W_j' is weight or share of the *jth* trading partner in our exports. 'C' is the elasticity of exports with respect to the *ith* determinant i-e price and income etc for the *jth* country. 'n' is the total number of trading partners, concerned. Equation (5.1) implies that to calculate the composite elasticity of export demand and supply for the *ith* determinant, the product of weight/share of the *jth* trading partner in our exports and the individual elasticity of that *ith* determinant for the trading partner is added across the 'n' trading partners and then divided by the sum of weights/shares. That is;

$$\eta_i = \frac{W_1 \times C_1 + W_2 \times C_2 + W_3 \times C_3 + \ldots\ldots\ldots\ldots + W_j \times C_i}{\sum_j^n W} \qquad (5.2)$$

We have obtained the following composite elasticities of the export demand and supply, using the above specification.

Export Demand Function: $X_t^d = -2.85 - 0.96\, P_t^x + 0.46\, P_t^w + 0.82\, Y_t^w$

Export Supply Function: $X_t^s = -0.55 + 0.79\, P_t^x - 0.23\, P_t^d + 0.31\, Y_t^d + 0.26\, M_t$

The composite price elasticity of export demand or equivalently the own price elasticity of export demand carries plausible magnitude, which is 0.96. This implies that a 10 percent increase in price of exports leads the demand for exports to decline by 9.6 percent. Likewise, the cross price elasticity or elasticity of export demand with respect to the price of competing/substitute goods in the world market is only 0.46, which is smaller than the own price elasticity. This means that export demand is much sensitive to changes in the price of exports as compared to the price of competing/substitute goods. The income elasticity of export demand carries relatively high magnitude of 0.82, which means that a 10 percent increase in the world income leads the demand for export to increase by 8.2 percent.

On the supply-side, all the parameters carried meaningful magnitudes but smaller than the demand side elasticities. For instance, the own price elasticity of export supply is 0.79, which is smaller than the own price elasticity of export demand. Likewise, the price elasticity of export supply is only 0.23, which implies that a 10 percent increase in domestic price of exportable goods leads the export supply to decrease by 2.3 percent only. This indicates that the domestic prices of exportable goods have not that much concern in determining exports supply. The income elasticity of export supply is o.31, whereas the coefficient of import of inputs is 0.26. Once again this confirms the fact that import of inputs (machinery, equipments and raw material etc) enhances the country potential to export.

5.4. Concluding Remarks

So far we have analyzed the determinants of exports of Pakistan at country-wise disaggregated level in which we have obtained different elasticities of export demand and supply for the trading partners. However, to analyze the impact of the concerned determinants on the overall exports, we have computed the composite elasticities, using the individual elasticities for the trading partners. Like the individual elasticities for the trading

partners, the composite demand and supply side elasticities suggest that the foreign prices of exports and world income (income of the trading partners) are much important in determining the foreign demand for our exports. Likewise, the magnitude of the own price elasticity is greater than the magnitude of the cross price elasticity of export demand, which implies that the own price of exports is much important in explaining export behavior. The findings conclude that exports of Pakistan are sensitive to changes in the own prices both on demand and supply side. However, the demand side responsiveness is much larger than the supply side. The overriding significance of world demand (approximated by income levels of the trading partners) in the determination of Pakistan's exports is evident from the highly significant income elasticity with reasonable magnitudes across the countries both on individual and composite level.

The supply side income elasticity carried significant and meaningful magnitudes for all the trading partners though it is smaller than the income elasticity on the demand side. This suggests that exports of Pakistan are not entirely demand constrained, rather the demand and supply side constraints are equally important in explaining export behavior. The magnitude of the own price elasticity on the supply side is larger than the domestic price elasticity both on individual and composite level, which confirm that the own prices are much significant in determining export supply. Likewise, the positive and significant coefficient of import of inputs with reasonable magnitude tends to prove that the non-price factors like import of inputs etc are equally important in improving the export performance of Pakistan.

The findings are in contrast to the findings of Reidel (1988) and Koukouritakis (2006), who suggest infinite income and price elasticities of export demand that support the small country hypothesis. Reidel (1988) obtained the own price elasticity of export demand for Hong Kong to be infinite i-e 33, which indicates that a slight increase in the prices of exports, the demand for the Hong Kong's exports are expected to decrease by many times. This implies that Hong Kong is a price taker i-e it follows the world prices and has no market power in the world market. Our findings are according to the findings of Khan and Knight (1985), Muscatelli et al (1992) and Siha Roy (2002, 2007), who find significant and but finite income and price elasticity of exports demand, that do not support the small country hypothesis. This implies that the world demand and the foreign prices of exports have equal concern in the determination of exports of Pakistan. Likewise, our supply side results are in contrast to the

findings of Afzal (2005) who find insignificant price elasticity of export supply, suggesting that the relative prices on the supply side have no concern in determining exports supply.

APPENDECES: Results and Discussions

Appendix 1: The Augmented Dickey Fuller test results for the unit root

Augmented Dickey Fuller (ADF)Test For Unit Root

Variables	With Intercept		Critical Values			I®	With Trend		Critical Values			I®
	Level	1st diff	1%	2%	3%		Level	1st diff	1%	2%	3%	
United States												
Import prices	0.47	-4.47	-3.71	-2.71	-2.92	I(I)	-0.34	-3.98	-3.85	-3.60	-3.23	I(1)
Export prices	1.10	-4.34	-3.64	-2.95	-2.61	I(1)	-0.34	-3.98	-4.30	-3.57	-3.22	I(1)
Total exports	6.31	0.92	-3.67	-2.96	-2.62	I(2)	-1.99	-9.40	-4.30	-3.57	-3.22	I(1)
GDP	-6.27	--	-3.6	-2.95	-2.61	I(0)	-2.38	-4.40	-4.26	-3.55	-3.21	I(1)
Mauritius												
Import prices	1.11	-3.67	-3.65	-2.95	-2.61	I(1)	0.32	-5.56	-4.32	-3.58	-3.23	I(1)
Export prices	1.10	-4.34	-3.65	-2.95	-2.62	I(1)	-1.73	-4.58	-4.32	-3.58	-3.23	I(1)
Total exports	-1.42	-7.54	-3.65	-2.95	-2.62	I(1)	-2.28	-7.23	-4.27	-3.56	-3.21	I(1)
GDP	-1.16	-6.10	-3.65	-2.95	-2.62-	I(1)	-1.73	-6.02	-4.26	-3.55	-3.21	I(1)
Canada												
Import prices	3.35	-3.91	-3.65	-2.96	-2.62	I(1)	-0.55	-6.49	4.26	-3.56	-3.21	I(1)
Export prices	1.10	-4.34	-3.66	-2.95	-2.61	I(1)	1.74	-4.58	4.26	-3.56	-3.21	I(1)
Total exports	-0.67	-6.17	-3.66	-2.95	-2.62	I(1)	-1.10	-3.70	4.26	-3.56	-3.21	I(1)
GDP	0.05	-3.86	-3.66	-2.95	-2.62	I(1)	-1.82	-3.70	4.26	-3.56	-3.21	I(1)
Kuwait												
Import prices	-1.51	-2.79	-3.70	-2.98	-2.63	I(1)	-1.46	-5.29	4.26	-3.56	-3.21	I(1)
Export prices	1.23	-4.27	-3.65	-2.96	-2.62	I(1)	-1.74	-4.58	4.26	-3.56	-3.21	I(1)
Total exports	2.96	-7.40	-3.65	-2.96	-2.62	I(1)	-3.10	-6.10	4.26	-3.56	-3.21	I(1)
GDP	-1.55	-6.77	-3.65	-2.96	-2.62	I(1)	-2.10	-4.52	4.26	-3.56	-3.21	I(1)
S Arabia												
Import prices	-1.43	-3.64	-3.65	-2.95	-2.62	I(1)	-1.57	-3.88	-4.26	-3.55	-3.21	I(1)
Export prices	1.10	-4.34	-3.65	-2.95	-2.62	I(1)	-1.74	-4.58	-4.26	-3.55	-3.21	I(1)
Total exports	-2.41	-5.69	-3.65	-2.95	-2.62	I(1)	-3.10	-5.64	-4.27	-3.27	-3.21	I(1)
GDP	0.51	-8.02	-3.65	-2.95	-2.61	I(1)	-1.47	-3.17	-4.32	-3.32	-3.21	I(1)
Korea												
Import prices	4.34	0.77	-3.71	-2.98	-2.62	I(2)	1.12	-7.64	-4.30	-3.57	-3.22	I(1)
Export prices	1.10	-4.34	-3.65	-2.95	-2.62	I(1)	-1.74	-4.58	-4.26	-3.55	-3.21	I(1)
Total exports	-1.77	-6.69	-3.65	-2.96	-2.62	I(1)	-1.10	-8.36	-4.28	-3.56	-3.21	I(1)
GDP	-2.32	-4.43	-3.66	-2.96	-2.62	I(1)	-2.23	-4.55	-4.28	-3.56	-3.21	I(1)
Bangladesh												
Import prices	-0.98	-1.47	-3.69	-2.97	-2.63	I(2)	-2.11	-4.10	-4.36	-3.60	-3.23	I(1)
Export prices	0.85	-4.32	-3.66	-2.96	-2.62	I(1)	-1.74	-4.39	-4.28	-3.56	-3.21	I(1)
Total exports	1.50	-9.61	-3.66	-2.96	-2.62	I(1)	-3.28	-9.75	-4.28	-3.56	-3.21	I(1)
GDP	-4.05	--	-3.74	-2.999	-2.64	I(0)	-2.85	-3.65	-4.36	-3.60	-3.21	I(1)

Augmented Dickey Fuller (ADF)Test For Unit Root

Variables	With Intercept		Critical Values			I®	With Trend		Critical Values			I®
	Level	1st diff	1%	2%	3%		Level	1st diff	1%	2%	3%	
Malaysia												
Import prices	1.59	-4.74	-3.64	-2.95	-2.61	I(1)	-1.62	-5.25	-4.28	-3.56	-3.21	I(1)
Export prices	1.10	-4.34	-3.65	-2.95	-2.62	I(1)	-1.74	-4.58	-4.26	-3.55	-3.21	I(1)
Total exports	0.74	-5.71	-3.65	-2.96	-2.62	I(1)	-2.66	-5.64	-4.26	-3.55	-3.21	I(1)
GDP	-1.32	-4.48	-3.65	-2.95	-2.61	I(1)	-2.55	-4.38	-4.26	-3.55	-3.21	I(1)
France												
Import prices	6.79	1.77	-3.66	-2.96	-2.62	I(2)	6.31	-0.73	-4.26	-3.55	-3.23	I(1)
Export prices	1.10	-4.34	-3.64	-2.95	-2.62	I(1)	-1.74	-4.58	-4.26	-3.55	-3.21	I(1)
Total exports	-2.38	-4.92	-3.65	-2.95	-2.62	I(1)	-1.71	-5.36	-4.27	-3.55	-3.21	I(1)
GDP	-1.39	-4.10	-3.65	-2.95	-2.62-	I(1)	-3.10	-4.06	-4.26	-3.55	-3.21	I(1)
Germany												
Import prices	4.62	-2.81	-3.65	-2.95	-2.62	I(1)	1.40	-4.19	-4.26	-3.55	-3.23	I(1)
Export prices	1.10	-4.34	-3.64	-2.95	-2.62	I(1)	-1.74	-4.58	-4.26	-3.55	-3.21	I(1)
Total exports	-1.96	-5.01	-3.65	-2.95	-2.62	I(1)	-1.46	-5.15	-4.26	-3.55	-3.21	I(1)
GDP	-1.10	-3.72	-3.65	-2.95	-2.62	I(1)	-2.57	-3.66	-4.26	-3.55	-3.21	I(1)
U Kingdom												
Import prices	4.71	-2.71	-3.66	-2.96	-2.62	I(2)	-1.13	-4.67	-4.28	-3.56	-3.22	I(1)
Export prices	1.10	-4.34	-3.66	-2.96	-2.62	I(1)	-1.74	-4.58	-4.28	-3.56	-3.22	I(1)
Total exports	-1.60	-7.24	-3.66	-2.96	-2.62	I(1)	-1.88	-7.44	-4.28	-3.55	-3.22	I(1)
GDP	-6.25	--	-3.66	-2.96	-2.62	I(0)	-2.72	-4.22	-4.28	-3.55	-3.22	I(1)
Pakistan												
Capital Goods	-0.60	-4.42	-3.66	-2.96	-2.62	I(1)	-2.01	-4.36	-4.28	-3.56	-3.22	I(1)
IRM	-1.10	-4.35	-3.66	-2.96	-2.62	I(1)	-3.20	-6.67	-4.28	-3.56	-3.22	I(1)
Domestic Prices	4.92	-1.14	-3.66	-2.96	-2.62	I(2)	0.26	-3.10	-4.28	-3.55	-3.22	I(1)
Export Prices	1.10	-4.34	-3.64	-2.95	-2.62	I(1)	-1.74	-4.58	-4.28	-3.55	-3.22	I(1)
FDI	0.17	-6.10	-3.66	-2.96	-2.62	I(1)	-3.11	-6.02	-4.28	-3.56	-3.22	I(1)
GDP	-2.10	-7.10	-3.66	-2.96	-2.62	I(1)	-2.94	-9.48	-4.28	-3.56	-3.22	I(1)
Exchange Rate	-0.30	-4.81	-3.66	-2.96	-2.62	I(1)	-1.89	-4.74	-4.28	-3.55	-3.22	I(1)

Appendix 2: Results of the Johanson Co-integration Test

Johnson Co-integration Test Results

Countries	Trace Statistics		Maximum Eigen Values	
	H_0: r = 0, H_1: r > 1	Critical Values	H_0: r = 0, H_1: r > 1	Critical Values
United State	31.42	15.50	31.42	14.26
Mauritius	38.10	15.50	32.10	14.26
Saudi Arab	37.29	15.49	23.44	14.26
Kuwait	22.44	15.50	17.31	14.26
Korea	32.10	15.50	28.66	14.26
Bangladesh	56.03	15.50	42.76	14.26
Malaysia	24.78	15.50	14.80	14.26
France	53.16	15.49	34.17	14.26
UK	25.36	15.49	19.86	14.26
Germany	35.91	15.49	25.29	14.26
Canada	21.17	15.49	15.68	14.26

CHAPTER 6
Summary and Conclusions

6.1 Summary

We have attempted to examine the determinants of exports of Pakistan in a country disaggregated framework, using a time series data over the period 1975-2008. We have specified the demand side export equation with appropriate arguments to see the relative importance of the exported goods prices and the price of competing goods at world market and to test the small country hypothesis. Besides the price and income variables, we have included two dummies in the demand side equation to capture the impact of two wars i-e Kuwait-Iraq war (1991) and the Afghanistan war (2001). Likewise the traditional export supply function has been augmented by introducing the 'import of inputs' to see its impact on exports behavior. Keeping in view the data constraints a sample of 11 trading partners of Pakistan has been used, including USA, UK, France, Germany, Bangladesh, Canada, Malaysia, Korea, Saudi Arabia, Kuwait and Mauritius. The estimation has been carried out, individually for each country i-e Pakistan versus each trading partners. We have employed two estimation techniques, namely the GMM and the Empirical Bayesian technique to estimate the set of equations. The later has been employed to get consistent and reliable estimates of the parameters concerned and to assess the robustness of the former.

Most of the elasticities of the Empirical Bayesian technique have appeared with correct signs and statistically significant. In contrast, the GMM technique provided mix results and some of the parameters appeared with unbelievable signs and insignificant magnitudes across the countries.

The price elasticity of export demand appeared to be statistically significant with correct sign in all cases. In most cases it is around unity which means that a 'given percentage change' in the price of exports brings about an equivalent change in export demand. In other words, our exports are unit elastic in own prices.

The cross price elasticity of export demand carried statistically significant magnitude with correct signs for all the trading partners which indicated that export demand is positively related to changes in the price of competing goods at world market. The income elasticity of

export demand was also statistically significant with expected sign, indicating that the world income has a positive impact on our export behavior.

Both of the two dummies i-e 'D91' and 'D01' in the demand side export equations turned out to be insignificant in most cases although they carried their expected sign. However, these variables were significant and negatively related to our exports only for Kuwait and USA respectively.

The own price elasticity of export supply appeared with correct sign and significant magnitudes except for Bangladesh. The positive and relatively high magnitudes of the price elasticity indicate the sensitivity of our exports to changes in the price level at world market. The price elasticity of exports supply with respect to the domestic price of exportable goods turned out to be insignificant in most cases although it carried the expected sign.

The income elasticity of exports supply was found to be significant across all the countries except for France. This means that GDP has a critical role in explaining exports performance.

The import of inputs appeared with correct sign and reasonable magnitudes in all cases, which strongly supports the hypothesis that import of inputs (machinery, equipments and raw material) has a positive and significant impact on export performance.

As we have already described that the Empirical Bayesian technique is an efficient and attractive devise which allow getting consistent and precise estimates. We have used the Empirical Bayesian technique to estimate the demand and supply functions. This has shown considerable improvement over the GMM results although it is not widely used by this research motivates the researchers to use it wherever it is applicable.

6.2. Conclusions

Our main objective was to determine the relative importance of the demand and supply side determinants of exports. The findings establish the importance of demand side factors in explaining export performance as indicated by highly significant magnitudes of the demand side price and income elasticities. The positive and significant coefficient of the world demand can be interpreted as that the Pakistani exporters have achieved up to some extent, the skills and capabilities to meet the global demand for the sophisticated products, i-e the cotton manufactures like ready made garments and synthetic textiles etc. In addition, the significance of the price of exports on the supply side implies that the price incentives have

sufficient concern for the domestic producers to increase supply. A significant finding of the study is the relatively high magnitude of the own price of exports on the demand side. This suggests depreciation of the domestic currency, which makes domestic goods cheaper in the world market relative to the substitute/competing goods to capture the world demand. Still another important finding is the positive and significant coefficient of import of inputs, which confirms the fact that import of inputs is critical for production of goods meant for exports. This strongly rejects the import compression policy, specifically for import of machinery, equipment and raw material etc.

The high income and price elasticity of demand indicates a high demand from the countries in European Union and NAFTA region. That's why Pakistan has persistently concentrated in these markets, although our exports have been seriously affected due to the war on terror.

6.3. Policy Implications/Recommendation

It is evident that commodity composition of the Pakistan's exports has changed significantly over the study period with an increase in the share of manufactures and a fall in the share of primary goods which is a healthy sign. No single factor or determinant can therefore explain this long run changing behavior of exports. In other words, a number of demand and supply side factors have a significant role in explaining the long run behavior of exports, most important being the 'price measures' and the 'world demand'. This means that more consideration should be given to demand side determinants as compared to relying purely on the removal of supply-side constraints while devising a viable strategy towards exports growth.

Further is the question of effectiveness of the relative prices (prices of exports relative to the domestic prices of exportable goods) and the world demand. The findings reveal that the world demand i-e income level of the trading partners is much significant in explaining exports performance as compared to other factors. 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 matched with this trend. Thus for a sustainable export growth, better market access has to be ensured in addition to diversification.

On the other hand the supply side determinants are relatively not that much important in explaining export performance. This leaves enough room to enhance the share of the value-

added goods along with technology up-gradation. In particular, the import of industrial inputs should be facilitated as they provide the very basis for our exports.

The desirable strategy should be diversification of export market with emphasis on the NAFTA, EU and Middle East regions where the demand for Pakistani exports is sufficiently large. The study also recommends particular concentration on the African countries, keeping in view the increasing demand from these countries.

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