DETERMINANTS OF MANUFACTURED GOODS EXPORTED FROM PAKISTAN: USE OF ARDL APPROACH

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Abstract

This study determined the impact of foreign direct investment (FDI) along with other factors on exports of manufactured goods in Pakistan. The study employed time series data from 1990 to 2010. We applied ARDL approach to estimate the determinants of manufactured goods exported from Pakistan. Results showed that FDI, agriculture value added and technology have positive and significant impact on manufactured exports of Pakistan, while real effective exchange rate showed in negative and significant impact on manufactured exports from Pakistan. So, better environment for attracting FDI, investing in agriculture, value addition and introducing the latest technology in the country would further improve the exports of manufactured goods from the country.

Keywords: FDI, Export growth, Value addition, ARDL, Pakistan

JEL Classification: Z.000

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Introduction

The developing economies are characterized with less availability of capital, less level of industrialization and a contracted industrial base, low capital to labor ratio, high unemployment rate, lack of managerial and technical skills, existence of inefficiency and heavy dependence on exports of raw materials. Foreign direct investment (FDI) is one of the important tools for overcoming these weaknesses in order to increase the pace of development (Zaidi, 2004). Similarly, international trade also enhances efficiency by increasing market size along with benefit of economies of scale (Smith, 1775). Exports can increase the foreign exchange reserve of the country and it is also argued that foreign exchange earned by exports can be used to finance the import of goods. The comparative advantage of the developing countries lies in primary goods which are labor intensive. However, when the economies grow they have to upgrade their goods from labor intensive manufactured goods to value added items. Economies can improve potential of domestic enterprises in manufactured goods by attracting FDI in export oriented activities (UNCTAD, 1999).

The system of FDI is intended that the host economies would adopt policies of deregulation and implementation of market forces in the economies. Most of the developing economies like Pakistan have now taken the FDI as one of the major peripheral source of funding. Nevertheless, a variety of empirical and observed studies shows a positive and significant role of inward inflow of FDI in the export promotion of the developing economies. The inflow of FDI contributes in expanding governmental and the managerial skills, availability of human resources and formation of capital and technology transfer (Lemi, 2004).

An important aspect of Pakistan’s exports is that approximately 70 percent of exports are supposed to be manufactured
items but as much as 65 percent of them are dependent on only single commodity i.e. cotton in the form of raw cotton, cotton yarn, textile, fabrics, garments, cotton made ups, etc. and 11 percent of the exports are food products, both of the categories are totally dependent on agriculture (Ali, 2007).

**Problem Statement**

Being a developing country, Pakistan has to expand its manufactured exports which constitute the major share of exports. Different factors including internal and external affect the export of manufactured goods. Considering the contribution of exports in the national economy, Pakistan has devised policies to attract foreign investors. Such policies include liberal investment policy, tax incentives and good return on investments. During the early years of the last decade, Pakistan introduced floating exchange rate and increasing incentive for export promotion which is one of the objectives for that policy. Second, Pakistan was the ally of war on terrorism and this also affected the exports of the country. Financial crisis of 2008 in the world is expected to have impact on export growth. We also observe flow of FDI, infrastructure development and progress in value addition in agriculture and manufacturing sectors in the country during this period. All these developments are considered as important factors affecting exports. Although studies are available focusing on export growth and exchange rate, we find a very little evidence on the impact of FDI, exchange rate, infrastructure, etc. on the manufactured goods exported from Pakistan. There is a dire need to determine the impact of FDI and other factors on the manufactured items exported from Pakistan. The present study is designed to examine the determinants of exports of manufactured goods in Pakistan.

**Review of literature**

Various studies are available indicating the role of different factors in export of manufactured goods, thereby leading to sustainable
economic growth. Variables considered in these studies include the extent of openness, tariffs, real effective exchange rate, terms of trade and export performance. Results also showed that the economies with trade openness develop more quickly than those with closed ones (Edwards, 1998). Steady inflows of FDI are very important for promoting exports performance. As FDI has substantial impact in capital formation, influence of capital flow becomes more visible when the country is experiencing trade liberalization policy (Sethi, 2007).

Greenway et al. (2004) and Kneller and Pisu (2007) advocated that multinational corporations, especially export-oriented generated positive export spill-over effects and significantly increased the possibility of exports for domestic firms. Conversely, Barrios et al. (2003) and Ruane and Sutherland’s (2004) found no evidence of export spill-over for domestic firms in the presence of multinational corporations.

Jordaan and Eita (2007) estimated factors affecting South African exports particularly of leather related goods and found that importing country’s GDP, population, infrastructure and regional trade agreements were the main determinants. The world market unit price/value of exports and the local real exchange rate in the long run and the domestic consumption pressure and world supplies from major exporters in the short-run were the important determinants of leather exports in Ethiopia (Asgedom, 2008).

Ghafoor et al. (2012) designed a study to examine the factors affecting export performance of leather goods from Pakistan. They collected primary data source from the exporters from Punjab province as they share almost 90 percent of total leather exports from Pakistan. They explored the impact of major variables on export of leather goods for USA and Germany markets. They employed double log form of regression analysis and found that experience and education of exporters, price of raw materials and exchange rate were important determinants of exports especially of leather goods from Pakistan.
Gul and Rehman (2014) used two stages least square to estimate determinants of Pakistan’s exports using time series data. They found that real effective exchange rate, nominal exchange rate, world production capability, world export price variable were important determinants of demand for exports from Pakistan and net national investment, gross capital formation, local production, FDI and Pakistan export price were important factors influencing supply of exported goods.

Due to globalization, export business is affected by global factors as well. Bekele and Ayele (2008) argued that globalization had resulted in the value chain and competitiveness issues as the important factors. Roy (2012) found that export of Indian leather faced many challenges as a result of increasing environmental standards in the world market. Priya and Anthuvan (2012) reported similar findings in the Indian leather exports. Same is the case with Pakistan’s exports. As a consequent, exports from Pakistan are facing many issues in the competitive world market and in the response, exports have responded to these challenges (Siddiqui, 2001).

Infrastructure development is an important factor in facilitating export of goods from a country. Several studies have documented the positive and significant relationship between trade and infrastructure (Clark et al., 2004; Wilson et al., 2003; Limão and Venables, 2001). Clark et al. (2004) argue that improving the efficiency of sea ports by Turkey to the same level as in Iceland or Australia can increase trade up to 25 per cent annually. Although considerable development has been done on improving infrastructure, still huge development work needs to be done to improve infrastructure to the level of the developed countries.

Terrorism incidents like civil war or war against terrorism can decelerate the pace of economic growth of a country in the short-run by diverting the foreign direct investment, decreasing the volume of trade, damaging the infrastructure, and redirecting the public funds to
ensure security. Thus such country is expected to lose its capital as a result of civil war (Collier et al., 2003). Similarly the terrorism campaign in a country can also cause a reduction in capital inflow (Enders and Sandler 1996; Enders et al. 2006) because foreign investors consider such countries as volatile. Terrorism activities can also affect the industries. One such example is the impact of the terrorist activity of 9/11 on airlines and tourism industry in USA (Drakos 2004; Ito and Lee 2004). So, countries experiencing terrorist activities have to face the challenge of decreasing trade. This is because of additional security measures and increased transaction cost resulting from loss of infrastructure (McKenna, 2005). Brück and Wickström (2004) find that doubling of the terrorist incidents in a country would cause a reduction in bilateral trade by 4 percent.

Materials and methods

The present study employed time series data from the year 1990 to the year 2010. Time series data collected in the present study included FDI, manufacturing value added, agriculture value added, infrastructure, financial crisis and or war on terrorism and real effective exchange rate. Data on above mentioned variables were taken from different issues of the Economics Survey of Pakistan, the State Bank of Pakistan and Federal Bureau of Statistics. Detailed description of variables is detailed later in the text.

Manufactured export is the function of various determinants. The following model was used in the present study.

\[
\text{LnMANX} = \beta_0 + \beta_1 \text{LnFDI} + \beta_2 \text{MVA} + \beta_3 \text{LnAVA} + \beta_4 \text{LnINFRA} + \beta_5 \text{LnREER} + \beta_6 D_1 + \beta_7 T_1 + \eta
\]

Where LnMANX is the natural log of total manufactured export measured in million rupees. LnFDI is the natural log of inflow of foreign direct investment (million rupees). MVA is the manufacturing value added measured as percentage of annual growth. It is expected that this variable would have positive effect on manufactured exports. LnAVA is the natural log of agriculture value added measured (million rupees)...
rupees) and its expected impact on manufactured exports is positive. LnINFRA is the natural log of gross fixed capital formation. This variable is taken in million rupees invested on transport, storage and communication. This variable is expected to have positive effect on manufactured exports. LnREER is the natural log of real effective exchange rate with a priori negative effect on manufactured exports. D1 is the dummy variable to capture the effect of war on terrorism/financial crisis. It was taken as 1 for the years, 2001-2010, otherwise zero. T, is the time trend and tells the trend movement over the year. ε is the error term which is assumed to be normally distributed with zero mean and constant variance. β are the parameters to be estimated.

**Autoregressive Distributed Lag Approach (ARDL)**

The autoregressive distributed lag approach was first used by Pesaran *et al.* (2001) to estimate long run coefficients of the study. We also adopt ARDL model because the traditional approach (Johanson Cointegration and Vector Error Correction Mechanism) determining the long-run and short-run relationship among variables has various flaws (for details, see Pesaran *et al.*, 2001). However, the ARDL approach provides consistent and robust estimates for the long-run and short-run relationship among variables. Another advantage of adopting ARDL is that the method yields consistent estimates of the long-run coefficients, being asymptotically normal irrespective of I(1) or I(0). Further, this approach does not require pretesting variables (Waliullah *et al.*, 2010).

Following ARDL equation was constructed for the variables to be studied:

\[
\Delta \text{LnMANEX}_t = \alpha_0 + \sum_{i=1}^{p} \beta_i \text{LnFDI}_{t-i} + \sum_{i=1}^{q} \gamma_i \text{MVA}_{t-i} + \sum_{i=1}^{s} \psi_i \text{AVA}_{t-i} + \sum_{i=1}^{r} \omega_i \text{INFRA}_{t-i} + \\
\sum_{i=1}^{s} \delta_i \text{REER}_{t-i} + \sum_{i=1}^{s} \rho_i \text{D1}_{t-i} + \sum_{i=1}^{s} \xi_i \text{T1}_{t-i} + \varepsilon_t \quad (2)
\]

where the coefficients \(\alpha_i, \beta_i, \gamma_i, \psi_i, \Omega, \pi_i, \text{and } \Omega\) show the short-run impacts while the coefficients from \(\omega_i \text{ to } \delta_i\) show the long-run relationship. \(\varepsilon_t\) shows the white
noise error term with zero mean and constant variance and $\alpha_0$ is the drift component.

The first step before estimating the long run coefficients is to check the existence of a long run relationship among the variables. If the relationship is found to exist, only then ARDL approach is applicable. Bounds F-test is used for this purpose. For F-test, equation 2 is estimated by using ordinary least squares approach. After estimation, all the lagged coefficients are restricted to zero to test the following hypothesis:

\[ H_0: \eta_1 = \eta_2 = \eta_3 = \eta_4 = \eta_5 = \eta_6 = \eta_7 = \eta_8 = 0 \]
\[ H_1: \eta_1 \neq \eta_2 \neq \eta_3 \neq \eta_4 \neq \eta_5 \neq \eta_6 \neq \eta_7 \neq \eta_8 \neq 0 \]

F calculated is compared with the critical value bounds. If the F-statistics lies above the upper bound, null hypothesis is rejected, and it is concluded that long run relationship exists among the variables. After establishing the long-run relationship, the next step is to select the order of lag by using Schwarz Bayesian or Akaik Information Criteria. Finally the long-run estimates are estimated using ARDL approach (Pesaran, 1997).

In order to estimate the short-run model i.e. error correction model is derived through, simple transformation in the ARDL model allowing the error correction term to show the speed of adjustment from disequilibrium to equilibrium. The presence of an error-correction term informs us that any deviations from the long run equilibrium are the response on the changes in the dependant variable. ECM is given as under:

\[
\Delta \ln MANEX_t = \alpha_0 + \sum_{i=1}^{n} \alpha_i \Delta \ln FDI_i + \sum_{i=1}^{m} \beta_i \Delta MVA_i + \sum_{i=1}^{p} \gamma_i \Delta AAV_i + \sum_{i=1}^{r} \delta_i \ln NFA_i + \\
\sum_{i=1}^{q} \theta_i \Delta \ln REER_i + \sum_{i=1}^{s} \psi_i \Delta T_i + \Phi_i \Delta ECM_{i-1} + \epsilon_t
\]  

(3)

Where ECM$_{i-1}$ is the error correction term and $\Phi_i$ shows the speed of adjustment to the long run equilibrium.
Prior to the application of the ARDL approach, the first step in analysis is to check the order of integration. In this study, traditional Augmented Dickey Fuller (ADF) test is used to check for the unit root in every variable in the model and thus determine the order of integration.

**Results and Discussion**

As the time series data is used in the present study, it is important to determine stationarity of the variables. Augmented Dickey Fuller (ADF) test is commonly employed to examine whether time series data is stationary or not. We also used ADF test and the results showed that all the variables were stationary either at level or first difference (Appendix 1). So ARDL is applicable. After applying bound F test, results showed that the calculated value of the F-test is 5.90 to compare with the bounds. It is clear that the F-calculated is more than the upper bound of F test. Therefore, it is concluded that there is a significant long run relationship between the dependent and independent variables. ARDL approach was applied to estimate the long run and short run elasticities and the lag length of the order 1 was selected as mentioned in Schwarz Bayesian Criterion.

The results of ARDL reported in Table 1 show that foreign direct investment, infrastructure, agriculture value added, real effective exchange rate and time variables have highly significant impact on manufactured exports. It can be shown from Table 1 that one percent increase in foreign direct investment leads to 0.21 percent increase in manufacturing export. Gul and Rehman (2014) and Zhang (2005) also found that foreign direct investment were important determinants of exports. Similarly, one percent increases in real effective exchange rate is related to a decrease in the manufactured exports. Our finding is in line with those of Gul and Rehman (2014) who found that real effective exchange rate was significantly related with exports demand in Pakistan. Time variable is taken as proxy for technological improvement over the study period and its coefficient points out that with the passage of time, technological development and innovations also contribute
in promoting exports of manufactured goods from Pakistan. Developing and promoting value addition in agriculture is another important area of policy concern as substantial amounts of manufactured goods come from agriculture sector.

In addition to the ARDL long run estimates, the short run estimates are given in Table 2. The information that the variables in the model are co-integrated supports the use of an ECM representation in order to study the short run dynamics. Results from estimation are based on Schwartz Bayesian Criterion. In terms of the short run relationships we observe a positive and significant impact of the different variables on manufactured exports. The variables namely foreign direct investment, agriculture value added, dummy variable of war on terror/financial crisis, real effective exchange rate and time have significant impact on manufactured exports while except real effective exchange rate and dummy variables, other variables have positive impact on manufactured exports. Our finding of negative coefficient of the real exchange rate is consistent with the findings of Atique and Ahmed (2003) in Pakistan as they also reported that a decline in the real effective exchange rate can improve the demand for exports. Another study conducted by Mustafa and Nishat (2004) indicate that exchange rate is significantly and negatively related to export from Pakistan with Australia, New Zealand, the UK and the USA both in the short-run and long-run. However, Mustafa and Nishat (2004) have not found relationship between export and exchange rate for Malaysia and Bangladesh. Thus the negative relationship between exchange rate and manufactured export goods from Pakistan can be viewed as an established reality.

We considered the impact of war on terror/financial crisis on the export of manufactured goods by considering dummy variable. As a priori, it has a negative impact on export of manufactured goods from Pakistan. This implies that improving security situation would improve export performance of the country. After the 9/11 terrorist activity, Pakistan is the active ally of the countries fighting war against
terrorism. Government has to divert public resources to the war and on the other hand, security risks have increased cost of doing business in Pakistan. So the country is paying the price of terrorism annually in the form of reduced foreign exchange earnings. Our finding confirms the results of the previous studies (Brück and Wickström, 2004, Enders et al., 2006).

The signs of the short run results are maintained to the long run. Since ECM (-1) is highly significant at 1 percent level. It shows the stability of relationship among variables in the long run. In the short run the coefficient of ECM is -0.64 with standard error of 0.189 and t-calculated value -3.39, showing its significance at less than one percent level. It shows that 64 percent of disequilibrium in the short run would adjust in the long run.

Conclusions

It was concluded that foreign direct investment and agriculture value added have significantly positive impact on exports of manufactured goods both in the long-run and short-run while real effective exchange rate has negative and significant effect on manufactured exports. Hence, with the increasing inflow of foreign direct investment and increasing the agriculture value added, exports of manufactured goods can be increased significantly. Further, it is found that foreign direct investment contributes more in the exports of manufactured goods than the agriculture value added and real effective exchange rate. Thus, foreign investment is crucial to increase the exports of manufactured goods. Therefore the government of Pakistan is required to revise its strategic policy for FDI to ensure its steady flow. The flow of FDI must be in favor of export sector to boost the economic growth because positive effects of foreign direct investment in the host country leads to increase in employment, productivity, exports, transfer of technology and access to market. As exchange rate plays the central role in open economies; through directly affecting export and import. The same case is with Pakistan
therefore government should focus on its stability ensuring more exports of manufactured goods. Besides all other factors, political stability and better law and order situations are essential to attract foreign direct investment which may enhance the technology and capital formation for the country and enhance the exports of manufactured goods.

Overtime, the importance of value addition has gained tremendous attention to improve export performance of the country. Since Pakistan’s manufactured exports come from agriculture sector, the time has come to emphasize policies in introducing and promoting value addition in agriculture sector. This will increase the export potential and enhance the earnings of various individuals involved in this sector.
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Table 1. Long Run Coefficients using the ARDL approach

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>LnFDI</td>
<td>0.21</td>
<td>0.05</td>
<td>4.06</td>
</tr>
<tr>
<td>MVA</td>
<td>0.04</td>
<td>0.03</td>
<td>1.62</td>
</tr>
<tr>
<td>LnAVA</td>
<td>0.45</td>
<td>0.21</td>
<td>2.14</td>
</tr>
<tr>
<td>LnINFRA</td>
<td>-0.002</td>
<td>0.05</td>
<td>0.06</td>
</tr>
<tr>
<td>D1</td>
<td>-0.01</td>
<td>0.10</td>
<td>-0.09</td>
</tr>
<tr>
<td>LnREER</td>
<td>-4.56</td>
<td>0.87</td>
<td>-5.27</td>
</tr>
<tr>
<td>T</td>
<td>0.00</td>
<td>0.00</td>
<td>1.26</td>
</tr>
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</table>

Table 2. Short Run Coefficient using ARDL approach

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>t-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔLnFDI</td>
<td>0.13</td>
<td>0.04</td>
<td>3.45</td>
</tr>
<tr>
<td>ΔMVA</td>
<td>0.01</td>
<td>0.02</td>
<td>0.76</td>
</tr>
<tr>
<td>ΔLnAVA</td>
<td>0.45</td>
<td>0.21</td>
<td>2.14</td>
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<tr>
<td>ΔLnINFRA</td>
<td>0.00</td>
<td>0.05</td>
<td>0.06</td>
</tr>
<tr>
<td>ΔD1</td>
<td>-0.01</td>
<td>0.10</td>
<td>-0.09</td>
</tr>
<tr>
<td>ΔLnREER</td>
<td>-2.08</td>
<td>0.41</td>
<td>-5.08</td>
</tr>
<tr>
<td>T</td>
<td>0.04</td>
<td>0.01</td>
<td>4.68</td>
</tr>
<tr>
<td>ECM (-1)</td>
<td>-0.64</td>
<td>0.19</td>
<td>-3.39</td>
</tr>
</tbody>
</table>

Appendix 1: Results of ADF Test

<table>
<thead>
<tr>
<th>Variables on Level</th>
<th>ADF-stat</th>
<th>Variables on First Difference</th>
<th>ADF-stat</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANEX</td>
<td>-1.08</td>
<td>ΔMANEX</td>
<td>-5.66*</td>
<td>I(1)</td>
</tr>
<tr>
<td>FDI</td>
<td>-2.80</td>
<td>ΔFDI</td>
<td>-3.91*</td>
<td>I(1)</td>
</tr>
<tr>
<td>MVA</td>
<td>-1.54</td>
<td>ΔMVA</td>
<td>-3.52*</td>
<td>I(1)</td>
</tr>
<tr>
<td>AVA</td>
<td>-3.42*</td>
<td>-</td>
<td>-</td>
<td>I(0)</td>
</tr>
<tr>
<td>INFRA</td>
<td>-1.54</td>
<td>ΔINFRA</td>
<td>-4.46*</td>
<td>I(1)</td>
</tr>
<tr>
<td>REER</td>
<td>-5.38*</td>
<td>-</td>
<td>-</td>
<td>I(0)</td>
</tr>
</tbody>
</table>

*Indicates that all variables are significant at 5% level of significance