# Impacts of Trade Liberalization on Exports
## *Bangladesh Experience*

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*Abstract:* *This article analyses and explains the impacts of trade liberalization on exports in Bangladesh. A number of empirical studies suggest that there exists positive relationship between trade liberalization and export performance. In case of Bangladesh it is observed that the TGR of exports in the pre-liberalization regime i.e. from 1972-1973 to 1989-1990 is 8.81 per cent while the same is 11.90 per cent in the post-liberalization period i.e. from 1990-1991 to 2009-2010. The TGR for the whole study period i.e. from 1972-1973 to 2009-2010 is estimated as 11.56 per cent. It indicates that the growth rates of exports are higher in the post-liberalization period. On the other hand, it is observed that the CAGR of exports in the pre-liberalization regime i.e. from 1972-1973 to 1989-1990 is 8.54 while the same is 11.88 per cent in the post-liberalization period i.e. from 1990-1991 to 2009-2010. The CAGR for the whole study period i.e. from 1972-1973 to 2009-2010 is estimated as 10.63 per cent, It can be concluded that trade reforms or trade liberalization in Bangladesh has positive impact on exports in Bangladesh. Chow Breakpoint test indicates that there is a structural change in exports of Bangladesh. The price elasticity of export supply is estimated at 0.25, the income elasticity of export supply is estimated at 0.50 and the gross fixed capital formation elasticity of export supply is estimated at 0.73. The estimated coefficient of liberalization dummy is very low (0.16) which is insignificant meaning that liberalization of trade has not significant impact on the export supply performance of Bangladesh. Therefore, the policy makers should be more cautious in designing the trade policy reforms in Bangladesh for reaping the full benefit of trade liberalization. The relative price of real export is negatively related to the demand of real export as expected and the relationship is statistically significant at 5 per cent level meaning that relative price is an important determinant of export demand.*

## Introduction:

The positive impact of trade liberalization export and growth is supported by a number of studies such as Little, Scitovsky and Scott (1970), Balassa (1971, 1982), Bhagwati (1978), Kruger (1978), Athukorala (1997), Ahmed (2001). A number of other studies show no or little link between trade performance and trade liberalization such as UNCTAD(1989), Agosin (1991), Clarke and Krikpatrick (1992), Greenway and Sapford

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(1994), Jenkins(1996). Bangladesh export trade is well responded with the intervention of trade liberalization programs. The average growth rate of export was about 7.07 per cent during the period from 1973-1974 to 1977-1978. GDP growth rate registered about 7.5 per cent which was slightly higher than export growth during the FFYP. During the SFYP export growth was achieved at around 5.0 per cent. In the TFYP and FFYP periods, export grew at an average rate of 11.27 per cent and 18.18 per cent respectively. The major export items are ready-made garments, knitwear, frozen foods, leather and leather products, jute and jute products, tea, ceramics, textile fabrics, home textiles, light engineering products including bicycles, handicraft and agro-based products. The higher growth rate of export was contributed by sharp increase of some non-traditional export items in the export basket such as Ready-Made Garments, Frozen Food, Specialized Textiles, Fertilizer etc. However, exports as a percentage of GDP were about 6.0 per cent and 9.0 per cent during these two plan periods. During the period from 1995-96 to 1999-2000 export grew continuously at an average growth rate of about 10.73 per cent while GDP growth rate was posted at about 5.27 per cent. Export as a percentage of GDP increased to 14.22 per cent. On the other hand, export as a source of import financing increased substantially. It was about 35.22 per cent in the FFYP and 30.37 per cent in the SFYP, while the rate was 58.0 per cent in the FFYP. In 1999-2000 export earnings was about 70 per cent of total import payments. This article analyses and explains the impacts of trade liberalization on exports in Bangladesh.

**Review of Literature:**

The impact of trade liberalization on trade performance in Bangladesh is still a relatively less researched area. Some studies examined the degree of trade liberalization in the context of Bangladesh economy[2]. There have been no systematic and in-depth studies to examine the overall impact of trade liberalization on trade performance of Bangladesh. There are some relevant studies which have been carried out for other countries. The existing literatures, related to this study, are briefly reviewed in this section.

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[2]  Remarkable studies include: Ahmed (1999, 2001), Rahman (1992), Mahmood, Rahman and Hasan (1991), Dean, Desai and Ridel(1994), Hossain (1997), Alam (1995), Bayes, Hossain and Rahman (1995), World Bank (1996), Yilmaz and Varma (1994), Kabir (1988), Raihan (2007), Rimi, Aziz and Kakoly (2009).

Reza (1981) analyses the chronic trade deficit of Bangladesh arguing that the export base and export earnings are persistently very low over a long span of time. He finds out the performance of export sub-sector is very poor because of heavy concentration on few traditional items like raw jute, jute goods, tea, fish, leathers etc. Analyzing the trade figures from 1950 to 1978 he tries to show the problems and prospect of this sub-sector. He also focuses the employment potential and income distribution implications of export-oriented strategy of development. He also suggests for export-led growth strategy instead of import substitution growth strategy as a policy option[3].

A. R. Bhuyan (1982) examines the prospect of non-traditional exports focusing on the imports of machinery and industrial raw materials. He shows that the demands for non-traditional items have been growing and there remains scope for modernization and expansion of this sub-sector[4]. He does not give details about the transformation and diversification of non-traditional exports. The policy reforms for improvement of exports have not been focused in this study.

Kabir (1988) estimated the aggregate import and export demand functions of Bangladesh using time series data for a sample period from 1973 to 1983. In his study, he chooses domestic price, foreign price, foreign exchange reserve, exchange rate as explanatory variables. He estimates the price elasticity and income elasticity of our exports and imports but he does not analyse the growth trend of export and imports and the impact of trade reforms[5]. The trade policy or reforms and its impact on the export performance have been ignored in this study.

Mahmood (1982) explains the possibilities of the export led growth in Bangladesh. He argues that a country like Bangladesh can achieve high standards of living only through industrialization and expansion of trade in manufacturing. Citing examples of South Korea, Taiwan, Singapore, Hong Kong he mentions that Bangladesh should avoid import substitution industries and move to manufactured export because the demand for manufactured exports are more stable compared to traditional

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[3]   Sadrel Reza, The Export Trade of Bangladesh 1950-1978 (Dhaka: University of Dhaka, 1981).

[4]   A. R. Bhuyan, Non-Traditional Exports of Bangladesh: Trends, Performance and Prospects (Dhaka: Bureau of Economic Research, University of Dhaka, 1982).

[5]   R. Kabir, "Estimating Import & Export Demand Functions: The Case of Bangladesh", The Bangladesh Development Studies, Vol. 16, No. 4 (Dhaka: BIDS, 1988).

products. He argues that traditional exports suffer from supply inelasticity in the world market[6]. His study does not include the trade reforms and its impact on trade performance.

Talukdar (1983) analyses the diversification of export with reference to Ready Made Garments (RMG). He points out that Bangladesh has comparative advantage in RMG because of cheap labour. He opines that export earnings could be enhanced through promotion of RMG. This study places more weights on RMG export. But other developing countries have been enjoying comparative advantage in RMG. So, in order to face global challenges Bangladesh should diversify export base[7].

Roy (1991) analyses the determinants of export performance of Bangladesh using an econometric analysis. He examines the causal relationship of the determining factors and export performance for Bangladesh. His study finds that the export performance of Bangladesh is associated with greater commodity diversification of exports. He shows that commodity exports have been diversified more over the years. Liberalization of trade and industrial polices has important consequences for the composition of exports as well as growth and stability[8]. But this study does not specifically cover the relationship between impact of trade liberalization and trade performance.

Raihan (2007) analyzed the dynamics of trade liberalization in Bangladesh[9] in the context of policies and practices by using modern tools of economic analysis. He reviewed theoretical evidences between trade liberalization and economic growth, trade liberalization policies and programs in Bangladesh. He conducted a time-series evaluation of Bangladesh's trade liberalization in a changing perspective and in a global perspective, a dynamic panel econometric study on Bangladesh manufacturing industries, Short-run vs. Long-run Macro impacts of trade liberalization: an inter-temporal computable general equilibrium (CGE) model of Bangladesh. He has attempted to investigate the 'Trade Liberalization--Growth Nexus' in the context of the manufacturing

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[6] Wahiduddin Mahmood, "Possibilities of Export-led Growth in Bangladesh", The Bangladesh Journal of Political Economy, Vol. 6, No. 1 (Dhaka: 1982).

[7] Md. Serajul Islam Talukdar, "Scope for the Diversification of Export Trade in Bangladesh with Special Reference to Ready Made Garments", Bank Parikrama, Vol. 8, Nos. 3, 4 (Dhaka: BIBM, 1983).

[8] Dilip Kumar Roy, "Determinants of Export Performance of Bangladesh", The Bangladesh Development Studies, BIDS, Vol. 19, No. 4 (Dhaka: BIDS, 1991).

[9] Selim Raihan, Dynamics of Trade Liberalisation in Bangladesh: Analyses of Policies and Practices (Dhaka: Pathak Shamabesh, 2007).

industries in Bangladesh and to explore the alternative options for the future direction of trade policy reform in Bangladesh.[10]

Ahmed (2001) analyzes the trends and impact of trade liberalization in Bangladesh. He examines the impact of trade liberalization on import demand, export supply, industrial growth of Bangladesh using modern time series method of co-integration and error correction modeling. In analyzing Bangladesh experience with trade liberalization he addresses a number of key issues such as nature and policy instruments of trade liberalization, the degree of trade liberalization, impact of trade liberalization on import demand, export supply, industrial growth and government revenue, and external constraints faced by Bangladesh. He finds that both at aggregate and commodity level the import is generally less sensitive to import price changes whereas export both at aggregate and commodity level are sensitive to real exchange rate and relative prices. Bangladesh export supply is found as price inelastic at both levels. Using ECM he finds that trade liberalization has significant role in improving the trade performance of Bangladesh .

Abedin (2004) analyses the policy measures taken by the Government of Bangladesh in the mid-1980s as the process of globalization. He discusses the origin, implementation process and effects of Structural Adjustment Programs as part of globalization process. He mentions that it has come into implementation since 1991 and the SAP has been partially successful in removing balance of payment problems, keeping inflation rate at reasonable rates, reducing budget deficits, promoting GDP growth rates and raising the growth rates of both exports and imports[11]. He uses times series data for selected macro economic variables and draws clear comparison between pre-SAP and post-SAP situations.

Datt (2004) defines globalization as the process of integrating all economies of the world so that there is free movement of goods, services, technology, capital and even cross border movement of labour. Globalization has four parameters such as (i) reduction of trade barriers, (ii) free flow of capital, (iii) free flow of technology, (iv) free movement

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[10]  Nasiruddin Ahmed, Trade Liberalization in Bangladesh: An Investigation into Trends (Dhaka: The University Press Limited, 2001).

[11]  M. Zainul Abedin, "Structural Adjustment programs in Bangladesh: Their Origin, Implementations and Effects", Economic Globalisation-Social Conflicts, Labour and Environmental Issues, ed. by Clem Tisdell and Raj Kumer Sen (UK: Cheltenham, Edward Elgar), 2004, pp. 227-243.

of labour. He explains that the impact of globalization on Indian economy by showing its share in world exports raises from 0.54 per cent in 1990 to 0.67 per cent in 1999. Indian imports increases from 8.3 per cent of GDP in 1991-1992 to 12.3 per cent in 1995-1996[12].

Hossain and Alauddin (2005) examined the process of Bangladesh's trade liberalization and its impact on the growth and structure of exports, imports, GDP and other relevant macroeconomic variables with particular emphasis on exports[13]. This study provides an updated account of the various structural adjustment programs undertaken in Bangladesh including trade, fiscal, industrial and financial reforms, and explains how these reforms supplemented one another to promote greater market and export orientation. Various Indicators of trade liberalization show a substantial shift of the Bangladesh external trade regime and the resultant reduction in anti-export bias.

Rimi, Aziz and Kakoly[14] empirically examined the export-led growth hypothesis on Bangladesh using co-integration and multivariate Granger Causality technique. The study findings support the export-led growth hypothesis that there are strong bi-directional causality between export growth and economic growth in Bangladesh. The bi-variates model with GDP as dependent variable and export as independent variable and the multivariate model with GDP as dependent variable and export and import as independent variables provides the similar result. They suggested for promoting exports to enhance the economic growth of Bangladesh.

**Exports of Bangladesh:**

Exports of Bangladesh in the pre-liberalization (1972-1989) and post-liberalization (1990-2010) regimes are shown in the Table 1:

[12]    Ruddar Datt, "Globalisation, the WTO and its Impact on India: A Developing Country Perspective", Economic Globalisation-Social Conflicts, Labour and Environmental Issues, ed. by Clem Tisdell and Raj Kumer Sen (UK: Cheltenham, Edward Elgar), 2004, pp. 106-123.

[13]    Mohammad A. Hossain and Mohammad Alauddin, "Trade Liberalization in Bangladesh: The Process and Its Impact on Macro Variables Particularly Export Expansion", Journal of Developing Areas, Vol. 39(1), 2005.

[14]    Tamanna Afreen Rimi, Ahmed Tariq Aziz, and Israt Jahan Kakoly, "Export-Led Growth (ELG) Hypothesis: An Empirical Investigation on Bangladesh", BIISS Journal. vol. 30(3).( Dhaka: BIISS, 2009), pp. 335-350.

## Table 1: Export of Bangladesh

| Regime | Year | Export (Million US$) | Growth Rate[15] (%) | 5-yearly Moving Average Growth Rate[16] (%) | Export as % of GDP(%) |
|---|---|---|---|---|---|
| | 1972-1973 | 348.42 | - | - | 4.22 |
| Pre-liberalization | 1973-1974 | 371.76 | 6.70 | - | 3.33 |
| | 1974-1975 | 382.68 | 2.94 | 3.73 | 2.79 |
| | 1975-1976 | 380.47 | -0.58 | 7.41 | 4.47 |
| | 1976-1977 | 417.01 | 9.60 | 11.14 | 6.75 |
| | 1977-1978 | 493.74 | 18.40 | 14.77 | 5.15 |
| | 1978-1979 | 618.82 | 25.33 | 13.83 | 5.16 |
| | 1979-1980 | 749.44 | 21.11 | 9.55 | 5.81 |
| | 1980-1981 | 709.85 | -5.28 | 7.81 | 5.72 |
| | 1981-1982 | 625.89 | -11.83 | 6.36 | 5.49 |
| | 1982-1983 | 686.60 | 9.70 | 5.19 | 6.45 |
| | 1983-1984 | 810.99 | 18.12 | 3.78 | 5.86 |
| | 1984-1985 | 934.43 | 15.22 | 12.36 | 6.05 |
| | 1985-1986 | 819.21 | -12.33 | 13.35 | 5.88 |
| | 1986-1987 | 1073.77 | 31.07 | 10.71 | 5.68 |
| | 1987-1988 | 1231.2 | 14.66 | 11.26 | 6.20 |
| | 1988-1989 | 1291.56 | 4.90 | 16.27 | 6.24 |
| | 1989-1990 | 1523.71 | 17.97 | 13.27 | 6.63 |
| Post-liberalization | 1990-1991 | 1717.55 | 12.72 | 14.24 | 5.49 |
| | 1991-1992 | 1993.92 | 16.09 | 14.53 | 6.35 |
| | 1992-1993 | 2382.89 | 19.51 | 18.34 | 7.39 |
| | 1993-1994 | 2533.9 | 6.34 | 18.16 | 7.46 |
| | 1994-1995 | 3472.57 | 37.04 | 17.70 | 9.13 |
| | 1995-1996 | 3882.42 | 11.80 | 17.16 | 9.54 |
| | 1996-1997 | 4418.28 | 13.80 | 16.48 | 10.41 |
| | 1997-1998 | 5161.2 | 16.81 | 10.73 | 11.70 |
| | 1998-1999 | 5312.86 | 2.94 | 10.85 | 11.60 |
| | 1999-2000 | 5752.2 | 8.27 | 6.60 | 12.16 |
| | 2000-2001 | 6467.30 | 12.43 | 5.12 | 13.76 |
| | 2001-2002 | 5986.09 | -7.44 | 7.75 | 12.58 |
| | 2002-2003 | 6548.44 | 9.39 | 8.86 | 12.61 |
| | 2003-2004 | 7602.99 | 16.10 | 10.70 | 13.46 |
| | 2004-2005 | 8654.52 | 13.83 | 15.33 | 14.33 |
| | 2005-2006 | 10526.16 | 21.63 | 16.62 | 15.06 |
| | 2006-2007 | 12177.86 | 15.69 | 15.47 | 16.88 |
| | 2007-2008 | 14110.80 | 15.87 | 13.52 | 15.92 |
| | 2008-2009 | 15565.19 | 10.31 | - | 18.42 |
| | 2009-2010 | 16204.65 | 4.11 | - | 19.45 |

Source: EPB, Export Statistics (various issues), IMF, International Financial Statistics(various issues), GOB, Bangladesh Economic Review(various issues).

In 1972-1973 the export figure was only 348 million US$. It has been increased over the years with fluctuations in the trend. It reached to 1523.71 million US$ in 1989-1990 - the highest figure in the pre-liberalization period. The export was US$ 1717 million in 1990-1991 which sharply rose to 3472.57 million US$ in 1994-1995 with 37.04 per cent growth rate. The export growth was very impressive except few

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[15]    Growth Rate = [(Xt - Xt-1)/X t-1] x 100

[16]    5-yearly Moving Average = (Y1 + Y2+Y3+Y4+Y5)/5, (Y2+Y3+Y4+Y5+Y6))/5 and so on.

exceptions. The export grew to 6467.30 million US$ in 2000-2001 with 12.43% growth rate. The year 2005-2006 can be marked as an important year for our foreign trade as export reached to 10526.16 million US$ i.e. one billion US$ export is achieved for the first time. After that the export continued to grow even in the situation of global economic slowdown. In 2006-2007 the export was US$ 12177.86 million with the growth rate of 15.69 per cent. The export rose to US$ 15565.19 million in 2008-2009 from 14110.80 million US$ in 2007-2008. The export grew at 4.11 per cent and reached to 16204.65 million US$ in 2009-2010.

Exports as percentage of GDP were very low at single digit figures throughout the entire pre-liberalization period. It was 4.22 per cent in 1972-1973, 2.79 per cent 1974-1975, 6.45 per cent in 1984-1985 and 6.63 per cent in 1989-1990. On the other hand, it was about 7.46 per cent in 1993-1994, 9.54 per cent in 1995-1996, 10.41 per cent in 1996-1997, 13.46 per cent in 2003-2004, 15.06 per cent in 205-2006 and 19.45 per cent 2009-2010. Therefore, the export as percentage of GDP substantially increased in the post-liberalization period. The 5-yearly moving average growth rates of exports were 3.73 per cent in 1974-1975, 11.14 per cent 1976-1977, 13.83 per cent in 1977-1978, 3.78 per cent 1983-1984, 12.36 per cent in 1984-1985, 16.27 per cent in 19881989 and 13.27 per cent in 1989-1990 in pre-liberalization period. Compared to the pre-liberalization period the 5-yearly moving average growth rates of export were higher in post-liberalization period. It was 14.24 per cent in 1990-1991, 18.16 per cent in 1993-1994, 17.16 per cent in 1995-1996. The lowest rates were observed in 2000-2001(5.12 per cent) and 2002-2003 (8.86 per cent). The 5-yearly moving average growth rates of exports were 15.33 per cent in 2004-2005 and 13.52 per cent in 2007-2008.

**Trade Performance and Trade Liberalization:**

*Export Propensity, Import Penetration and Trade Openness*

The trade performance of a country can be evaluated by the Export Propensity, Import Penetration and Trade Ratio or Trade Openness. The three indicators are calculated for both pre-liberalization and post-liberalization regimes. The estimates are presented in Table-2.

Table 2: Export Propensity, Import Penetration and Trade Openness

| Regime | Year | Export Propensity [(X / Y)] x100 | Import Penetration [M / (Y+M-X)] x100 | Export as % of Import | Trade Openness [(X+M ) / Y ] x100 |
|---|---|---|---|---|---|
| Pre-liberalization | 1973-1974 | 3.33 | 9.16 | 40.19 | 13.08 |
| | 1974-1975 | 2.79 | 7.35 | 27.28 | 10.46 |
| | 1975-1976 | 4.47 | 13.33 | 29.84 | 20.46 |
| | 1976-1977 | 6.75 | 10.27 | 47.66 | 17.42 |
| | 1977-1978 | 5.15 | 12.06 | 36.60 | 18.16 |
| | 1978-1979 | 5.16 | 12.34 | 39.77 | 18.51 |
| | 1979-1980 | 5.81 | 14.87 | 54.62 | 22.26 |
| | 1980-1981 | 5.72 | 15.14 | 28.02 | 22.55 |
| | 1981-1982 | 5.49 | 16.17 | 24.33 | 23.72 |
| | 1982-1983 | 6.45 | 15.57 | 29.74 | 23.70 |
| | 1983-1984 | 5.86 | 14.10 | 34.47 | 21.32 |
| | 1984-1985 | 6.05 | 13.59 | 35.30 | 20.82 |
| | 1985-1986 | 5.88 | 12.75 | 34.65 | 19.63 |
| | 1986-1987 | 5.68 | 12.47 | 40.98 | 19.11 |
| | 1987-1988 | 6.20 | 13.03 | 41.23 | 20.26 |
| | 1988-1989 | 6.24 | 13.66 | 38.27 | 21.07 |
| | 1989-1990 | 6.63 | 13.91 | 40.53 | 21.72 |
| Post-liberalization | 1990-1991 | 5.49 | 10.60 | 49.50 | 16.69 |
| | 1991-1992 | 6.35 | 10.73 | 57.58 | 17.60 |
| | 1992-1993 | 7.39 | 12.06 | 59.78 | 20.09 |
| | 1993-1994 | 7.46 | 11.80 | 59.62 | 19.84 |
| | 1994-1995 | 9.13 | 14.48 | 59.52 | 24.51 |
| | 1995-1996 | 9.54 | 15.74 | 55.89 | 26.44 |
| | 1996-1997 | 10.41 | 15.87 | 61.69 | 27.31 |
| | 1997-1998 | 11.70 | 16.21 | 68.60 | 28.78 |
| | 1998-1999 | 11.60 | 16.54 | 66.26 | 29.12 |
| | 1999-2000 | 12.16 | 16.82 | 68.45 | 29.93 |
| | 2000-2001 | 13.76 | 18.72 | 69.28 | 33.63 |
| | 2001-2002 | 12.58 | 17.02 | 70.09 | 30.54 |
| | 2002-2003 | 12.61 | 17.55 | 67.80 | 31.22 |
| | 2003-2004 | 13.46 | 18.23 | 69.73 | 32.76 |
| | 2004-2005 | 14.33 | 20.27 | 65.83 | 36.11 |
| | 2005-2006 | 15.06 | 21.92 | 71.38 | 38.90 |
| | 2006-2007 | 16.88 | 23.37 | 70.98 | 42.22 |
| | 2007-2008 | 15.92 | 24.56 | 65.24 | 43.30 |

Notes: X = Export, M= Import, Y = GDP

Source: Estimated from Appendix Table A 1.1 & A 1.2.

The export propensity is ranged from the lowest 2.79% in 1974-1975 to the highest 6.76% in 1976-1977 in the pre-liberalization regime while it is ranged from the lowest 5.49% in 1990-1991 to the highest 16.88% in 2006-2007 in the post-liberalization regime. The import penetration is ranged from the lowest 7.35% in 1974-1975 to the highest 16.17% in 1981-1982 in the pre-liberalization regime while it is ranged from the lowest 10.60% in 1990-1991 to the highest 24.56% in 2007-2008 in the post-liberalization regime. The trade openness is ranged from the lowest 10.46% in 1974-1975 to the highest 23.72% in 1981-1982 in the pre-liberalization regime while it is ranged from the lowest 16.69% in 1990-1991 to the highest 43.30% in 2007-2008 in the post-liberalization

regime. Export as percentage of import has substantially increased during the post-liberalization period. The lowest value was achieved as 24.33% in 1981-1982. It reaches as high as 71.38% in 2005-2006. The trend growth rate (TGR) of export propensity, import penetration and trade openness of Bangladesh during the pre-liberalization and post-liberalization regimes are presented in Table 3.

Table 3: TGR of Export Propensity, Import Penetration and Trade Openness

| Period | Export Propensity (%) | Import Penetration (%) | Trade Openness (%) |
|---|---|---|---|
| Pre-Liberalization | 3.25 | 2.22 | 2.43 |
| Post-Liberalization | 5.87 | 4.50 | 5.13 |
| Overall | 4.29 | 1.92 | 2.63 |

*Note:*

1.      TGR = [Anti-log of estimated b - 1] X 100, L means natural logarithm
2.      The estimated coefficients are highly significant since the p-value of the estimated coefficients are found 0.000 except Trade Openness Coefficient in Pre-liberalization period (0.013).
Source:  Table 2

The trend growth rate of export propensity is found 3.25 per cent during the pre-liberalization period which has significantly increased to 5.87 per cent during post-liberalization period. The trend growth rate of import penetration is found higher in the post-liberalization period (4.50%) as compared to the pre-liberalization period (2.22%). The trend growth rate of trade openness of Bangladesh is found more than double in post-liberalization period (5.13%) as compared to the pre-liberalization period (2.43%). The overall trend growth rates of export propensity, import penetration and trade openness are found 4.29 per cent, 1.92 per cent and 2.63 per cent respectively. It can be concluded that export propensity, import penetration and trade openness of Bangladesh has significantly increased in the post-liberalization period.

**Growth Trend of Exports:**

The trend growth rate (TGR) and compound annual growth rate(CAGR) of exports are estimated separately for the pre-liberalization and post-liberalization regimes as well for the entire study period from 1972-1973 to 2009-2010. The estimates are presented in the Table 4. It is observed that the TGR of exports in the pre-liberalization regime i.e. from 1972-1973 to 1989-1990 is 8.81 per cent while the same is 11.90 per cent in the

post-liberalization period i.e. from 1990-1991 to 2009-2010. The TGR for the whole study period i.e. from 1972-1973 to 2009-2010 is estimated as 11.56 per cent. It indicates that the growth rates of exports are higher in the post-liberalization period.

On the other hand, it is observed from Table 4 that the CAGR of exports in the pre-liberalization regime i.e. from 1972-1973 to 1989-1990 is 8.54 while the same is 11.88 per cent in the post-liberalization period i.e. from 1990-1991 to 2009-2010. The CAGR for the whole study period i.e. from 1972-1973 to 2009-2010 is estimated as 10.63 per cent. It can be concluded that trade reforms or trade liberalization in Bangladesh has positive impact on exports in Bangladesh.

Table 4: Trend Growth Rates and Compound Annual Growth Rates for Exports

| Period | Estimated Trend Regression | TGR[1] (%) | CAGR[2](%) |
|---|---|---|---|
| Pre-liberalized 1972-1973 to 1989-1990 | LX= 5.71 + 0.084T | 8.81 | 8.54 |
| Post-liberalized 1990-1991 to 2009-2010 | LX= 5.45 + 0.112T | 11.90 | 11.88 |
| Overall 1972-73 to 2009-2010 | LX= 5.50 + 0.109T | 11.56 | 10.63 |

*Note:*

    1. TGR = [Anti-log of estimated b - 1] X 100, L means natural logarithm
    2. CAGR = [Ending Value/Beginning Value]$^{1/N}$ - 1
    Source: Estimated from Table 1.

**Test of Hypothesis:**

Using t-test the following hypothesis is tested whether trade liberalization has positive impact on export growth in Bangladesh.

    $H_0$: There is no change in export growth between pre and post trade liberalization regimes.

    $H_1$: There is significant positive change in export growth between pre and post trade liberalization regimes.

The t-test is performed on the basis of trend regression of the pre-liberalization and post-liberalization periods.

$$t_{37df} = ( b_1 - b_2)/\sqrt{ (seb_1)^2 + (seb_2)^2}$$

Here, $b_1$ = slope coefficient of time variable in the pre-liberalization period, $b_2$ = slope coefficient of time variable in the post-liberalization

period, se = standard error of slope coefficient. Now by putting the values in the formula the t-statistic is computed as:

$t_{37df}$ = (0.037 – 0.049 ) /√ $(0.002)^2 + (0.002)^2$ = = -4.26

*Decision:* The table value of t-statistic at 37 degree of freedom is 1.65 and the absolute value of calculated t-statistic is 4.26. Since the calculated value is higher than the critical t-value so the null hypothesis $H_0$ is rejected and the alternative hypothesis $H_1$ is accepted at 5 per cent significance level implying that the export is significantly increased in the post-liberalization regime.

**Chow Breakpoint Test:**

The structural change in export of Bangladesh to the liberalization of trade is tested by Chow Test using the F-test :

$$F = \frac{(Rss - (RSS1 + RSS2)/k)}{(RSS1 + RSS2)/(n1 + n2 - 2k)}$$

Table 4: Chow Breakpoint Test: 1989

| Test | Test Statistics | P-value |
|---|---|---|
| F-statistic | 14.86 | 0.000 |
| Log likelihood ratio | 23.86 | 0.000 |

Chow Breakpoint test is conducted based on 1989-90 and it is found that F-statistic is greater than F critical value at 2, 34 degree of freedom and the p-value 0,000 indicates that the null hypothesis H0 of structural stability is rejected. Therefore, it can be concluded that there is a structural change in exports of Bangladesh. The growth trends of export and import are presented in Figures 6.1 and 6.2 for pre-liberalization period and post-liberalization period respectively.

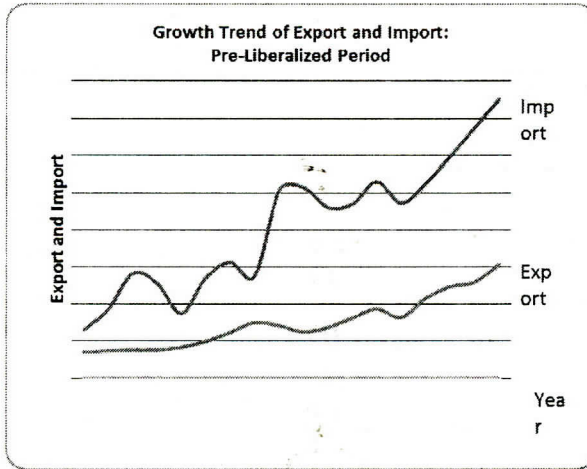Figure 1: Growth Trend of Export and Import in Pre-Liberalization Regime



Figure 2: Growth Trend of Export and Import in Post-Liberalization Regime



**Instability of Exports:**

The instability is measured separately by using Coppock's Instability Index (CII) for pre-liberalization period and post-liberalization period. The CII is also measured for the overall study period. The estimate results are shown in the following table. It is evident from the value of CII that the exports of Bangladesh in pre-liberalization period is more instable as compared to post-liberalization period as expected. The CII is computed as 11.56% for the pre-liberalization period and 7.76% for the post-

liberalization period. The overall CII is 10.00% for the study period (Table 6).

### Table 6: Instability of Exports

| Period | Coppock Instability Index(CII) in % |
|---|---|
| Pre-liberalized 1972-1973 to 1989-1990 | 11.56 |
| Post-liberalized 1990-1991 to 2009-2010 | 7.76 |
| Overall 1972-1973 to 2009-2010 | 10.00 |

Note: CII = [Anti-log /log variance- 1] X 100.

Source: Estimated from Table 1.

### Growth Trend of Major Export Commodities:

The growth trend of major commodities such RMG, Tea, Leather, Frozen Foods, Jute Manufacture, Raw Jute and Pharmaceuticals etc. are estimated. A comparison between the growth rates of RMG and Non-RMG exports as well as Primary and Manufactured exports are also estimated. The structural stability is tested by 'Chow Break point Test'.

### Growth Trend of RMG and Non-RMG Exports:

The Trend Growth Rates and the Compound Annual Growth Rates for Exports of RMG and Non-RMG Commodities are shown in Table 7.

### Table 7: Trend Growth Rates and Compound Annual Growth Rates for Exports of RMG and Non-RMG Commodities

| Period | Estimated Trend Regression | TGR[1] (%) | CAGR[2] (%) |
|---|---|---|---|
| Pre-liberalization 1976-1977 to 1989-1990 | LNRMG= 6.22 + 0.042T | 4.27 | 5.63 |
| | LRMG = -3.86 + 0.834T | 130.27 | 112.13 |
| Post-liberalization 1990-1991 to 2009-2010 | LNRMG= 5.53 + 0.076T | 7.89 | 7.64 |
| | LRMG = -5.12 + 0.130T | 13.91 | 14.27 |
| Overall 1976-1977 to 2009-2010 | LNRMG = 6.07 + 0.02T | 5.65 | 6.63 |
| | LRMG = -0.037 + 0.055T | 40.21 | 48.86 |

*Note:*    1. TGR = [Anti-log of estimated b - 1] X 100

         2. log means natural logarithm

         3. CAGR = [Ending Value/Beginning Value]$^{1/N}$ - 1

Source: Researcher's Own Calculation.

The trend growth rate of RMG in the pre-liberalization regime is 130.27 per cent while the same is 13.91 per cent in the post-liberalization regime. The trend growth of RMG export for the entire study period is 40.21 per cent. The trend growth rate of non-RMG exports was 4.27 per cent in the pre-liberalization regime and 7.89 per cent in the post-liberalization

regime. The trend growth of non-RMG export for the entire study period was 5.65 per cent.

**Chow Breakpoint Test for RMG Export:**

The structural change in export of RMG and Non-RMG due to the liberalization of trade is tested by Chow Test (Table 8).

Table 8 : Chow Breakpoint Test for RMG: 1989

| Test | Test Statistics | P-value |
|---|---|---|
| F-statistic | 205.18 | 0.000 |
| Log likelihood ratio | 91.33 | 0.000 |

The critical value of F at 2 and 30 degree of freedom ($F_{df\ 2, 30}$) is 19.5 at 5% and 99.5 at 1% level of significance. Since the calculated value of F equals to 205.18 is greater than the critical values of F at both 5% and 1% level of significance, the null hypothesis of no structural change is rejected. It can be concluded that there is presence of statistically significance structural breakpoint in the exports of RMG between pre-liberalization and post-liberalization periods.

**Chow Breakpoint Test for Non-RMG Export:**

The Chow test is also conducted for exports of Non-RMG commodities by using the same procedure and the calculated F is found as 9.78 and p value is 0.000 (Table 9).

Table 9: Chow Breakpoint Test for Non-RMG: 1989

| Test | Test Statistics | P-value |
|---|---|---|
| F-statistic | 9.78 | 0.000 |
| Log likelihood ratio | 17.07 | 0.000 |

The calculated F-statistic is greater than the critical value of F at 2, 30 degree of freedom ($F_{df\ 2, 30}$) is at both 5% and 1% level of significance. Since the calculated value of F is greater than the critical values of F at both 5% and 1% level of significance, the null hypothesis of no structural change is rejected. So it can be concluded that there is also structural breakpoint in the exports of Non-RMG.

**Growth Trend of Primary and Manufactured Exports:**

The Trend Growth Rates for Exports of Primary and Manufactured Commodities are shown in Table 10.

Table 10: Trend Growth Rates for Exports of Primary and Manufactured Commodities

| Period | Estimated Trend Regression | TGR[1] (%) |
|---|---|---|
| Pre-liberalization 1972-1973 to 1989-1990 | LPEX= 4.90 + 0.053T | 5.41 |
| | LMEX = 5.16 + 0.099T | 10.45 |
| Post-liberalization 1990-1991 to 2009-2010 | LPEX= 4.68 + 0.054T | 5.59 |
| | LMEX = 5.18 + 0.119T | 12.58 |
| Overall 1972-1973 to 2009-2010 | LPEX= 4.94 + 0.046T | 4.70 |
| | LMEX = 4.97 + 0.124T | 13.20 |

*Note:* TGR = [Anti-log of estimated b - 1] X 100

Source:   Researcher's Own Calculation.

The trend growth rate of export of primary commodities was 5.41 per cent in the pre-liberalization regime while the same was 5.59 per cent in the post-liberalization regime.   The trend growth of export of manufactured commodities was 10.45 per cent in the pre-liberalization period and the same was 12.58 per cent in the post-liberalization period. The trend growth of export of primary commodities for the entire study period was 4.70 per cent while the trend growth rate of the export of manufactured commodities was 13.20 per cent. Therefore, it can be concluded that the export of manufactured commodities increased in the post-liberalization period as compared to the export of primary commodities.

**Chow Breakpoint Test for Export of Primary Commodities:**

The structural stability of the export of primary commodities is tested by chow breakpoint test (Table 11).

Table 11 : Chow Breakpoint Test for Export of Primary Commodities: 1989

| F-statistic | 2.089972 | Prob. F(2,34) | 0.139297 |
|---|---|---|---|
| Log likelihood ratio | 4.406096 | Prob. Chi-Square(2) | 0.110466 |

The test result confirms that there exists no structural breakpoint in the series of  exports of primary commodities from Bangladesh during the study period. Since the F-statistic is 2.089 which is lower than the F-

critical value and it is also confirmed by the p-value equals to 0.139 which is greater than any level of significance ($\alpha$).

## Chow Breakpoint Test for Export of Manufactured Commodities:

The structural stability of the export of manufactured commodities is tested by chow breakpoint test (Table 12).

### Table 12: Chow Breakpoint Test for Export of Manufactured Commodities: 1989

| F-statistic | 11.04789 | Prob. F(2,34) | 0.000201 |
|---|---|---|---|
| Log likelihood ratio | 19.02660 | Prob. Chi-Square(2) | 0.000074 |

The test result confirms that there exists structural breakpoint in 1989 in the series of exports of manufactured commodities from Bangladesh during the study period. Since the F-statistic is 11.04 which is higher than the F-critical value and it is also confirmed by the p-value equals to 0.000 which is lower than any level of significance ($\alpha$).

## Growth Trend of Exports of Selected Commodities.

The growth trend of exports of selected commodities such as leather, jute goods, frozen foods and pharmaceuticals are presented in Table 13.

### Table 13: Growth Trend of Exports of Selected Commodities[17]: 1972 - 2010

| Period \ Exports | Estimated Trend Equations | | |
|---|---|---|---|
| | Pre-liberalization 1972-1989 | Post-liberalization 1990-2010 | Overall 1972-2010 |
| Tea | TEA= 2.97 + 0.057T | LTEA=5.70 - 0.093T | LTEA=3.76- 0.025T |
| | TGR¹ (%) = 5.85 | TGR¹ (%) = (-) 9.69 | TGR¹ (%) = (-) 2.51 |
| Leather | LLHR=2.91 + 0.122T | LLHR=4.57+ 0.025T | LLHR=3.46- 0.065T |
| | TGR¹ (%) = 13.02 | TGR¹ (%) = 2.53 | TGR¹ (%) = 6.66 |
| Jute Manufactures | LJMF=5.29 + 0.034T | LJMF=5.48+ .0075T | LJMF= 5.51 + .007T |
| | TGR¹ (%) = 3.46 | TGR¹ (%) = 0.75 | TGR¹ (%) = 0.78 |
| Raw Jute | LJMF= 4.83 - .0080T | LJMF=3.53+ .0365T | LJMF = 4.71 - .002T |
| | TGR¹ (%) = (-) 0.81 | TGR¹ (%) = 3.72 | TGR¹(%) = (-) 0.28 |
| Frozen Foods | LTEA=1.34 + .0235T | LTEA= 4.00 + .06T | LFF= 2.39 + .0119T |
| | TGR¹ (%) = 26.48 | TGR¹ (%) = 6.29 | TGR¹ (%) = 12.64 |
| Pharmaceuticals | LPHAR=-3.00+ 048T | LPHAR=-3.89+ .21T | LPHAR=-4.31+ .21T |
| | TGR¹ (%) = 4.89 | TGR¹ (%) = 22.88 | TGR¹(%) =23.74 |

*Note:*  1.  TGR = [Anti-log of estimated b - 1] X 100
       2.  Log means natural logarithm
Source:  Researcher's own calculation.

## Market Concentration of Bangladesh Exports:

The export of Bangladesh is not only concentrated by products but also by destination. More than 50 per cent of total export is gone to only five countries such as the USA, the UK, Germany, France and Belgium. Here

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[17] Tea, Leather, Jute Goods, Frozen Foods and Pharmaceuticals.

the growth trend of country wise export and the share of total export are analyzed. The share of exports to the above mentioned five countries in total exports is shown in Table 6.14.

Table 14: Share of Exports of Five Countries in Total Exports.

| Year | Total Export (in Mn US$) | Exports to Five Countries (in Mn US$) | Share in Total Exports (%) |
|---|---|---|---|
| 1972-1973 | 348.42 | 140.21 | 40.20 |
| 1977-1978 | 493.74 | 136.61 | 27.70 |
| 1982-1983 | 686.60 | 161.12 | 23.50 |
| 1987-1988 | 1231.20 | 559.48 | 45.40 |
| 1992-1993 | 2382.89 | 1432.64 | 60.10 |
| 1997-1998 | 5161.20 | 3459.28 | 67.00 |
| 2002-2003 | 6548.44 | 4462.11 | 68.10 |
| 2007-2008 | 14110.80 | 8580.92 | 60.80 |
| 2008-2009 | 15565.19 | 9263.82 | 59.50 |

Source: Researcher's Own Calculation.

The share of exports of five countries was 40.20 per cent in 1972-1973, 27.70 per cent in 1977-1978, 23.50 per cent in 1982-1983, 45.40 per cent in 1987-1988 during the pre-liberalization regime. On the other hand, the share of exports of the same five counties was 60.10 in 1992-1993, 67,00 per cent in 1997-1998, 68.10 per cent in 2002-2003, 60.80 per cent in 2007-2008 and 59.50 per cent in 2008-2009 during the post-liberalization regime. It is evident that the export of Bangladesh is heavily concentrated in the five markets.

The trend growth rates of exports to major destination is presented in Table 15. The TGR of exports to the USA was 12.84 per cent in the pre-liberalization period and 10.69 per cent in the post-liberalization period. The TGR of exports to the UK was 6.50 per cent in the pre-liberalization period and 13.66 per cent in the post-liberalization period. The TGR of exports to the Germany was 14.3 per cent in the pre-liberalization period and 16.15 per cent in the post-liberalization period.

Table 15: Trend Growth Rates of Exports to Major Destination.

| Country | Period | Estimated Trend Equation | TGR[1] |
|---|---|---|---|
| USA | Pre-liberalization | 3.57 + 0.121T | 12.84 |
| | Post-liberalization | 4.61 + 0.102T | 10.69 |
| | Overall | 3.49 + 0.138T | 14.87 |
| UK | Pre-liberalization | 3.11 + 0.063T | 6.50 |
| | Post-liberalization | 2.66 + 0.128T | 13.66 |
| | Overall | 2.59 + 0.127T | 13.57 |
| Germany | Pre-liberalization | 1.38 + 0.135T | 14.39 |
| | Post-liberalization | 2.27 + 0.149T | 16.16 |
| | Overall | 0.99 + 0.190T | 20.95 |
| France | Pre-liberalization | 1.59 + 0.071T | 7.34 |
| | Post-liberalization | 2.40 + 0.123T | 13.07 |
| | Overall | 0.87 + 0.169T | 18.57 |
| Belgium | Pre-liberalization | 2.45 + 0.121T | 9.09 |
| | Post-liberalization | 2.61 + 0.098T | 10.31 |
| | Overall | 2.30 + 0.108T | 11.35 |
| Total Five Countries | Pre-liberalization | 1.37 + 0.209T | 23.23 |
| | Post-liberalization | 0.56 + 0.004T | 0.41 |
| | Overall | 1.42 + 0.325T | 38.40 |

*Note:* TGR = [Anti-log of estimated b - 1] X 100

Source:  Researcher's Own Calculation.

The TGR of exports to the France was 7.34 per cent in the pre-liberalization period and 13.07 per cent in the post-liberalization period. The TGR of exports to the Belgium was 9.09 per cent in the pre-liberalization period and 10.31 per cent in the post-liberalization period. The overall trend growth of exports to the five countries was 38.40 per cent.

The degree of market concentration of Bangladesh's export is measured by Herfindhal and Finger-Kreinin market concentration indices is presented in Table 6.16. The higher the value of the index, the high the degree of concentration. The concentration is based on exports to five countries.

Table 16: Market Concentration of Bangladesh Export

| Year | Herfindhal (H) Index | Finger-Kreinin(FK) Index |
|---|---|---|
| 1972-1973 | 0.162 | 0.101 |
| 1977-1978 | 0.076 | 0.038 |
| 1982-1983 | 0.055 | 0.017 |
| 1987-1988 | 0.206 | 0.127 |
| 1992-1993 | 0.361 | 0.201 |
| 1997-1998 | 0.449 | 0.235 |
| 2002-2003 | 0.464 | 0.241 |
| 2007-2008 | 0.369 | 0.204 |
| 2008-2009 | 0.354 | 0.198 |

Note: $H = \sum_{a=1}^{n} \left( \frac{BXa}{BXW} \right)^2$ ; $0 < H < 1$

$FK = \sum_{a=1}^{n} \left( \frac{BXa}{BXW} - \frac{1}{n} \right)/2$ ; $0 < FK < 1$

Source: Estimated from Table 11.

Here H represents Herfindhal Index and FK represents Finger-Krenin Index. $_BX_a$ means Bangladesh export to country 'a' while $_BX_W$ means Bangladesh export to the world. Both the indices are constructed based on Bangladesh exports to major five countries. The Herfindhal Index is 0.162 in 1972-1973 which becomes lower to 0.076 in 1977-1978 and 0.055 in 1982-1983. The index has jumped to 0.206 in 1987-1988 and it has been on increasing trend becoming 0.464 in 2002-2003. The Herfindhal Index based on five countries has become slightly lower in recent years such as 0.369 and 0.354 in 2007-2008 and 2008-2009 respectively. On the other hand the Finger-Krenin Index is estimated as 0.101 in 1972-1973, 0.038 in 1977-1978, 0.017 in 1982-1983, 0.127 in 1987-1988. It has sharply increased to 0.201 in 1992-1993, to 0.235 in 1997-1998, to 0.241 in 2002-2003. The Finger-Krenin Index has declined slightly to 0.204 in 2007-2008 and 0.198 in 2008-2009. It is clearly seen in the Table 16 that market concentration has been increased in respect to the five countries concerned substantially during the post-liberalization period.

**Econometric Approach of Model Estimation:**

**The aggregate export demand model is specified as:**

$$LRX_t = \beta_1 + \beta_2 LRPX_t + \beta_3 LWY_t + \beta_4 LIBD_t + \varepsilon_t , (\varepsilon_t \sim N(0, \sigma^2))$$

[$LRX_t$ = Real Exports in log form, $LRPX_t$= Relative Price of Exports in log form, $LWY_t$ = World Income in log form, $LIBD_t$ = Liberalization Shift Dummy, $\varepsilon_t$ = Error Term, $\beta$ = Coefficients

**Test of Stationary of the Variables of Aggregate Export Demand Model:**

To check the Stationarity of the variables, expect the liberalization dummy, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests have been conducted both at levels and at the first difference of each variable of the Aggregate Export Demand Model of Bangladesh.

**ADF Unit Root Test**

Augmented Dickey-Fuller (ADF) test of the Aggregate Export Demand Model is shown in Table 17.

Table 17: ADF Unit Root Test of Export Demand Model
Null Hypothesis: $H_0$ ; The concerned variable has a unit root

| Variables | Level / First Difference | Intercept | Intercept and Trend | Conclusion |
|---|---|---|---|---|
| LRX | Level | -0.554 (0.986) | -2.859 (0.186) | I(1) and I(1) Non-stationary |
| | First Difference | -6.976 (0.000) | -6.971 (0.000) | I(0) and I(0) Stationary |
| LRPX | Level | -1.122 (0.696) | -3.690 (0.035) | I(1) and I(1) Non-Stationary |
| | First Difference | -8.591 (0.000) | -8.470 (0.000) | I(0) and I(0) Stationary |
| LRWY | Level | -4.080 (0.003) | -1.380 (0.849) | I(0) and I(1) Inconclusive |
| | First Difference | -5.195 (0.000) | -5.944 (0.000) | I(0) and I(0) Stationary |

Note:
1. ADF test Critical Values for model with intercept: -3.62 for 1% level of significance, -2.94 for 5% level of significance and -2.61 for 10% level of significance.
2. ADF test Critical Values for model with intercept and trend: -4.23 for 1% level of significance, -3.54 for 5% level of significance and -3.20 for 10% level of significance.
3. Unit Root Tests are performed by Econometric Software E-Views 5.0.
4. Figures in Parenthesis show p-values.

It is observed from the above ADF test (Table 17) that most of the variables are non-stationary at the level for model with intercept and intercept and trend. But it is interesting to note that all the variables are I(0) i.e. stationary at the first difference for model with intercept and intercept and trend.

**Co-integration Test:**

The Co-integration test conducted by maximum eigenvalue is shown in Table 18. The null hypothesis of 'no cointegrating relationship (r = 0)' is rejected at 5% level of significance. The other cases of null hypotheses are not rejected at any level. Therefore, it can be concluded that there is only one conintegrating vector at 5% level of significance.

Table 18: Johansen Co-integration Test Based on Maximum Eigenvalue Trend assumption: Linear deterministic trend Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

| Hypothesis | | Eigenvalue | Max-Eigen Statistics | 0.05% Critical Value | p-value** |
|---|---|---|---|---|---|
| Null | Alternative | | | | |
| r* = 0 | r = 1 | 0.496 | 24.70 | 24.14 | 0.042 |
| r   1 | r = 2 | 0.338 | 14.88 | 17.79 | 0.130 |
| r   2 | r = 3 | 0.228 | 9.32 | 11.22 | 0.105 |
| r   3 | r = 4 | 0.001 | 0.43 | 4.12 | 0.864 |

*Note:* Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The Co-integration test conducted by trace test is shown in Table 19. The null hypothesis of 'no cointegrating relationship (r = 0) is rejected at 5% level of significance. The other cases of null hypothesis are not rejected at any level. Therefore, it can be concluded that there is only one conintegrating vector at 5% level of significance.

Table 19: Johansen Co-integration Test Based on Trace Test Trend Assumption: Linear Deterministic Trend Unrestricted Cointegration Rank Test (Trace)

| Hypothesis | | Eigenvalue | Trace Statistics | 0.05% Critical Value | p-value** |
|---|---|---|---|---|---|
| Null | Alternative | | | | |
| r* = 0 | r = 1 | 0.496 | 48.96 | 40.17 | 0.005 |
| r   1 | r = 2 | 0.338 | 24.25 | 24.27 | 0.050 |
| r   2 | r = 3 | 0.228 | 9.37 | 12.32 | 0.148 |
| r   3 | r = 4 | 0.001 | 0.04 | 4.12 | 0.864 |

*Note:* Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

## Granger Causality Test of Export Demand:

The casual relationship among the variables of the aggregate export demand model is presented in Table 6.33. It reveals that there is no casual relationship between Real Export Demand (RX) and Relative Price of Export (RPX). There is no casual relationship between Real World Income (RWY) and Real Export Demand. Real World Income has granger cause to relative price of Export. Relative price has granger cause to liberalization.

Table 20: Granger Causality Test of the Aggregate Export Demand Model

| Sl. | Null Hypothesis | F-Statistics | Probability |
|---|---|---|---|
| 1 | LOG(RPX) does not Granger Cause LOG(RX) | 0.81225 | 0.45308 |
| 2 | LOG(RX) does not Granger Cause LOG(RPX) | 1.31245 | 0.28370 |
| 3 | LOG(RWY) does not Granger Cause LOG(RX) | 1.47351 | 0.24473 |
| 4 | LOG(RX) does not Granger Cause LOG(RWY) | 0.32837 | 0.72257 |
| 5 | LIBD does not Granger Cause LOG(RX) | 1.21910 | 0.30927 |
| 6 | LOG(RX) does not Granger Cause LIBD | 1.80791 | 0.18086 |
| 7 | LOG(RWY) does not Granger Cause LOG(RPX) | 4.15660 | 0.02516 |
| 8 | LOG(RPX) does not Granger Cause LOG(RWY) | 0.22468 | 0.80006 |
| 9 | LIBD does not Granger Cause LOG(RPX) | 1.71090 | 0.19733 |
| 10 | LOG(RPX) does not Granger Cause LIBD | 3.65275 | 0.03763 |
| 11 | LIBD does not Granger Cause LOG(RWY) | 0.79221 | 0.46180 |
| 12 | LOG(RWY) does not Granger Cause LIBD | 2.34717 | 0.11241 |

Note: Lag=2, Observation=35

Table 21: Direction of Causality Based on Granger Test

| Null Hypothesis | Results | Conclusion |
|---|---|---|
| $H_0 : 1$ | Accepted | Relative Price of Export has no Granger cause to Real Export Demand. |
| $H_0 : 2$ | Accepted | Real Export Supply has no Granger cause to Relative Price of Export. |
| Direction of Causality | | No casual relationship |
| $H_0 : 3$ | Accepted | Real World Income has no granger cause to Real Export Demand. |
| $H_0 : 4$ | Accepted | Real Export Demand has no Granger cause to Real World Income. |
| Direction of Causality | | No casual relationship |
| $H_0 : 5$ | Accepted | Liberalization has no Granger cause to Real Export Demand |
| $H_0 : 6$ | Accepted | Real Export demand has no Granger cause to Liberalization |
| $H_0 : 7$ | Rejected | Real World Income has no Granger cause to Relative Price |
| $H_0 : 8$ | Accepted | Relative Price has no Granger cause to Real World Income |
| $H_0 : 9$ | Accepted | Liberalization has no Granger cause to Relative Price |
| $H_0 : 10$ | Rejected | Relative Price has Granger cause to Liberalization |
| $H_0 : 11$ | Accepted | Liberalization has no Granger cause to Real World Income |
| $H_0 : 12$ | Accepted | Real World Income has no Granger cause to Liberalization |

Source: Researcher's Own Calculation.

## Estimation of Export Demand Model by OLS:

The export demand model is run by OLS method because all the variables are stationary at the first difference and they are cointegrated. The estimates are shown in Table 22.

$$LRX = -3.73 - 0.70LRPX + 1.53LRWY + 0.25LIBD$$

### Table 22: Regression Results of Export Demand Model Dependent Variable: LOG (RX)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -3.73 | 1.45 | -2.58 | 0.015 |
| LOG(RPX) | -0.70 | 0.32 | -2.22 | 0.033 |
| LOG(RWY) | 1.53 | 0.32 | 4.78 | 0.000 |
| LIBD | 0.25 | 0.12 | 2.13 | 0.040 |
| Test Statistics | | | | |
| R-squared | 0.95 | Mean dependent var | | 3.23 |
| Adjusted R-squared | 0.94 | S.D. dependent var | | 0.78 |
| S.E. of regression | 0.18 | Akaike info criterion | | -0.50 |
| Sum squared resid | 1.09 | Schwarz criterion | | -0.33 |
| Log likelihood | 13.51 | F-statistic | | 226.19 |
| Durbin-Watson stat | 1.95 | Prob(F-statistic) | | 0.000 |

All estimated coefficients are in expected sign and all are statistically significant (Table 6.35). The $R^2$ of the model is very high i.e. 0.95 and adjusted-$R^2$ is 0.94. It signifies that about 95 per cent variation in the dependent variable i.e. demand of real export (RX) is explained by the independent variables i.e. relative price of export demand (RPX), real income of the World (RWY) and Liberalization Dummy (LIBD). The DW statistic is high i.e. 1.95 and the F-statistics of the model is computed as 226.19. The mean of the dependent variable in logarithm is found as 3.23 and the standard deviation is 0.78. The relative price of real export is negatively related to the demand of real export as expected and the relationship is statistically significant at 5 per cent level meaning that relative price is an important determinant of export demand. The coefficient of real world income is positive meaning that the demand of real export has positively related with real world income and the relationship is statistically significant at 1 per cent level. The estimated coefficient of liberalization dummy is very low (0.25) but it is significant at 5 per cent level meaning that liberalization of trade has significant impact on the export demand performance of Bangladesh. So the policy makers should be more cautious in designing the trade policy reforms in Bangladesh for reaping the full benefit of trade liberalization.

The trend of Real Export, Real World Income and Relative price of Export is shown in Figures 6.6, 6.7 and 6.8. The real export demand has a smooth upward trend with some drifts. The world income has increasing trend with minor fluctuations. The relative price has declining trend.

### Vector Error Correction Model for Export Demand Model:

The estimated coefficients of VECM for aggregate export demand function is shown in Table 6.36. The short run elasticity of real export

demand is -0.250 with respect to real export at one lag and it is statistically significant at 5 per cent. The short run elasticity of real export demand is -0.076 with respect to relative price at one lag and it is statistically significant. The short run elasticity of real export demand is -0.643 with respect to real world income at one lag but it is not statistically significant. The short run elasticity of real export demand is 0.232 with respect to liberalization dummy is 0.15 and it is statistically significant at 5 per cent level of significance.

Table 23: Vector Error Correction Model for Export Demand Model

Dependent Variable: Δ Log (RX)

Method: Engale Granger Vector Error Correction

| Repressors | Coefficients | T-statistics | Test Statistics | |
|---|---|---|---|---|
| C (Intercept) | 0.092 | 1.59 | R-squared | 0.650 |
| Log(RX)(-1) | -0.250 | -0.89 | Adj. R-squared | 0.423 |
| Log(RX)(-2) | -0.028 | -0.11 | Sum sq. resids | 0.403 |
| Log(RPX)(-1) | -0.076 | -0.33 | F-statistic | 16.30 |
| Log(RPX)(-2) | 0.176 | 0.85 | D.W. | 1.55 |
| Log(RWY)(-1) | -0.643 | 0.48 | Ramsey RESET | 0.045 |
| Log(RWY)(-2) | 0.397 | 0.327 | HET | 2.60 |
| LIBD(-1) | 0.150 | 2.45 | Log likelihood | 21.12 |
| LIBD(-2) | -0.053 | -0.539 | Akaike AIC | -1.001 |
| ECT(-1) | -0.18 | -1.94 | Schwarz SC | -0.558 |

Source: Estimated from Appendix Table A.

The ECT is found negative (-0.18) means that any short run disequilibrium of mode will be converged in the long run. However, the low magnitude of the coefficient indicates the slow speed of adjustment.

**Vector Auto Regression Model for Aggregate Export Demand Model**

The estimated coefficients of VAR for aggregate export demand function is shown in Table 6.37. The short run coefficient of real export demand is 0.622 with respect to its own value at one lag and it is statistically significant at 5 per cent. The short run coefficient of real export demand is -0.362 with respect to relative price at one lag and it is statistically significant at 5 per cent. The sign of the coefficient is consistent with the usual demand law. The coefficient of real export demand is 1.01 with respect to real World Income at one lag which is statistically significant at 5 per cent level. The sign of this coefficient is consistent with law of income demand and it is greater than unity means the export demand is highly responsive with foreign income. The short run coefficient of real export demand is 0.095 with respect to liberalization dummy at one lag and it is statistically significant at 5 per cent.

## Table 24: VAR Estimates Aggregate Export Demand Model
## Dependent Variable: Log (RX)

| Repressors | Coefficients | T-statistics | Test Statistics | |
|---|---|---|---|---|
| C (Intercept) | -1.94 | -1.99 | R-squared | 0.605 |
| Log(RX)(-1) | 0.622 | 2.33 | Adj. R-squared | 0.366 |
| Log(RX)(-2) | 0.196 | 0.76 | Sum sq. resids | 0.403 |
| Log(RPX)(-1) | -0.362 | -0.15 | F-statistic | 376.30 |
| Log(RPX)(-2) | -0.266 | 1.42 | Log likelihood | 44.01 |
| Log(RWY)(-1) | 1.01 | 0.80 | Akaike AIC | -1.94 |
| Log(RWY)(-2) | -0.464 | -0.39 | Schwarz SC | -1.54 |
| LIBD(-1) | 0.095 | 1.96 | D.W. | 1.75 |
| LIBD(-2) | 0.056 | 0.57 | Ramsey RESET | 0.032 |

Source: Estimated from Appendix Table A 1.1.

### Short run and Long Run Elasticity of Aggregate Export Demand:

The short run and long run elasticities are shown in Table 6.38. The long run price elasticity of export demand is estimated -0.58 while income elasticity is 1.63. The short run price elasticity and income elasticity are -0.36 and 1.01 respectively. The income elasticity of export found in other studies is 1.58 (Emran and Shilpi, 1996), 1.83 (Islam and Hasan, 2004), 4.19 (Ahmed, 2001). The income elasticity of this study is consistent with other studies except Ahmed's study. The price elasticity of export demand is -0.58 which is consistent with the estimates of other studies such as -0.72 (Emran and Shilpi, 1996), -0.77 (Ahmed, 2001).

Table 25: Long Run and Short Run Elasticity of Aggregate Export Demand

| Dependent Variable: Log(RX) | | |
|---|---|---|
| Variables | Short Run | Long Run |
| Log(RPX) | -0.36 | -0.58 |
| Log(RWY) | 1.01 | 1.63 |
| LIBD | -0.09 | -0.152 |

Source: Table 24

### Impulse Responses based on VECM Model:

The impulse responses of the variables in VECM are presented in Figure 3. The impulse responses imply that the variables move 'too far away' from each other independently instead of moving together. The independent variables are responded with real export demand in a divergent way. The response of relative price to other variables is found uncorrelated and divergent. In case of real World Income other variables move independently. The response of liberalization dummy indicates that the variables move independently.

## Figure 3: Impulse Responses of the Export Demand Model in VECM
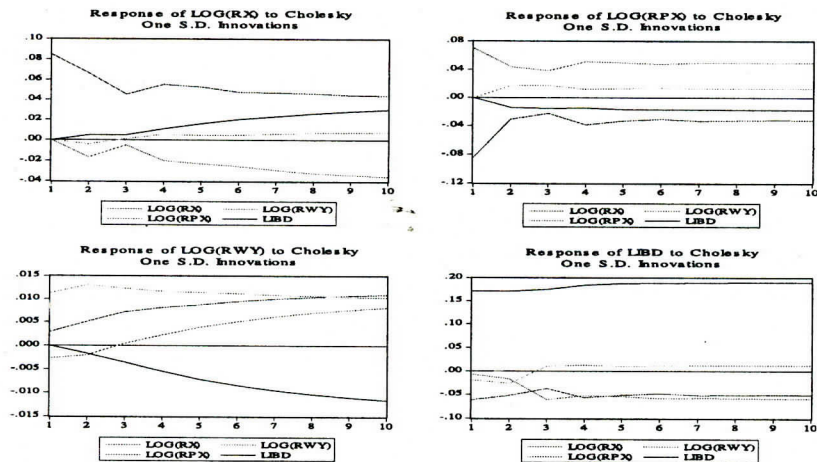


Source:  Estimated from Appendix Table A 1.1.

## Figure 4: Residuals of Export Demand Model
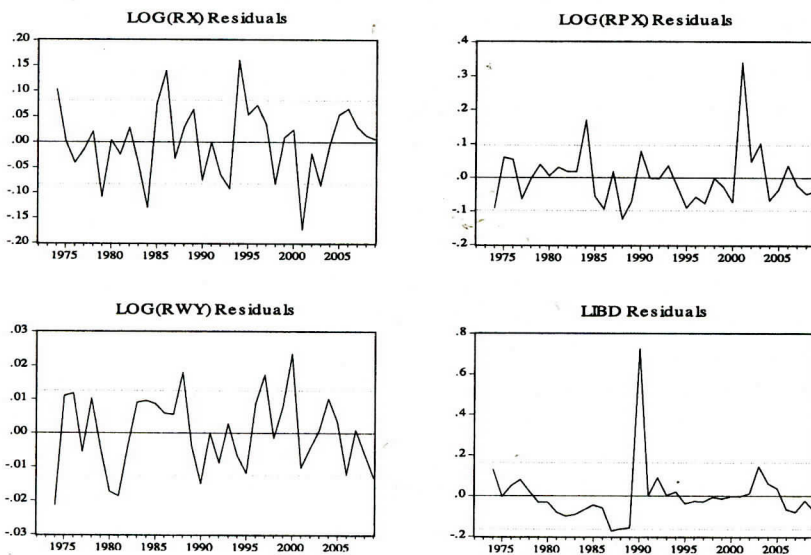


Source:  Estimated from Appendix Table A

## Conclusion:

This chapter analyses and explains the impacts of trade liberalization on exports in Bangladesh. It is observed that the TGR of exports in the pre-liberalization regime i.e. from 1972-1973 to 1989-1990 is 8.81 per cent while the same is 11.90 per cent in the post-liberalization period i.e. from 1990-1991 to 2009-2010. The TGR for the whole study period i.e. from 1972-1973 to 2009-2010 is estimated as 11.56 per cent. It indicates that the growth rates of exports are higher in the post-liberalization period. On the other hand, it is observed that the CAGR of exports in the pre-liberalization regime i.e. from 1972-1973 to 1989-1990 is 8.54 while the same is 11.88 per cent in the post-liberalization period i.e. from 1990-1991 to 2009-2010. The CAGR for the whole study period i.e. from 1972-1973 to 2009-2010 is estimated as 10.63 per cent. It can be concluded that trade reforms or trade liberalization in Bangladesh has positive impact on exports in Bangladesh. Chow Breakpoint test indicates that there is a structural change in exports of Bangladesh. It is evident from the value of Coppock Instability Index (CII) that the exports of Bangladesh in pre-liberalization period is more instable as compared to post-liberalization period as expected.

The price elasticity of export supply is estimated at 0.25, the income elasticity of export supply is estimated at 0.50 and the gross fixed capital formation elasticity of export supply is estimated at 0.73. The estimated coefficient of liberalization dummy is very low (0.16) which is insignificant meaning that liberalization of trade has not significant impact on the export supply performance of Bangladesh. Therefore, the policy makers should be more cautious in designing the trade policy reforms in Bangladesh for reaping the full benefit of trade liberalization. The relative price of real export is negatively related to the demand of real export as expected and the relationship is statistically significant at 5 per cent level meaning that relative price is an important determinant of export demand. The coefficient of real world income is positive meaning that the demand of real export has positively related with real world income and the relationship is statistically significant at 1 per cent level. The estimated coefficient of liberalization dummy is very low (0.25) but it is significant at 5 per cent level meaning that liberalization of trade has significant impact on the export demand performance of Bangladesh. The next chapter deals with the impacts of trade liberalization on trade balance.

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Table A: Export, Import, Real Export, Real GDP, Relative Price of Export Supply, Real Gross Capital Formation, Real World Income, Relative price of Export Demand, Real Effective Exchange Rate of Bangladesh.

| Year | Export (million US$) | Import (million US$) | RX (million US$) | RGDP (million Taka) | RPXs (1995-96 = 1.00) | RGCF (million Taka) | RWY (1995-96 = 100) | RPXd (1995-96 = 1.00) | REER (1995-96 = 100) | LIBD |
|---|---|---|---|---|---|---|---|---|---|---|
| 1972-73 | 348.42 | 650 | 74.46 | 19081 | 0.85 | 1140 | 50 | 1.74 | 90.00 | 0 |
| 1973-74 | 371.76 | 925 | 57.96 | 28993 | 1.15 | 2240 | 54 | 1.96 | 100.00 | 0 |
| 1974-75 | 382.68 | 1403 | 89.04 | 27808 | 1.10 | 5541 | 55 | 1.69 | 114.00 | 0 |
| 1975-76 | 380.47 | 1275 | 122.89 | 29382 | 1.25 | 4316 | 58 | 1.59 | 90.00 | 0 |
| 1976-77 | 417.01 | 875 | 163.75 | 30167 | 1.28 | 5104 | 61 | 1.61 | 101.00 | 0 |
| 1977-78 | 493.74 | 1349 | 155.51 | 32301 | 1.30 | 6443 | 63 | 1.6 | 138.00 | 0 |
| 1978-79 | 618.82 | 1556 | 159.86 | 33852 | 1.37 | 8106 | 66 | 1.68 | 156.00 | 0 |
| 1979-80 | 749.44 | 1372 | 158.82 | 34130 | 1.41 | 9028 | 68 | 1.86 | 137.00 | 0 |
| 1980-81 | 709.85 | 2533 | 212.08 | 35288 | 1.46 | 10603 | 69 | 2 | 146.00 | 0 |
| 1981-82 | 625.89 | 2572 | 268.61 | 35722 | 1.52 | 11825 | 70 | 1.51 | 155.00 | 0 |
| 1982-83 | 686.6 | 2309 | 337.44 | 37470 | 1.56 | 12783 | 72 | 1.34 | 170.00 | 0 |
| 1983-84 | 810.99 | 2353 | 315.15 | 39503 | 1.58 | 13431 | 75 | 1.22 | 178.00 | 0 |
| 1984-85 | 934.43 | 2647 | 319.76 | 40693 | 1.66 | 14714 | 78 | 1.2 | 172.00 | 0 |
| 1985-86 | 819.21 | 2364 | 475.17 | 42459 | 1.68 | 15601 | 81 | 1.36 | 145.00 | 0 |
| 1986-87 | 1073.77 | 2620 | 516.87 | 44234 | 1.69 | 16641 | 84 | 1.12 | 170.00 | 0 |
| 1987-88 | 1231.2 | 2986 | 534.25 | 45513 | 1.70 | 17998 | 87 | 1.13 | 155.00 | 0 |
| 1988-89 | 1291.56 | 3375 | 635.82 | 46661 | 1.72 | 19092 | 91 | 1.16 | 163.00 | 0 |
| 1989-90 | 1523.71 | 3759 | 722.29 | 49753 | 1.74 | 20431 | 93 | 1.11 | 162.00 | 0 |
| 1990-91 | 1717.55 | 3470 | 724.25 | 51444 | 1.78 | 21723 | 94 | 1.11 | 151.00 | 1 |
| 1991-92 | 1993.92 | 3463 | 879.87 | 53619 | 1.79 | 22031 | 95 | 1.05 | 179.00 | 1 |
| 1992-93 | 2382.89 | 3986 | 961.12 | 145568 | 1.85 | 23010 | 96 | 1.02 | 140.00 | 1 |
| 1993-94 | 2533.9 | 4250 | 1029.09 | 151514 | 1.81 | 25201 | 98 | 0.93 | 120.00 | 1 |
| 1994-95 | 3472.57 | 5834 | 1345.29 | 158976 | 1.84 | 27558 | 99 | 0.92 | 88.00 | 1 |
| 1995-96 | 3882.42 | 6947 | 1385.70 | 166324 | 1.00 | 30067 | 100 | 0.92 | 75.00 | 1 |
| 1996-97 | 4418.28 | 7162 | 1641.95 | 175285 | 1.86 | 33254 | 103 | 0.94 | 90.00 | 1 |
| 1997-98 | 5161.2 | 7524 | 1843.35 | 184448 | 1.92 | 36939 | 107 | 0.99 | 88.00 | 1 |
| 1998-99 | 5312.86 | 8018 | 1773.95 | 193429 | 1.93 | 41395 | 109 | 1.2 | 76.00 | 1 |
| 1999-00 | 5752.2 | 8403 | 2121.29 | 204928 | 1.95 | 45489 | 112 | 1.5 | 78.00 | 1 |
| 2000-01 | 6467.3 | 9335 | 2694.62 | 215735 | 1.98 | 48800 | 117 | 2.1 | 65.00 | 1 |
| 2001-02 | 5986.09 | 8540 | 2511.90 | 225261 | 2.10 | 51616 | 118 | 2.5 | 55.00 | 1 |
| 2002-03 | 6548.44 | 9658 | 2633.45 | 237101 | 2.15 | 55829 | 120 | 1.6 | 62.00 | 1 |
| 2003-04 | 7602.99 | 10903 | 3001.78 | 251968 | 2.30 | 60221 | 123 | 1.7 | 67.00 | 1 |
| 2004-05 | 8654.52 | 13147 | 3686.37 | 266975 | 2.38 | 65740 | 127 | 1.8 | 70.00 | 1 |
| 2005-06 | 10526.16 | 14746 | 4905.18 | 284673 | 2.45 | 72776 | 130 | 1.9 | 72.00 | 1 |
| 2006-07 | 12177.86 | 17157 | 6448.95 | 302971 | 2.25 | 78808 | 131 | 1.7 | 76.00 | 1 |
| 2007-08 | 14110.8 | 21629 | 5773.69 | 321726 | 2.20 | 85481 | 134 | 0.99 | 90.00 | 1 |
| 2008-09 | 15565.19 | 22507 | 6258.98 | 340197 | 2.34 | 87024 | 136 | 0.89 | 85.00 | 1 |

Source: IMF, International Financial Statistics (various issues).GOB, Bangladesh Economic Review (various issue).EPB, Export Statistics (various issues). Bangladesh Bank, Economic Trends (various issues).