# Impact of economic growth and financial development on exports: Cointegration and causality analysis in Pakistan

Shahbaz, Muhammad and Rahman, Mizanur

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**Impact of Economic Growth and Financial Development on Exports: Cointegration and Causality Analysis in Pakistan**

**M.M. Rahman and M. Shahbaz**

**Abstract:** The analysis shows cointegration between exports, economic growth and financial development in case of Pakistan. The results that economic growth and financial development stimulate rate of exports growth in Pakistan. The causality analysis reveals bidirectional causal relationship between financial development and economic growth, financial development and exports and exports and economic growth in case of Pakistan.

## I. Introduction

The relationship between export expansion and economic growth has drawn much attention of development economists until recently, and many empirical studies were conducted to examine the role of exports in the economic growth of developing countries from various perspectives (see Ullah et. al. 2009; Vohra 2001; Sengupta and Espana 1994; Ram 1985, 1987; Krueger 1990; Chow 1987; Balassa 1985; Feder 1982; Tyler 1981; and Michaely 1977). Most of these studies concluded that exports have a positive and significant impact on economic growth.

A considerable literature also exists on the relationship of financial development and economic growth (see Shahbaz et al. (2008, 2010); Shahbaz (2009); Shahbaz and Rahman 2010; Ang 2009; Choong and Lim 2009; Ljunwal and Li 2007; Hermes and Lensink 2003; and Omran and Bolbol 2003). All these studies advocate that well developed financial sector facilitates growth through various channels including export expansion.

Though export led growth is theoretically and empirically established, it can also be argued that causality runs from the growth of output to the growth of exports. In a growing economy some industries experience substantial changes in terms of learning and technological innovation; accumulation of human capital occurs; manufacturing experiences and technology transfer via foreign direct investment (FDI) are also observed. Under such a situation, output will still continue to grow even in the absence of outward-oriented policies. The growth of domestic demand will be lower than the growth of output in these prosperous industries; as a result it is likely that producers will sell their products in foreign markets. Hence economic growth will promote export growth in a country.

In contrast to positive growth-led export, a negative growth-led export is also plausible. It is likely to occur if consumers demand more exportable and non-traded goods. In this situation, an increase in domestic demand would induce an increase in domestic output with a decrease in exports. Therefore, output growth will lead to a reduction in exports growth (Lee and Huang, 2002).

A well-developed financial sector may also play a contributory role in export growth in addition to its impact on output growth (see Hur, et al. 2004, for example). Economies with higher level of financial development are more likely to have higher export shares in world trade.

Though literature on exports-led growth and financial development-growth nexus are substantial, literature on growth-led exports and financial development-exports nexus are still limited. This study aims to fill up this gap, and will enrich the existing literature. To the best of our knowledge, this is the first study in Pakistan as well as in South Asia with regard to the effect of economic growth and financial development on exports. The rest of the paper is organized as follows: section II provides literature review; section III presents modeling, data and methodological framework, section IV interprets the results, and finally, section V concludes the paper and presents some policy implications.

## II. Literature review

### *Growth-Export*

Growth affects trade (Rodriguez and Rodrik 2000 cited in Won et.al 2008) and vice versa. This is known as the relation between trade regime/outward orientation and growth in the development literature (Edwards 1993). Surveying more than 150 papers Giles and Williums (2000) find that there is no obvious agreement to whether the causality dictates export-led growth or growth-led exports. Bidirectional causality between exports and growth is possible (see Wernerheim 2000).

Using seasonally unadjusted quarterly data from 1987.1 to 2002.4 Alici and Ucal (2003) found only unidirectional causality from exports to output for Turkey, but Dritsaki, Dritsaki and Adamopoulos (2004) observed bidirectional causality between real GDP and real exports for Greece. Ahmad, Alam and Butt (2004) used undeflated annual data from 1972 to 2001 for Pakistan and found unidirectional causality from exports to GDP. Cuadros, Orts and Alguacil (2004) conducted a study for Mexico, Brazil and Argentina; they used seasonally adjusted quarterly data from late 1970s to 2000. Their experience is mixed; that is, they found unidirectional causalities from real exports to real GDP in Mexico and Argentina, and unidirectional causality from real GDP to real exports in Brazil.

Export-led growth is also confirmed by Ullah, et. al (2009) and Shirazi (2004) for Pakistan, Erfani (1999) for some developing countries in Asia and Latin America, Balaguer (2002) for Spain and Jordaan (2007) for Namibia. On the other hand, no evidence of unidirectional causality from exports to economic growth is found in Hong Kong, South Korea, Singapore and Taiwan in the study conducted by Darrat (1986). However, the study reveals the unidirectional causality from economic growth to export growth for Taiwan.

Amavilah (2003), Mah (2005) and Pazim (2009) found no significant relationship between exports and output growth. Amavilah (2003) conducted the study for Namibia using data from 1968 to 1992. Mah (2005) investigated the long-run causality between export and growth for China. Pazim (2009) tested the validity of export-led growth hypothesis for Indonesia, Malaysia, and the Philippines by using panel data analysis.

The literature on the relationship between export and growth presented above indicate that a generalized conclusion can never be drawn. The outcome is country specific, and it depends on certain characteristics of a specific country. Also what variables/considerations are being included, and how the study is being conducted are also matters in determining the outcome. Hence the importance of current study is realized.

***Financial Development- Export***

Financial sector development is considered as a potential source of comparative advantage for a country. Countries with a well developed financial sector are able to have an easier access to external finance for investment projects than those without (Hur et, al. 2004, Beck 2003, Beck and Levine 2001, Rajan and Zingales 1998, Kletzer and Bardhan 1987).

Becker and Greenberg (2003) found a positive impact of financial development on exports for a given industry and country-pair. They have used accounting standards, stock market capitalization over GDP, ratio of credit to the private sector over GDP, and new issues of equity and bonds over GDP as proxies for financial development and all these variables are positively related to the level of exports. However, if financial development were proxied for comparative advantage, exports should be decreasing in the financial development of the importer.

Exporting firms face large fixed costs. Financial development helps the exporting firms to acquire these fixed costs. Melitz (2002) realized the effects of fixed costs on firm composition in exporting industries. Roberts and Tybout (1997) also noted the importance of sunk costs in a firm's exports. They find that firm's current exporting status is considerably determined by its previous export experience.

Berman and Hericourt (2007) noted that financial health had a causal positive impact on firm's export participation, but not on export share. Empirically, evidence shows that financially developed countries export relatively more in financially vulnerable sectors (see Beck 2003, Manova 2005, Svaleryd and Vlachos 2005, Hur et al. 2006).

**Table-1: Descriptive Statistics and Correlation Matrix**

| Variables | $\ln GDP_t$ | $\ln FD_t$ | $\ln EXP_t$ |
|---|---|---|---|
| Mean | 13.7795 | 13.4441 | 7.0829 |
| Median | 13.7615 | 13.4366 | 7.0511 |
| Maximum | 14.2065 | 14.9378 | 7.5816 |
| Minimum | 13.2917 | 12.0535 | 6.3986 |
| Std. Dev. | 0.2286 | 0.8250 | 0.3028 |
| Skewness | 0.0848 | 0.1831 | -0.0503 |
| Kurtosis | 2.0643 | 2.0429 | 1.8925 |
| Jarque-Bera | 2.7881 | 3.2378 | 3.8127 |
| Probability | 0.2480 | 0.1981 | 0.1486 |
| $\ln GDP_t$ | 1.0000 | | |
| $\ln FD_t$ | 0.7803 | 1.0000 | |
| $\ln EXP_t$ | 0.4513 | 0.2227 | 1.0000 |

**Table-2: Estimation of Unit Root Tests**

| Variables | ADF Test | | DF-GLS Test |
|---|---|---|---|
| | T-calculated | Prob-value | T-calculated |
| $\ln GDP_t$ | -2.1713 (4) | 0.4975 | -1.9038(4) |
| $\Delta \ln GDP_t$ | -4.2129 (3)* | 0.0072 | -4.3750 (2)* |
| $\ln EXP_t$ | -1.6093 (4) | 0.7793 | -1.7571 (4) |
| $\Delta \ln EXP_t$ | -4.7425 (3)* | 0.0001 | -4.7248 (2)* |
| $\ln FD_t$ | -1.0912 (2) | 0.9230 | -1.1998 (2) |
| $\Delta \ln FD_t$ | -6.5572 (2)* | 0.0000 | -6.2183 (2)* |
| Variables | Ng-Perron Test | | |
| | MZa | MZt | MSB |
| $\ln GDP_t$ | -1.9541 (4) | -0.94701 | 0.48463 |
| $\Delta \ln GDP_t$ | -17.3258 (2)** | -2.93664 | 0.16949 |
| $\ln EXP_t$ | -5.0814(3) | -1.3348 | 0.2627 |
| $\Delta \ln EXP_t$ | -27.8375(2)* | -3.7287 | 0.1339SS |
| $\ln FD_t$ | -3.6375(1) | -1.2951 | 0.3560 |
| $\Delta \ln FD_t$ | -36.820(1)* | -4.2903 | 0.1165 |

Note: The asterisks * (**) denotes the significant at %1 (5%) level. The figure in the parenthesis is the optimal lag structure for ADF and DF-GLS tests, bandwidth for

the PP unit root test is determined by the Schwert (1989) formula

**Table-3: Lag Length Criteria**

| VAR Lag Order Selection Criteria | | | | | | |
|---|---|---|---|---|---|---|
| Lag | LogL | LR | FPE | AIC | SC | HQ |
| 0 | 55.66500 | NA | 4.46e-05 | -1.5047 | -1.4083 | -1.4664 |
| 1 | 309.5149 | 478.6883 | 4.08e-08 | -8.5004 | -8.1149 | -8.3473 |
| 2 | 334.2569 | 44.53571 | 2.61e-08 | -8.9501 | -8.2756 | -8.6822 |
| 3 | 354.1558 | 34.11241 | 1.92e-08 | -9.2615 | -8.2979 | -8.8788 |
| 4 | 391.9692 | 61.58171* | 8.48e-09* | -10.0848* | -8.8321* | -9.5872* |

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Where **GDP** is real GDP, **EXP** is real exports and FD is real domestic credit to private sector.

**Table-3: The Results of Cointegration Test**

| Panel I: Bounds Testing to Cointegration | | | |
|---|---|---|---|
| Estimated Model | $F_{EXP}(\ln EXP / \ln GDP, \ln FD)$ | $F_{GDP}(\ln GDP / \ln EXP, \ln FD)$ | $F_{FD}(\ln FD / \ln EXP, \ln GDP)$ |
| Optimal Lag Length | (4, 4, 4) | (4, 3, 3) | (2, 1, 2, 2) |
| F-Statistics | 8.175* | 2.634 | 4.479** |
| | Critical values ($T = 37$)# | | |
| | Lower bounds $I(0)$ | Upper bounds $I(1)$ | |
| 1 per cent level | 4.922 | 6.328 | |
| 5 per cent level | 3.920 | 4.904 | |
| 10 per cent level | 3.182 | 4.258 | |
| Panel II: Diagnostic tests | Statistics | Statistics | Statistics |
| $R^2$ | 0.7584 | 0.9707 | 0.8139 |
| Adjusted- $R^2$ | 0.6626 | 0.9616 | 0.7506 |
| CUSUM | Stable | Stable | Stable |
| CUSUMsq | Stable | Unstable | Stable |

Note: The asterisks * and **denotes the significant at 1% and 10% level. The optimal lag structure is determined by AIC. # Critical values bounds computed by surface response procedure developed by Turner (2006).

**Table-5: Long Run Elasticities**

Dependent Variable = $\ln EXP_t$

| Variable | Coefficient | Std. Error | T-Statistic |
|---|---|---|---|
| Constant | -3.5142 | 2.0217 | -1.7382*** |
| $\ln GDP_t$ | 0.5967 | 0.1960 | 3.0434* |
| $\ln FD_t$ | 0.1765 | 0.0543 | 3.2490* |

R-Squared = 0.8457
Adjusted R-Squared = 0.8414
S.E. of Regression = 0.1206
Akaike info Criterion = -1.3528
Schwarz Criterion = -1.2594
F-Statistic = 194.6664*

| **Diagnostic Tests** | **Statistics** |
|---|---|
| J-B Normality test | 1.2406 [0.5377] |
| ARCH LM test | 4.2203 [0.0436] |
| White Heteroscedisticity | 0.8448 [ 0.4339] |
| Ramsey RESET | 2.4433 [0.1236] |
| CUSUM | Stable** |
| CUSUMsq | Stable** |

Note: * and ** (***) denote significance at the 1% and 5% (10%) levels respectively.

**Table-6: Short Run Elasticities**

Dependent Variable = $\Delta \ln EXP_t$

| Variable | Coefficient | Std. Error | T-Statistic |
|---|---|---|---|
| Constant | 0.0077 | 0.0190 | 0.4063 |
| $\Delta \ln GDP_t$ | 0.4717 | 0.1189 | 3.9644* |
| $\Delta \ln FD_t$ | 0.0253 | 0.3370 | 0.0753 |
| $ECM_{t-1}$ | -0.5920 | 0.1156 | -5.1196* |

R-Squared = 0.4216
Adjusted R-Squared = 0.3661
S.E. of Regression = 0.1089
Akaike info Criterion = -1.5420
Schwarz Criterion = -1.4155
F-Statistic = 16.5270*
Durbin-Watson = 1.9514

| **Diagnostic Tests** | **Statistics** |
|---|---|
| J-B Normality test | 0.4956 [0.7805] |
| Breusch-Godfrey LM test | 1.3102 [0.2767] |
| ARCH LM test | 1.7365 [0.1919] |
| White Heteroscedisticity | 31488 [0.0303] |
| Ramsey RESET | 1.6015 [0.2093] |
| CUSUM | Stable** |
| CUSUMsq | Stable** |

Note: * and ** denote significance at the 1% and 5% levels SS respectively.

**Table-6: The Results of Granger Causality**

| Dependent variable | Type of Granger Causality | | | | | | |
|---|---|---|---|---|---|---|---|
| | Short-run | | | Long-run | Joint (short- and long-run) | | |
| | $\Delta \ln EXP_t$ | $\Delta \ln GDP_t$ | $\Delta \ln FD_t$ | $ECT_{t-1}$ | $\Delta \ln EXP_t, ECT_{t-1}$ | $\Delta \ln GDP_t, ECT_{t-1}$ | $\Delta \ln FD_t, ECT_{t-1}$ |
| | F-statistics [p-values] | | | [T-statistics] | F-statistics [p-values] | | |
| $\Delta \ln EXP_t$ | – | 4.9447** [0.0010] | 1.3922* [0.2558] | -0.6527* [-4.3669] | – | 8.3037* [0.0001] | 8.0412* [0.0001] |
| $\Delta \ln GDP_t$ | 18.9780* [0.0000] | – | 32.1154 [0.0000] | -0.4825* [-3.4183] | 16.6909* [0.0000] | – | 36.3915** [0.0000] |
| $\Delta \ln FD_t$ | 2.2923)*** [0.1091] | 50.2327* [0.0000] | – | -0.0478** [-2.1913] | 3.5889** [0.0182] | 34.1945** [0.0000] | – |

Note: The asterisks *, ** and *** denote the significant at the 1, 5 and 10 per cent levels, respectively.

| Year | $\ln EXP_t$ | $\ln FD_t$ | $\ln GDP_t$ |
|---|---|---|---|
| 1990Q1 | NA | NA | NA |
| 1990Q2 | NA | NA | NA |
| 1990Q3 | 6.398661 | 12.05357 | 13.29178 |
| 1990Q4 | 6.634902 | 12.10989 | 13.54571 |

| | | | |
|---|---|---|---|
| 1991Q1 | 6.637690 | 12.12744 | 13.42659 |
| 1991Q2 | 6.897430 | 12.17478 | 13.45184 |
| 1991Q3 | 6.613852 | 12.15499 | 13.37479 |
| 1991Q4 | 6.726173 | 12.23303 | 13.61537 |
| 1992Q1 | 6.791987 | 12.28499 | 13.49358 |
| 1992Q2 | 6.976413 | 12.31158 | 13.51863 |
| 1992Q3 | 6.610913 | 12.38518 | 13.38826 |
| 1992Q4 | 6.799417 | 12.46629 | 13.60930 |
| 1993Q1 | 6.719411 | 12.49875 | 13.53492 |
| 1993Q2 | 6.763316 | 12.53015 | 13.55375 |
| 1993Q3 | 6.698606 | 12.52068 | 13.45030 |
| 1993Q4 | 6.736984 | 12.61563 | 13.64769 |
| 1994Q1 | 6.758163 | 12.63328 | 13.57222 |
| 1994Q2 | 6.865475 | 12.66483 | 13.56972 |
| 1994Q3 | 6.715631 | 12.67099 | 13.47138 |
| 1994Q4 | 6.836453 | 12.76601 | 13.67703 |
| 1995Q1 | 6.768757 | 12.80225 | 13.62736 |
| 1995Q2 | 7.027576 | 12.83730 | 13.64997 |
| 1995Q3 | 6.569317 | 12.82631 | 13.53115 |
| 1995Q4 | 6.768374 | 12.95230 | 13.76094 |
| 1996Q1 | 7.014719 | 12.96756 | 13.67365 |
| 1996Q2 | 7.146075 | 12.98548 | 13.67732 |
| 1996Q3 | 6.774397 | 12.98764 | 13.56221 |
| 1996Q4 | 6.944571 | 13.09521 | 13.79222 |
| 1997Q1 | 6.897807 | 13.10872 | 13.68105 |
| 1997Q2 | 6.933034 | 13.13300 | 13.66101 |
| 1997Q3 | 6.846801 | 13.11618 | 13.55238 |
| 1997Q4 | 7.043957 | 13.22929 | 13.79567 |
| 1998Q1 | 6.943632 | 13.27769 | 13.71249 |
| 1998Q2 | 6.967632 | 13.29003 | 13.68998 |
| 1998Q3 | 6.881106 | 13.25695 | 13.58444 |
| 1998Q4 | 6.962192 | 13.37508 | 13.83414 |
| 1999Q1 | 6.895173 | 13.39448 | 13.72106 |
| 1999Q2 | 7.023803 | 13.42254 | 13.76216 |
| 1999Q3 | 6.950274 | 13.39951 | 13.62943 |
| 1999Q4 | 7.058288 | 13.46184 | 13.88126 |
| 2000Q1 | 6.999581 | 13.47171 | 13.75120 |
| 2000Q2 | 7.122602 | 13.45069 | 13.80570 |
| 2000Q3 | 7.089200 | 13.45122 | 13.66557 |
| 2000Q4 | 7.145909 | 13.56401 | 13.87053 |
| 2001Q1 | 7.180248 | 13.56417 | 13.79234 |
| 2001Q2 | 7.316886 | 13.52778 | 13.82302 |
| 2001Q3 | 7.246497 | 13.51310 | 13.70314 |
| 2001Q4 | 7.161082 | 13.60596 | 13.89777 |
| 2002Q1 | 7.085099 | 13.59331 | 13.81744 |
| 2002Q2 | 7.295828 | 13.59633 | 13.86085 |

| | | | |
|---|---|---|---|
| 2002Q3 | 7.266594 | 13.56243 | 13.73673 |
| 2002Q4 | 7.258730 | 13.69047 | 13.93278 |
| 2003Q1 | 7.263644 | 13.72011 | 13.88936 |
| 2003Q2 | 7.473229 | 13.78486 | 13.90870 |
| 2003Q3 | 7.356282 | 13.80840 | 13.80783 |
| 2003Q4 | 7.303871 | 13.95685 | 14.00387 |
| 2004Q1 | 7.332713 | 13.99248 | 13.96045 |
| 2004Q2 | 7.433763 | 14.05786 | 13.97980 |
| 2004Q3 | 7.444884 | 14.10812 | 13.88171 |
| 2004Q4 | 7.305095 | 14.25952 | 14.07775 |
| 2005Q1 | 7.466821 | 14.31285 | 14.03433 |
| 2005Q2 | 7.581688 | 14.35323 | 14.05367 |
| 2005Q3 | 7.553949 | 14.39756 | 13.94862 |
| 2005Q4 | 7.473968 | 14.51352 | 14.14466 |
| 2006Q1 | 7.479284 | 14.53641 | 14.10124 |
| 2006Q2 | 7.576401 | 14.56404 | 14.12059 |
| 2006Q3 | 7.508526 | 14.58133 | 14.01048 |
| 2006Q4 | 7.475008 | 14.67615 | 14.20652 |
| 2007Q1 | 7.423881 | 14.68501 | 14.16310 |
| 2007Q2 | 7.552038 | 14.72361 | 14.18245 |
| 2007Q3 | 7.482501 | 14.76672 | 14.07854 |
| 2007Q4 | 7.462384 | 14.80337 | 14.08610 |
| 2008Q1 | 7.438828 | 14.83873 | 14.09360 |
| 2008Q2 | 7.374880 | 14.87287 | 14.10105 |
| 2008Q3 | 7.315177 | 14.90589 | 14.10844 |
| 2008Q4 | 7.295681 | 14.93785 | 14.11578 |

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