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Relationship between service sector GDP and import & export trade: a case of Pakistan

Mohammad Shujaat Mubarik and Aurangzeb

Abstract

The main objective of this study has been to investigate whether augmenting service sector GDP can increase exports and imports or augmenting exports and imports accelerate service sector GDP. The study uses two approaches, namely Granger causality test in VAR analysis and Pesaran et al. (2001) ARDL approach for long run relationship analysis. Initially, the study develops three equations, and finds out that there exists long run relationship when exports and imports are used as dependent variables, but when service sector GDP is used as dependent variable, the null hypothesis of no co-integration is not rejected

Consequently, the model is left with two error correction equations, namely: (i) when exports are used as dependent variable, and (ii) when imports are used as dependent variable. The ECT of both equations are having appropriate signs and are found significant at 1% level. In Granger Causality test, between service sector GDP and exports, there exists a unidirectional relationship, where service sector GDP only causes exports, whereas in long run neither imports nor exports causes service sector GDP as there is no co-integration in this case. Hypothesis for co-integration has been accepted even at 10% level. In imports and exports cases, a unidirectional relationship exists where exports causes imports only; these results are aligned with the results of Konya et al. (2009) and Afzal and Murat (2010) which explain co-integration between import and export.

JEL Classification:F13, F14, F18, F31
Keywords: Service sector GDP, imports-export trade, Co-integration, Granger cause, ARDL.

I. INTRODUCTION

One of the prominent aspects of the Pakistani economy is the growing contribution of services sector in its GDP. In past few years, contribution of service sector towards GDP has robustly increased from 49% in year 1999 to 55% in year 2011. Economy of Pakistan is also facing problem of unfavorable balance of payments since its inception. Pakistan has tried a lot of strategies to make its foreign trade account favorable; she has been one of the countries which have adopted import substitution strategies, by producing the imported goods domestically. But implementation of such strategy has resulted in producing a non-competitive industrial structure.

Edward (1993) expounds that after the unsuccessful attempt of import substitution policy and owing to increased trend of globalization, the countries made a paradigm shift in 1960s and changed their focus to adopt an outward-oriented export based growth. Countries kept their prime target to augment their foreign exchange by accelerating exports. This strategy was also adopted to minimize the paying difficulties of a country. Keynes also had same thought that the export augmentation could expand production volumes through foreign trade multiplier.

Services sector is the fastest growing sector in Pakistan as well as in world economy. In the financial crisis of 2008, Pakistani services sector was the one which showed a good growth despite of heavy hands of global economy; the Pakistani service sector grew 7.1% during the year.

Pakistan's service sector comprises of storage and transport, wholesale and retail trade, finance and insurance, defense and public administration. Now in export led growth country needs to identify the sector which can influence the export. For this reason, a lot of studies have been conducted to explore the relationship between various sectors of GDP and export and import trade, in order to devise the right policy for making the balance of payment favorable. In this study, we will be testing the long run relationship between service sector GDP and import and export trade, using the well known econometric technique, the Autoregressive Distributed Lag (ARDL) modeling.

II. LITERATURE REVIEW

Developing countries like Pakistan usually face unfavorable structures of international trade and balance of payment. Many efforts are dedicated to devise the economic policies in a way that they can cause the better GDP growth with favorable balance of payment structure. In the same context a lot of studies have been conducted to find out the relationship between international trade and growth in GDP.

Murat (2010), highlighting the significance of international trade for developing countries, states that because the developing countries can materialize the economic growth with the help of export-led growth, so it should be their mainstay strategy for fostering growth. The issue has been the subject of research due to its prime importance. A lot of empirical research on this subject reveals a relationship between growth

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and foreign trade. It depicts a mix of the results, thus leaving no solid conclusion. Hussain and Afzal (2010) investigated the relationship between economic growth, exports and imports in Pakistan from 1990Q1 to 2008Q1 to see the success of export-led growth strategy. Their results showed that economic growth and exports are not co-integrated, suggesting the absence of long-run relationship. They also highlighted the absence of causality in Granger's sense between economic growth and exports as well as between imports and economic growth. However, they found imports and exports Granger-cause each other.

Li, Jiyang and In (2009) conducted a research on China's foreign trade. They took the data for the period 1990 to 2007. Applying Granger Causality test, they showed that there was causality between foreign trade and economic growth. Unit Root test revealed that the time series were integrated of order 1, I(1). Co-integration test confirmed a long run and sustained relationship between foreign trade and economic growth. Each 1% of increase in foreign trade made bigger the economy as much as 0.65 percent. Error Correction Model (ECM) results highlighted that a short term variation in economy will affect on economic growth in the same direction.

Chaudhary et al. (2007) carried out research to find the relationship between imports, exports and GDP. Their results highlight a long-run relationship among the three variables. Empirical results also show a feedback effect between import and output growth in the short-run for Bangladesh. This research also has found an interdependent effect between exports and output growth for Bangladesh. Singh (2007) has conducted a study to find the relationship between industrial and agricultural sector GDP and imports and exports. They concluded that exports and imports jointly and individually caused GDP, supporting the export-led growth hypothesis.

Wörz (2005) investigated the correlations between structure of trade and commercial competency and the increase in the income per capita. He took the data of 45 OECD and Latin American countries for the period of 1981 to 1997. His prime findings unveil that in long term, changes in exports build a positive impact on the growth, while the effect of import was vague. The findings refute that imports and exports have effects on the growth in long term. It had also been observed that exports and imports had important differences in economic development. Yosoff (2005) conducted a study in Malaysia. By taking the data from 1974:1 to 2004:4, he tried to explain the impact of bilateral import and bilateral export on the economic growth. He applied Granger causality test for the analysis. While comparing bilateral import with export, he concluded that bilateral imports had relatively higher effect on economic growth as compared to bilateral export. It was further confirmed that both foreign trade variables had a causality relationship with economic growth.

Ahmed et al. (2000) have investigated the export driven GDP and GDP growth led export hypotheses; they have found that neither the export-driven GDP growth, nor the GDP growth-led export promotion hypotheses were supported in all the cases investigated.

Berg (1997) investigated the relationship between foreign trade and economic growth for period from 1960 to 1976 in Mexico. He found a strong positive relationship between foreign trade and economic growth. Jung and Marshal (1985), conducted research on developed countries by applying Granger Causality technique. They used the data between 1950 and 1980. Their study indicates that in developed countries, there is a causal relationship between the increase in export and economic growth. The study also found a strong relationship between international trade and economic growth.

In GDP growth, the contribution of each of the major GDP sectors is one major issue. Presently the service sector comprises of major portion of Pakistan GDP. Policy makers are seeking whether the promoting of service sector GDP can make the balance of payment favorable, and/or focusing on international trade can augment the services sector GDP.

III. RESEARCH METHODOLOGY

Since the prime focus of this study is to find out the long run relationship between imports, exports and service sector GDP, we have primarily used Granger Causality test using Pesaran et al. (2001) ARDL approach. First, for establishing the order of integration of variables, we have used the Augmented Ducky Fuller test (ADF), Philips Perron test (PP), and Kwiatkowski-Philips-Schmidt-Shin (KPSS) test to find out the unit roots in the series. In second step, investigation of the existence of long run relationship has been done under Pesaran et al. (2001) ARDL approach. This approach is preferred because of some benefits detailed as follows:

a) Simultaneous estimation of long and short run parameters of the model under study.
b) The approach is applicable irrespective of whether the underlying repressors are purely I(0), I(1), or mutually integrated.
c) Problem of endogeneity does not arise.

The Pesaran et al. (2001) ARDL process involves exploring the presence of a long run relationship in the shape of the unrestricted error correction model for each of the variables included, as follows:

$$\Delta LM = \lambda_0 M + \sum \lambda_i M \Delta LM_{t-1} + \sum \lambda_i M \Delta LX_{t-1} + \sum \lambda_i M \Delta LGDPS_{t-1} + \beta_1 MLM_{t-1} + \beta_2 MLX_{t-1} + \beta_3 MLGDPS_{t-1} + v_{1t} \quad (1)$$

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$$\Delta LX = \lambda_0 X + \sum \lambda_i X \Delta LX_{t-1} + \sum \lambda_i X \Delta LM_{t-1} + \sum \lambda_i X \Delta LGDPS_{t-1} + \beta_1 X LX_{t-1} + \beta_2 X LM_{t-1} + \beta_3 X GDPS_{t-1} + v_{2t} \quad (2)$$

$$\Delta LGDPS = \lambda_0 G + \sum \lambda_i G \Delta LGDPS_{t-1} + \sum \lambda_i G \Delta LX_{t-1} + \sum \lambda_i G \Delta LM_{t-1} + \beta_1 G GDPS_{t-1} + \beta_2 G LX_{t-1} + \beta_3 G LM_{t-1} + v_{3t} \quad (3)$$

Where LM, LX & LGDPS represent natural logarithm of imports, exports and service sector GDP, respectively. Relationship in long run is evaluated, using Wald test, F-statistics and Chi Square.

a) Null hypothesis for Equation 1 is:
$\beta_1 M = \beta_2 M = \beta_3 M = 0 \rightarrow$ No Co integration

b) Null hypothesis for Equation 2 is:
$\beta_1 X = \beta_2 X = \beta_3 X = 0 \rightarrow$ No Co integration

c) Null hypothesis for Equation 3 is:
$\beta_1 G = \beta_2 G = \beta_3 G = 0 \rightarrow$ No Co integration

The Pesaran et al. (2001) have developed two sets of critical values. One set assumes that all variables are I(0) and the other set assumes, they are all I(1). Acceptance or rejections of hypotheses are decided by comparing the calculated values with Pesaran values. When the co-integration has been found between any of the variables, error term is developed by normalizing the coefficients and an Error Correction model is developed, as follows. Since in our case, co-integration has been found in two equations, so we have developed only two error correction models.

$$\Delta LM = \lambda_0 M + \psi ECTM_{t-1} + \sum \lambda_i M \Delta LM_{t-1} + \sum \lambda_i M \Delta LX_{t-1} + \sum \lambda_i M \Delta LGDPS_{t-1} + v_{1t} \quad (4)$$

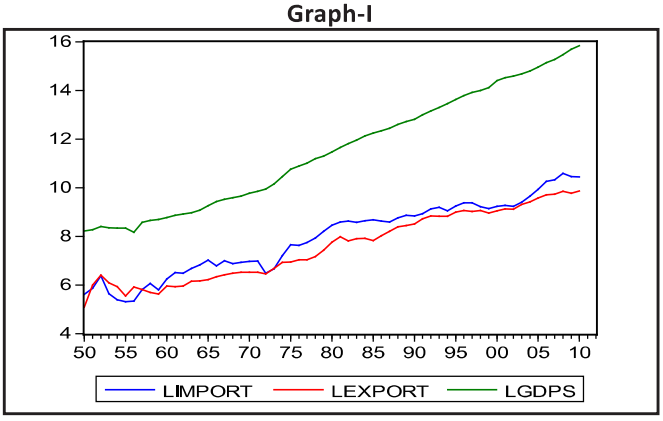
$$\Delta LX = \lambda_0 X + \psi ECTX_{t-1} + \sum \lambda_i X \Delta LX_{t-1} + \sum \lambda_i X \Delta LM_{t-1} + \sum \lambda_i X \Delta LGDPS_{t-1} + v_{2t} \quad (5)$$

Where ECTM and ECTX, respectively, represent the error correction terms of equation 1 and 2.

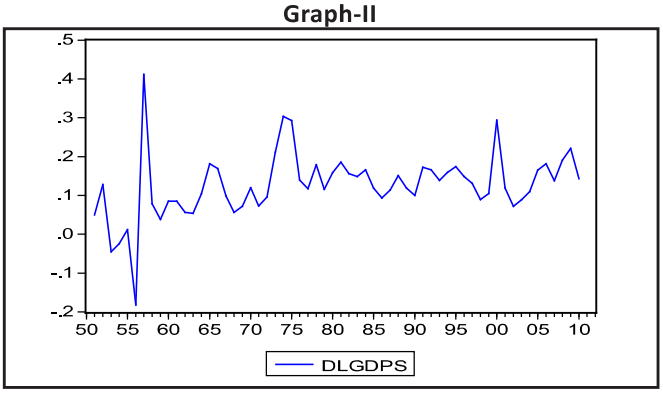
IV. DATA

Annual data for sixty one years from 1950 to 2010 have been used. The data for Pakistani exports, imports and service sector GDP have been taken at constant prices, in Pakistani Rupees. The sources of data have been the State Bank of Pakistan's statistical handbooks. All data series have been converted in to natural logarithms before proceeding for analysis. The transformed data series are symbolized as LGDPS (natural log of service GDP), LEXP (natural log of total exports), and LIMP (natural log of total imports), respectively, and are exhibited in graphs as follows:

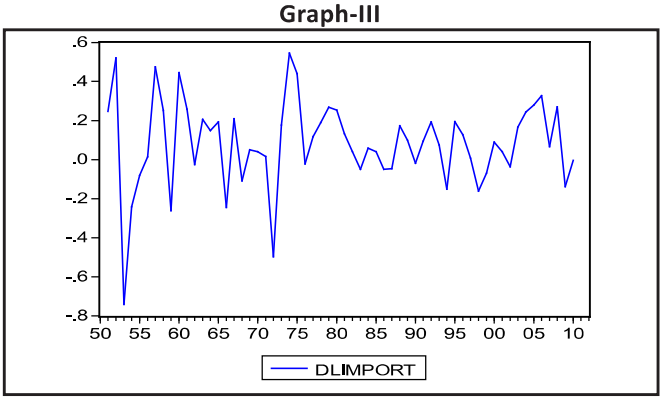
Graph-I



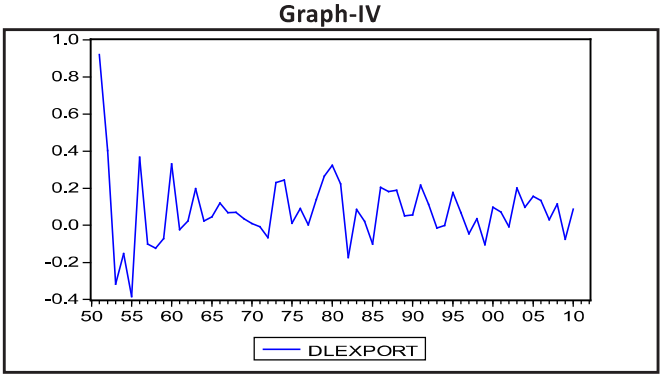
Graph-II



Graph-III



Graph-IV



A. Data properties

Before going for further analysis, it is important to check data

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for its stationarity. For checking stationarity, ADF, KPSS, PP and DP tests are used. For results, readers may refer to Appendix I.. The results of all the tests are showing that all the variables are integrated of order I(1) at 1% level, as is evident from the results of ADF, PP and KPSS tests.

V. EMPIRICAL RESULTS

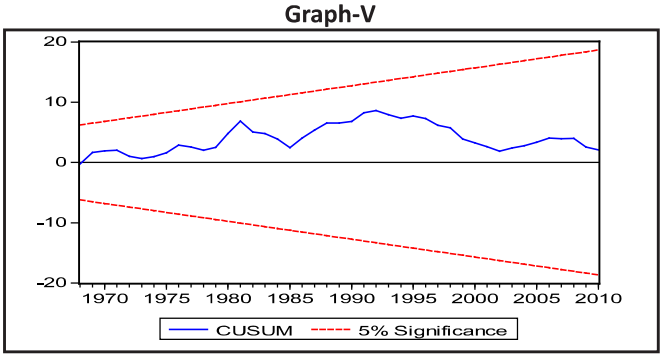
For long run relationship, we have estimated three equations, taking natural logs of imports (LIMPORT), exports (LEXPORT) and service GDP (LGDPS), as dependent variables. The results confirm the long run relationships in two equations when log of export and import are used as dependent variables. For LIMPORT and LEXPORT using as dependent variables, null hypothesis have been rejected at 1% in both cases (Appendix II). When GDPS is used as dependent variable, the null hypothesis has not been rejected at 10%, finding no co-integration. Hence we are left with two error correction models, namely: (i) when LIMPORT is used as dependent variable, and (ii) when LEXPORT is used as dependent variable.

For results of Error Correction terms and Granger causality test, refer to Appendix III. Error Correction Term (ECT), when ΔLEXPORT is dependent variable, has appropriate sign i.e. negative and significant. It is significant at 1% level. ECT is showing that approximately in three periods the ΔLEXPORT can come in equilibrium. However these results are lag sensitive, we have selected five lags by seeing the AIC criteria. ECT of model having ΔLIMPORT as dependent variable is significant at 1% level. It is also depicting the existence of long run relationship when ΔLEXPORT is dependent variable.

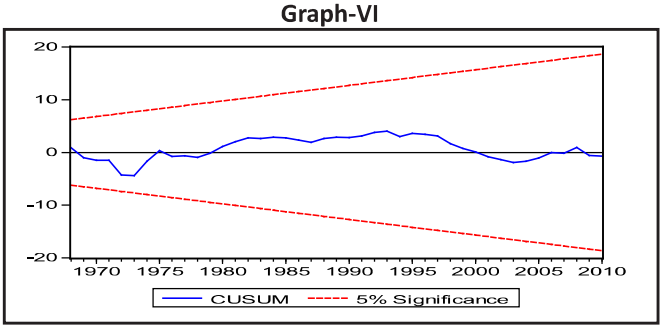
From results of Granger causality test, it is evident that ΔLGDPS is causing export in long run and there is a unidirectional relationship between ΔLGDPS and ΔLEXPORT. ΔLIMPORT is not causing ΔLEXPORT; however, ΔLEXPORT is causing ΔLIMPORT and again there is a unidirectional relationship between ΔLEXPORT and ΔLIMPORT. Whereas in long run, neither ΔLIMPORT nor ΔLEXPORT is causing ΔLGDPS as there is no co-integration in this case.

A. Stability Test

Graph-V



Graph-VI



For checking the stability of parameters we have conducted the CUSUM test. The above graphs are showing that parameters of both models are stable as the variation is within the bands.

VI. CONCLUSION AND RECOMMENDATIONS

Our main objective for this research has been to investigate whether augmenting service sector GDP can increase exports or augmenting exports can accelerate service sector GDP, for the study period from 1950-51 to 2010-11. Additionally, we were trying to scientifically testify the myth that service sector GDP had been a source of boosting imports. We used two approaches, namely Granger causality test in VAR analysis and Pesaran et al. (2001) ARDL approach for long run relationship analysis. Initially three equations were developed to find out co integration. The results depicted that there exist long run relationship when LEXPORT and LIMPORT were used as dependent variables. The both null hypotheses were rejected at 5% and 1%, respectively; while when LGDPS was used as dependent variable, the null hypothesis could not be rejected, suggesting existence of no co-integration in this case.

ECT of both equations are having appropriate signs and are found significant at 1% level. In Granger Causality test, between service sector GDP and LEXPORT, there exists a unidirectional relationship, where LGDPS only causes LEXPORT. Where as in long run neither ΔLIMPORT nor ΔLEXPORT causes ΔLGDPS as there is no co-integration in this case. Hypothesis for co-integration has been accepted even at 10% level.

In ΔLIMPORT and ΔLEXPORT cases, a unidirectional relationship exists at 1% level, where ΔLEXPORT causes ΔLIMPORT only. These results are aligned with the results of Konya et al. (2009) and Afzal and Murat (2010) which explain co-integration between import and export.

APPENDIX I

	ADF Test	KPSS	PP
LGDPS	1.906221	0.97351	2.337589
D(LGDPS)	-4.425622*	0.566226*	-6.522563*

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LEXPORT	-0.785661	0.966842	-0.754477
D(LEXPORT)	-8.459374*	0.09499*	-9.000284*
LIMPORT	-0.413727	0.958685	-0.338122
D(LIMPORT)	-7.132406*	0.04743*	-7.121079*

* shows the significance at 1% ** shows significance at 5

APPENDIX II

Eq.	Null Hypothesis	Explanation		
1	$\beta_1X=\beta_2X=\beta_3X=0$	LX/ LM, LGDPS		
2	$\beta_1M=\beta_2M=\beta_3M=0$	LM/LX, LGDPS		
3	$\beta_1G=\beta_2G=\beta_3G=0$	LGDPS/ LX, LM		
F. Statistics		χ^2- Statistics		Decision
Value	Prob.	Value	Prob.	
**3.879	0.0168	**11.63	0.0087	Co- integration exists
*6.978	0.0008	*20.93	0.0001	Co- integration exists
0.878	0.4611	2.63	0.451	Co- integration does not exist

APPENDIX III

Dependent Variable	ΔLIMP	ΔLEXP	ΔLGDPS	ECT
ΔLIMPORT	_	6.77 (0.0001)	1.96 (0.1324)	-0.466 (.0001)
ΔLEXPORT	.887 (.4803)	_	2.367 (.0848)	-0.5298 (.0001)

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