

Role of Financial Sector Development in the Growth Effectiveness of Trade Openness: Empirical Evidence from SAARC Countries

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Abstract

Since mid-1980s most of the SAARC countries exercised trade liberalization measures in order to enhance pace of economic growth. However, question remains that whether in term of economic growth, SAARC countries harvested the potential gain of this outer-oriented regime. Received literature on the subject fixed conditional the potential gain of the outer-oriented regime with trading country domestic financial sector deployment. In this association, this paper is an attempt to investigate the role of domestic financial sector development in the growth effectiveness of trade openness in case of SAARC region using data spanning from 1980-2014. Considering nature of the data set the empirical estimations have been carried out through Fully Modified Ordinary Least Square (FMOLS) and Dynamic Ordinary Least Square (DOLS) estimations techniques. The estimates validate complementarities between domestic financial sector development and trade openness in the case of the SAARC countries. Findings of the study suggest that SAARC countries should increase growth effectiveness of trade openness in order to develop its domestic financial sector.

Keywords: Trade Openness; Financial Development; Economic Growth; Panel Data Analysis; SAARC

1. Introduction

Globalization has reshaped the economic outline of the world in 20th century. The world economic and financial linkages have become stronger across global economies due to economic integration. In economic literature the link between trade openness and economic growth has long been a matter of attraction for discussion. The received literature on the subject highlighted a number of channels through which trade openness is thought to influence economic growth. To mention a few, a liberal trade regime with greater competition and better resource allocation improves the efficiency. Similarly, greater integration of world markets permit the economies to overcome size limits and take advantage from economies of scale. Literature also highlights that import of intermediate and capital goods support the process of growth by increasing the productive ability of the economy. Likewise, trade can cause global technological diffusion and thus the adoption of new technologies ultimately results in greater production of goods and services.

While emphasising the importance of trade for growth, a consensus is emerging in the literature that for the country's welfare, performance and economic growth, the degree of financial development is also very important¹. Bagehot (1873) pioneered the work exploring the role of financial sector development in growth and development process of an economy. According to Bagehot (1873), mobilization of capital and growth mainly depends on financial system performance. For that reason, an efficient financial system plays very important role in the facilitation of economic transaction and the creation of competitive markets. Schumpeter (1912) extended this idea and argued that for growth sustainability, the services of financial institutions are very important, and a well-developed financial system paves the path to use the financial resource to its most productive level.

Based on said work, overtime economists have developed two diverse hypotheses about growth effectiveness of financial system. First, "*demand-lead hypothesis*" developed by Robinson (1952), claims that finance does not apply a causal effect on economic growth. He argued that, economic growth is generally followed by the financial development basically due to higher

¹ Financial development is a process that expands and strengthens the financial services of banks and other financial organizations. A country financial development depends on its size, access, depth and also the strength and capability of a financial system which take into account its markets, assets range, intermediaries, institutions, and regulations (Financial Development Report (2012)).

demand for financial services. As per this view, financial services do not cause growth in the economy. The developments in economy emerges in response to the demand for financial services which results in emergence of more financial organizations, financial services and products in the market. Later on Patrick, (1966) extended the idea with bifurcation of stages. Patrick argued that at the initial stages of development an economy makes use of the supply-lead finance, but as the economy develops, the demand-lead finance dominates. The second strand of literature discusses the “*finance-led hypothesis*”, which was empirically tested by McKinnon (1973), Shaw (1973) and Pagano (1993) among others. This hypothesis states that financial sector development cause growth in real sector and thus contributes to the economic growth.

These opposing hypotheses provides avenue to investigate the role of financial sector development on trade openness, which in turn affects economic growth. A considerable body of literature proposes a strong and positive link between trade liberalization, financial development and economic growth. It is widely believed that liberalized trade and financial policies reduces the inefficiencies in the production process which in turn boosts economic growth. These studies came with the conclusion that countries having more open policies for trade and financial sector, grow faster. Openness is expected to have positive impacts on economic growth (Jin, 2000; Fry, 1997).

Recently, many developing countries have taken steps towards financial and trade liberalization to achieve higher level of growth. The South Asian economies, during their early phases of development, followed the protectionist trade policies in order to protect domestic industries from foreign competition and to maintain foreign exchange reserves to support the balance of payment. However, by 1980s regionalism achieve its strength in the context of globalization, and as a result South Asian countries started to think about harvesting the gains from open trade. The South Asian countries under the banner of South Asian Association of Regional Cooperation (SAARC²) hence made efforts to match the flow.

Most of the SAARC countries exercised trade liberalization measures since mid-1980s to enhance pace of economic growth. However, question remains that whether in terms of

² SAARC was established on December 08, 1985. Bangladesh, Bhutan, India, Pakistan, Nepal, Sri Lanka, and Maldives were the founders of the organization. In April 2007, Afghanistan also joined the regional association.

economic growth, SAARC countries harvested the potential gain of this outer-oriented regime. Received literature on the subject fixed conditional the potential gain of the outer-oriented regime with trading country domestic financial sector development. In this context, this paper attempts to investigate the role of domestic financial sector development in the growth effectiveness of trade openness in SAARC region, using data spanning from 1980-2014. The rest of the paper is organized as follows. Section 2 presents review of literature about the topic. Section 3 presents methodology including empirical illustrations to analyse the role of financial sector development in the growth effectiveness of trade openness. Empirical findings and discussion is presented in section 4. Finally, section 5 offers conclusion.

2. Literature Review

It has been theoretically discussed that both financial development and trade liberalization may perform a vital part in the economic growth. Trade openness makes the process of production efficient while financial development facilitates the intermediation between investors and savers. So, trade openness and financial development supplements each other to positively affect the economic growth. Roubini and Sala-i-Martin(1991) studied both the relationship between ‘trade openness and economic growth’ as well as the ‘financial development and economic growth’. The study found that the trade openness and financial development both positively affect the economic growth. Empirical studies concluded that the outward oriented economies achieves higher economic growth (Wong, 2005). It was somewhat in line with the failure of import–substitution policies (Yanikkaya, 2003).

Following the development of endogenous growth theory in the last two decades, the impact of financial and trade regimes on economic growth have been the most discussed theoretical issue. In contrast to the neo-classical growth theory, the endogenous growth theory suggests that trade policies might have a significant effect on the long-term rate of economic growth. To this end, since 1980s most developing countries started to liberalize their trade and financial sectors to increase the economic growth. The main basis for this policy change was that the liberalization of trade and financial policies make the process of production better and hence, stimulate the economic growth.

Most of the empirical studies explained the positive impact of trade liberalization policies in terms of efficiency and productivity perspective. Kar et al. (2008) investigated the case of

Turkey and the empirical findings showed that trade liberalization, financial development and their joint impact positively contributed to economic growth in Turkey. In another study, Kar et al. (2014) studied the direction of causality among trade openness, financial development and economic growth in Turkey. The results indicated that in Turkey, economic growth relies upon trade openness through finance. Similar results were found by Soukhakian (2007) where the results favoured the supply-leading growth hypothesis and growth-driven trade hypothesis for the economy of Japan. Soukhakian (2007) findings declared that economic growth brings “more efficient imports and exports” for Japan.

In the case of Nigeria, Chimobi (2010) found that financial development exhibited no impact on economic growth, however, economic growth had made impact on the credit and supply of money. For the economy of Saudi Arabia, Rehman et al. (2015) examined the association between financial development, trade openness and economic growth from 1971 to 2012. They found long run relationship among the proposed variables while the Granger causality test revealed that in Saudi Arabia the unidirectional causality, functioning from trade openness to economic growth, brings financial development. Similarly, economic growth causes import and feedback effect exists between trade openness and economic growth according to Arouri, Uddin et al. (2014). Saaed and Hussain (2015) investigated the case for Kuwait and the findings suggested support for growth-led financial development as well as for the trade openness led-growth. Sabandi and Noviani (2015) found that trade liberalization and financial development supported economic growth in Indonesia.

On the other hand, Vaighan, et al. (2010) examined the link among growth, financial development and trade openness for seven Central Asian countries. Results suggested that for growth, financial development, the impact was significant however, trade openness has negative impact. Zghidi and Abida (2014) selected a panel of three countries³ of North Africa and found the strong indication of a positive link between trade openness and economic growth. They also found that for financial development, trade openness works like a complement and similarly in the presences of financial development variable, the effect of trade openness was more prominent. Studying a larger sample of 21 African countries, Menyah et al. (2014), found that efforts regarding trade liberalization and financial development in the given countries did not

³Tunisia, Morocco, and Egypt.

appear to have critical effect on economic growth. Findings from Algeria showed a positive impact of openness on economic growth. In the study by Lacheheb (2013), financial development had positive but insignificant impact on economic growth. On the contrary, Goswami (2013) showed the existence of bi-directional causality between economic growth, financial development and trade openness for five South Asian economies.

The study of Rahim and Abedin (2014) examined the impacts of trade liberalization and financial development on economic growth in Malaysia. The result showed that unidirectional causality exists between economic growth and financial development. The results for trade openness and financial development were unidirectional indicating that financial development did not Granger cause trade liberalization but, the trade liberalization Granger caused financial development. Bojanic (2012) analysed the link of economic growth with financial development and trade openness for Bolivia. The empirical results showed long-run association, and from the variables of financial development and trade openness to economic growth where unidirectional Granger causality exists. Polat et al. (2015) re-examined the effect for South Africa. The results of the study showed that financial development encouraged economic growth. In South Africa the demand-side hypothesis was validated. In brief, to increase the economic growth, most of the developing countries have started liberalizing trade and financial sectors; as both policies are supposed to be able to reduce inefficiency and cost of the production process, and affect economic growth positively. Nevertheless, the empirical evidence is still not conclusive. A volume of study is available on joint impact of trade openness and financial development on economic growth for various countries but it is far from consensus due to varying results for different countries and regions. Although, studies are available on SAARC region however, these studies were limited up to five countries and not a single study used PCA to develop financial development Index and interactive term. Therefore, to contribute to the existing literature by adding latest evidence, this study covers seven SAARC countries and add an interactive term of trade openness and financial development to check the joint impact of trade openness and financial development on economic growth.

3. Methodology and Data

3.1 Theoretical Background

To explore the association between financial development and economic growth various studies have been carried out. However, still for researchers and as well as for academicians the way of the relationship between financial development and economic growth is an open question. In empirical findings, the ambiguities might be because of the utilization of variety of variables of financial development and misspecification of empirical model. Following the Mankiw et al. (1992), we use Cobb-Douglas production function assuming the marginal role of capital and labour in production, production function in period (t) is as follow;

$$Y_t = A_t(K_t)^\beta L_t^{1-\beta} \quad 0 < \beta < 1 \quad (1)$$

Where Y_t is the real domestic output, technological progress is denoted by A, capital stock and labour are denoted by K and L respectively. We extend the Cobb-Douglas production function by assuming that technology can be driven by the level of financial development and trade. In an economy, financial development stimulate economic growth by increasing the capital formation.

This indicates that financial development moves the producer's incentives with increasing returns to scale towards the goods, specialization in inter-sectoral and trade flows, determined by the relative level of financial intermediation. An economy well-developed financial system can improve the capacity to gain from international trade by circulating the technological advancements to increase the economic growth (Polat et al., 2015).

International trade is also taking part in economic growth, by the efficient allocation of resources; transfer of modern technology from developed to developing countries and less developed countries exploit innovations by developed countries i.e. learning by doing effects. Hence, to incorporate the variables trade openness and financial development model take the following form

$$A_t = \phi \cdot T_t^\alpha F_t^\gamma \quad (2)$$

Where ϕ is constant, trade openness indicator is T and F is the indicator of financial development. Substituting Eq. 2 in Eq. 1:

$$y_t = \phi \cdot T_t^\alpha F_t^\gamma K_t^\beta L_t^{1-\beta} \quad (3)$$

Taking log of, Eq. 2 can be modified as follows:

$$\ln y_t = \ln \phi + \alpha \ln T_t + \gamma \ln F_t + \beta \ln K_t + 1 - \beta \ln L_t \quad (4)$$

Where $\ln \phi$ is the constant term, $\ln Y_t$ is log of current GDP (constant), $\ln F_t$ is the financial development is the composite index of three variables namely money supply (M2), domestic credit and private credit, $\ln T_o_t$ is log of trade openness, $\ln K_t$ is physical capital and $\ln L_t$ is population growth.

3.2 Empirical Model

As our first objective is to check the impact of trade openness on economic growth in selected SAARC countries, hence the following base model is empirically tested.

$$\ln Y_{it} = \alpha_0 + \alpha_1 \ln T O_{it} + \alpha_2 \ln X_{it} + \varepsilon_{it} \quad (1)$$

As the second objective of the study is to explore the role of financial sector development in trade openness and economic growth nexus hence, to meet the objective we incorporated the interaction term of trade openness and financial sector development ($T O_{it} \times F D_{it}$) in our second empirical model.

$$\ln Y_{it} = \beta_0 + \beta_1 \ln T O_{it} + \beta_2 \ln (T O_{it} \times F D_{it}) + \beta_3 \ln X_{it} + \varepsilon_{it} \quad (2)$$

Where 'i' and 't' denotes country and time respectively.

3.3 Definition and Construction of Variables

Our dependent variable is economic growth which is captured with GDP at constant market prices (GDP_{it}). Data of GDP at constant market prices for the countries under consideration is taken from World Development Indicators of World Bank (2014). Among explanatory variables trade openness ($T O_{it}$) is our variable of interest. The sum of exports and imports of goods and services as percent of GDP is used for trade openness. Data for trade openness is obtained from the World Development Indicators (WDI) 2014. Human Capital (HC_{it}) is one of the most significant determinants of economic growth. In this study, we used health expenditure as a percentage of GDP. Data is taken from World Development Indicators (WDI) 2014. Physical Capital (INV_{it}) is measured with investment to GDP. Data for investment to GDP is taken from the economy watch 2014. Population Growth Rate (POP_{it}) is the annual percentage change in population and data is taken form World Development Indicators 2014. "Financial Development

Index (FD_{it}) of a country refers to such elements, policy making decisions and institutions that lead to an efficient financial markets and easy access to capital and financial service” (Financial development Report, 2008). To capture financial development, construction of variables is a hard task due to some reasons. First a number of financial institutes and agents are providing the financial services. Among them both stock markets and banks play an important role. In order to see the whole scenario, we have to consider different elements of financial development for example, whether countries under consideration have financial sector dominated by stock market or the banks or both. However, our objective is to explore the long-run relationship hence, we use bank-based financial proxies.

Our first measure of financial development is M2 as % of GDP to capture the overall size and depth of the financial sector. A number of studies used M2 a standard proxy for financial development such as (Asghar& Hussain, 2014; Luqman et al. 2013; Chimobi, 2010 ; Samargandi et al., 2014). Our second proxy for the financial development is domestic credit provided by financial sector % of GDP consist of all credit to several sectors on a gross basis, with the exemption of credit to the central government, which is net. The financial sector includes monetary authorities and deposit money banks, as well as other financial corporations; examples of other financial corporations are finance and leasing companies, insurance companies, money lenders pension funds, and foreign exchange companies. This proxy is used by (Pradhan et al., 2014 ; Menyah et al., 2014).

Our third proxy for the financial development is private credit by deposit money banks and other financial institutions % of GDP consist of the deposited money by banks as well as other financial institutions. This proxy set apart the credit issuance to the private sector as opposite to the credit issue to the public enterprises and government. The focus of this proxy is on the intermediary’s credit issuance rather than central bank. This is the measure of financial intermediary’s activity in one of its key function: direct the savings to the investors. Rachdi (2011) previously use this indicator.

Instead of using different yet closely related variables we make an aggregate financial development indicator to signify the overall financial sector development. The resulting variables together with the three earlier mentioned variables of financial development: that M2 as a ratio of nominal GDP; domestic credit provided by financial sector to GDP; Private credit by deposit

money banks and other financial institutions to GDP. The data of these three variables is taken from (WDI). We followed the Ang and McKibbin (2007), Gries, Kraft, and Meierrieks (2009) and Campos & Kinoshita, (2010) among others, used Principle Component Analysis (PCA) to merge these variables into one indicator. We symbolized the resulting indicator as FD. Principal Component Analysis (PCA), as designed by Karl Pearson in 1901, is a methodology to change over an arrangement of connected variables into uncorrelated one's principal components (Joliff, 2002). Utilizing numerical calculations, for example, eigenvalue decomposition of the covariance tensor or single value decomposition. There are two benefits of using the PCA as specified by (Samargandi et al., 2015). First, the variables of financial development are highly interconnected PCA helps to solve the multicollinearity problem. Second, the studies to investigate the association between financial development and economic growth have not presented any suitable proxy to capture the link; they select different proxies and find different results (Chuah, Thai, & Chuah, 2004; Khan & Senhadji, 2003; King & Levine, 1993a; Savvides, 1995). Having considered the potential advantage we used this new financial development index which is capable to capture the information of original data and rather than individual variables it is a better indicator.

3.4 Estimation Technique

This section explains the econometric methodology to test the time series data and panel data which we used in this study. In order to choose the efficient estimation technique first we have to check the characteristics of time series data. Hence, the possibility of panel co-integration will be checked by using the panel unit root test, which provide information whether the data is stationary or non-stationary. Therefore, first to check the data characteristics we used some panel unit root tests, the IPS-W-statistic (Im, Pesaran, & Shine, 2003) and also ADF-Fisher tests utilizing the Augmented Dickey Fuller tests are employed to check the unit root in the data.

3.4.1 Panel Co-integration Tests

After checking the unit root, in the second step we used two types of panel co-integration tests. First co-integration test proposed by Pedroni (1999 and 2004) and second test proposed by Kao (1999) which is a residual based test. To check the existence of heterogeneity of co-integration Pedroni (2004) proposed two types of tests. The first test practices the within-dimension approach. It has 4 statistics, namely panel V-statistic, panel R-statistic, panel PP-statistic, and a

panel ADF-statistic. In case of within dimension test statistics the first order auto-regressive term across all cross section is supposed same. The second test is based on between-dimensions approach (a group test). It consists of 3 statistics: a group R-statistic, a group PP-statistic, and a group ADF-statistic and in this group statistics, first order auto-regressive term parameter is acceptable to fluctuate across the cross section.

3.4.2 Panel Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Square (DOLS)

For panel co-integration model, several estimation techniques have been suggested. Despite the fact that OLS estimator is (super) reliable under the panel co-integration however, to its 2nd order asymptotic bias its standards errors are not valid. A number of estimation techniques such as Fully Modified OLS (FMOLS) estimation and Dynamic OLS (DOLS) estimation have been planned to build the effective t-statistics. Kao and Chiang (2000) showed that the ordinary OLS estimator has a significant bias in panel co-integration under small sample. To analyze the panel FMOLS and DOLS estimators small sample properties, they conducted Monte Carlo experiments and pooled the data with within-dimension. Panel FMOLS and DOLS estimators for these within-dimension specific versions, Monte Carlo results showed that over the OLS as compared to FMOLS the DOLS has superior small sample properties. On the contrary, Pedroni (2001) called attention that the within-dimension panel FMOLS and DOLS estimators suggested by Kao and Chiang (2000) could experience severe small sample size distortions.

Pedroni (2000) suggested the Fully Modified OLS estimator intended for heterogeneous co-integrated panel data. This method talks about both the problems of non-stationary regressors and simultaneity bias. This methodology of Phillips and Hansen (1990) was extended by Pedroni which for the OLS estimator considered semi-parametric correction to remove the second order bias, introduced by the endogeneity of the regressors for panel data analysis. The Fully Modified OLS estimator to remove the trouble parameters, to correct the dependent variable use the long-run covariance matrices and after that use the simple OLS estimation method to the variables corrected for endogeneity. Dynamic Ordinary Least Square (DOLS) associated with McCoskey and Kao (1998) and Kao and Chiang (2000). One of the main features of the DOLS regression is that in levels the explanatory variables are augmented with the lags and leads of their first

difference (Saikkonen, 1991; Stock & Watson, 1993). The augmentation by leads, in addition to lags, is instrumental in allowing the regressors to be endogenous.

3.5 Data and Data Sources

As this study is about the SAARC countries so, the data set of selected SAARC member's countries is used from 1980-2014. The data for selected sample countries and variables under consideration is taken from WDI (2014) and data on investment to GDP ratio is taken from website of economy watch (2014).

4. Empirical Findings

4.1 Panel Unit Root Test

To check the stationary of data we used panel unit root test. Generally, Panel unit root falls into two major types. First type is common unit root process which is employed by Levine, Lin, and Chu (2002). On the other hand, second type is individual unit root process and formed by the Im, Pesaran and Shin (2003), Fisher-ADF and Fisher-PP (1984). In common unit root test persistent parameters are common across cross section and in individual unit root test persistent parameters across cross section move freely.

Among these tests the IPS test is viewed as more advanced unit root test. This test rejects the assumption of homogeneity of autoregressive coefficient. It is based on average of Augmented Dickey Fuller (ADF) test which is estimated with the assumption of serially correlated error term. Maddala and Wu (1999) proposed ADF-Fisher which is similar to IPS unit root test. It carries out heterogeneous auto-regressive coefficient and base on p-values of unit root which are estimated for each cross-sectional unit.

Panel unit root tests are more statistically significant. They explore the information about the time and cross dimension of the data. However, time series unit root tests only examine the information about the time dimension. Hence, variability of data increases with the inclusion of cross section dimension in analysis (Im, Pesaran, & Shin, 1997; Maddala & Wu, 1999; Taylor & Sarno, 1998; Hadri, 2000; Levin et al., 2002; Pesaran, 2007). Following table 4.1 presents results of unit root test.

Table 4.1: Im, Person and Shin and Fisher-ADF Panel Unit Root Tests Results

Variables	Im, Person and Shin W-Stat		Fisher-ADF	
	Level	First Difference	Level	First Difference
<i>LN</i> GDP _{it}	2.18370 (0.9855)	-10.7789 (0.0000)	4.40620 (0.9925)	109.948 (0.0000)
<i>LN</i> TO _{it}	-1.24947 (0.1057)	-6.87566 (0.0000)	24.2897 (0.0423)	119.913 (0.0000)
<i>LN</i> FD _{it}	0.91493 (0.8199)	-11.0779 (0.0000)	12.2538 (0.5859)	115.045 (0.0000)
<i>LN</i> POP _{it}	-2.80684 (0.0025)	-6.87264 (0.0000)	51.7793 (0.0006)	292.728 (0.0000)
<i>LN</i> INV _{it}	-4.76459 (0.0000)	-13.8924 (0.0000)	50.0280 (0.0000)	220.623 (0.0000)
<i>LN</i> HEXP _{it}	1.63570 (0.9490)	-11.3323 (0.0000)	6.64959 (0.9474)	118.252 (0.0000)
<i>LN</i> TOF _{it}	0.15684 (0.5623)	-14.9210 (0.0000)	11.3137 (0.6612)	164.437 (0.0000)
<i>LN</i> TDC _{it}	-1.19428 (0.1162)	-13.3535 (0.0000)	18.7395 (0.1751)	148.763 (0.0000)
<i>LN</i> TPC _{it}	-0.07929 (0.4684)	-9.57066 (0.0000)	14.2359 (0.4323)	98.0829 (0.0000)

The results presented in table 4.1 show that except investment to GDP and annual population growth rate all the variables are non-stationary at I(0). This can be checked by analysing the values of both IPS and Fisher ADF test statistics at level of significance of 1%, 5%, and 10% respectively. However, investment to GDP and annual population growth is stationary at 1% level of significance. The results provide a strong indication of non-stationarity. So, the null hypothesis which is the series is not stationary, of unit root is accepted. After this result on both the IPS and Fisher ADF tests all variables were checked at I(1) and results showed that all the variables are stationary at I(1). On this base we accept the alternative hypothesis which is the series is stationary and this indicates that variable are integrated at I(1). These results guide for

Pedroni (2000 and 2004) test and Kao residual (1999) test for panel co- integration in order to check the long run relationship among the variables.

4.2 Panel Co-Integration Tests

After testing the unit root test in next step, we employ two types of panel co-integration tests in order to check the long run relationship among the variables. The first test which was introduced by Pedroni (1999, 2004) and second test introduced by Kao (1999) a residual based test conforming (Engle & Granger, 1987). The first test, Pedroni's test consists of seven test statistics, four out of seven tests are based on within dimension and the rest of three are between dimensions. The four panel test statistics which are based on within dimension test comprise of panel V-statistics, Panel-Rho statistics, Panel PP statistics, and panel-ADF statistics, and three between dimension panel test consist of Group-PP, Group-Rho and Group-ADF.

Now to check the presences co-integration among the variables, we employ the panel co-integration tests suggested by Pedroni (2000 and 2004) and Kao (1999) residual co-integration. Table 4.2 and 4.3 present results of Pedroni and table 4.4 presents Kao tests results respectively.

Table 4.2: Pedroni's Test for Panel Co-Integration (Null hypothesis: No co-integration)

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.
Panel V-Statistic	-2.571	0.994	-2.897	0.998	-2.897	0.998	84.932	0.000	-2.518	0.994
Panel Rho-Statistic	-0.518	0.301	-0.981	0.163	-0.981	0.163	0.984	0.837	-2.411	0.007
Panel PP-Statistic	-1.785	0.037	-3.471	0.000	-3.471	0.000	-0.255	0.399	-4.977	0.000
Panel ADF-Statistic	-1.509	0.065	-3.562	0.000	-3.562	0.000	-2.058	0.019	-4.831	0.000
Alternative hypothesis: individual AR coefs. (between-dimension)										
	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.
Group Rho-Statistic	0.489	0.687	0.130	0.552	0.130	0.552	2.285	0.988	-0.838	0.200
Group PP-Statistic	-1.942	0.026	-3.233	0.000	-3.233	0.000	-1.418	0.078	-4.196	0.000
Group ADF-Statistic	-1.476	0.069	-3.323	0.000	-3.323	0.000	-1.883	0.029	3.441	0.000

Table 4.3: Pedroni's Test for Panel Co-Integration (Null Hypothesis: No Co-Integration)

	Model 6		Model 7		Model 8		MODEL 9	
	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.
Panel V-Statistic	-2.506	0.993	55.235	0.000	-2.949	0.998	-3.151	0.999
Panel Rho-Statistic	-1.792	0.036	0.867	0.807	-0.943	0.172	-0.575	0.282
Panel PP-Statistic	-3.611	0.000	-1.500	0.066	-3.357	0.000	-2.629	0.004
Panel ADF-Statistic	-3.179	0.000	-2.157	0.015	-3.454	0.000	-2.220	0.013
Alternative hypothesis: individual AR coefs. (between-dimension)								
	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.
Group Rho-Statistic	-0.503	0.307	1.846	0.967	0.1483	0.559	0.317	0.624
Group PP-Statistic	-3.268	0.000	-	-	-3.243	0.000	-2.617	0.004
Group ADF-Statistic	-1.190	0.116	-	-	-3.498	0.000	-2.230	0.012

In table 4.2 and 4.3 the results of Pedroni test presented for 9 models. Results of 7 models (1, 2, 3,4,6,8,9) show that four out of seven test statistic reject the null hypothesis which means no co-integration. Model 5 and 7 show the results that five out of seven test statistics reject the null hypothesis means no integration, so, these results indicate the long run relationship among the variables. In the next step, we apply the Kao residual co-integration test.

Kao Residual Co-integration test also implied to check the existence of long run relationship among the variables, the results of table 4.4 indicate that null hypothesis of no co-integration is rejected. So, it is safely concluded from the, Pedroni's panel Co-integration and Kao Residual Co-Integration test results that long run relationship exist among the under consideration variables.

Table 4.4: Kao Residual Co-Integration Test

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
t-stat (Prob.)	-2.525 (0.005)	-3.013 (0.001)	-3.062 (0.001)	-3.043 (0.001)	-1.795 (0.036)	-3.921 (0.000)	-2.036 (0.021)	-3.952 (0.000)	-2.240 (0.012)

4.3 Fully Modified Ordinary Least Square (FMOLS) and Dynamic Ordinary Least Square Estimation (DOLS)

When we find the presences of panel co-integration, Pedroni (2000) proposed the Fully Modified Ordinary Least Squares (FMOLS) to find the long- co-integrating coefficients. The FMOLS is a better estimation technique over pooled OLS as some studied argued that it handles the problems of simultaneity biased as well as if variables have time trend. To give most precise assessment of co-integration equation FMOLS effectively explain the impact and endogeneity in the explanatory variables that can emerge due to the presences of long run equilibrium relationship among the variable

Table 4.5: Panel Fully Modified Ordinary Least Squares (FMOLS)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
$LNTO_{it}$	2.388*** (0.000)	0.824*** (0.002)	1.879 *** (0.000)	-----	-----	-----	-----	0.460* (0.080)	1.474*** (0.000)
$LNPOP_{it}$	0.902** (0.014)	1.178*** (0.000)	1.178 *** (0.000)	1.935*** (0.000)	1.888*** (0.000)	1.848*** (0.000)	2.291*** (0.000)	1.132*** (0.000)	1.325*** (0.000)
$LNINV_{it}$	3.525*** (0.000)	0.544** (0.015)	0.544** (0.015)	1.272*** (0.000)	1.987*** (0.000)	1.613*** (0.000)	3.282*** (0.000)	1.137*** (0.000)	2.702*** (0.000)
$LNHEXP_{it}$	1.424*** (0.000)	0.680 *** (0.004)	0.680 *** (0.004)	1.021*** (0.000)	2.095*** (0.000)	1.242*** (0.000)	1.845*** (0.000)	0.853*** (0.000)	0.899*** (0.005)
$LNTOF_{it}$	-----	2.704 *** (0.000)	-----	2.022*** (0.000)	-----	-----	-----	-----	-----
$LNFD_{it}$	-----	-----	2.704 *** (0.000)	-----	2.805*** (0.000)	-----	-----	-----	-----
$LNTDC_{it}$	-----	-----	-----	-----	-----	1.909*** (0.000)	-----	2.049*** (0.000)	-----
$LNTPC_{it}$	-----	-----	-----	-----	-----	-----	1.196*** (0.000)	-----	0.994*** (0.000)

Note: P-values are in parenthesis. ***, **, * shows level of significance at 1%, 5%, and 10% respectively.

In table 4.5 the results of FMOLS test show that most of the variables are significant which indicate that in models the variables are significantly linked with dependent variable. In model 1 trade openness (TO_{it}) is our first variable of interest which is significant with positive sign which means trade openness plays an important role in economic growth and there exist long-run relationship between trade openness and economic growth. Our result is in line with the findings of (Rizavi et al., 2010; Das & Paul, 2011; Mercan et al., 2013) who argued that trade openness, plays a significant role to increase the economic growth.

In second model, our main variable of interest is financial development using our interactive term trade openness and financial development ($LNTOF$)_{it} which enter the model positively and significantly. The result indicates that financial development enhances the trade openness effects and both variables are complimentary for each other for economic growth. Our result is in line with Zghidi and Abida (2014), who used financial development and trade openness as an interactive term and found that financial development and trade openness as complimentary for each other and suggested that in the presence of financial development variable trade openness worked more efficiently.

In model 3 we use our financial development index $(LNFD)_{it}$ to check the effect of financial development on economic growth. We find financial development and trade openness both are significant with positive sign which support the claim that financial development and trade openness contribute positively to growth process. Our findings are in line with the studies of (Gosawami, 2013; Abida and Zghidi, 2014; Novian and Sabandi, 2015; Sehwat&Giri, 2016) who argued that financial development and trade openness play a significant role in economic growth of economy.

In model 4 and 5 we check the financial development effect on economic growth through interactive term $(LNTOF)_{it}$ and financial development index $(LNFD)_{it}$ respectively, and we find both variables significant with positive sign. The positive sign of interactive term shows that trade openness and financial development are complementary and a developed financial system increases the effect of trade openness. This means that there exists a long run relationship between financial development and economic growth. The results of Jalil and Feridun (2011) study in case of Pakistan also suggested the positive and significant relationship between financial development and economic growth.

In model 6 and 7 to check the financial development impact on economic growth we used financial development proxies individually and make interactive terms with trade openness. In model 6 and 7 we used domestic credit and private credit for inter active terms respectively. We find both $LNTDC_{it}(TO*DC)$ and $LNTPC_{it}(TO*PC)$ variables significant with positive sign which means that trade openness with domestic credit and private credit is respectively complementary and that a well-functioning financial system increase the effect of trade openness. Our results are in line with the findings Pardhan et al. (2014) who used with other proxies, domestic credit as a proxy variable for financial development and findings of the study indicated that financial development plays significant role in economic growth. Rachdi and Mbarek (2011) used the proxy of private credit for financial development and results showed the existences of significant relationship between financial development and economic growth.

To analyze the role of domestic financial sector development in growth effectiveness of trade openness we used interactive term of domestic credit and private credit with trade openness in model 8 and 9 respectively. We find both $LNTDC_{it}(TO*DC)$ and $LNTPC_{it}(TO*PC)$ variables significant with positive sign which means that trade openness and domestic credit and private

credit respectively are complementary and that a well-functioning financial development system increase the effect of trade openness.

All the control variables population growth, investment to GDP ratio and health expenditures are significant and positively contributed to economic growth. This means that in the process of long run economic growth of selected SAARC countries human capital, physical capital and population growth rate plays a significant role.

Table 4.6: Panel Dynamic Ordinary Least Square (DOLS)

Variables	Model 1	Model 2	Model 3	MODEL 4	MODEL 5	MODEL6	MODEL 7	Model 8	Model 9
<i>LNTO_{it}</i>	1.744*** (0.000)	1.914*** (0.000)	0.952** (0.029)	-----	-----	-----	-----	0.464** (0.036)	0.493** (0.037)
<i>LNPOP_{it}</i>	2.749*** (0.000)	1.763*** (0.008)	1.763 *** (0.008)	2.233*** (0.000)	1.739*** (0.000)	2.135*** (0.000)	2.327*** (0.000)	1.773*** (0.007)	1.796*** (0.000)
<i>LNINV_{it}</i>	3.292*** (0.000)	0.595** (0.013)	0.595** (0.013)	0.899** (0.058)	1.984*** (0.000)	1.360*** (0.002)	2.977*** (0.000)	1.278*** (0.001)	2.460*** (0.000)
<i>LNHEXP_{it}</i>	2.468*** (0.000)	1.750*** (0.006)	1.750 *** (0.006)	1.089*** (0.009)	2.031*** (0.000)	-----	1.517*** (0.000)	1.840*** (0.003)	1.831*** (0.002)
<i>LNTOF_{it}</i>	-----	2.866 *** (0.000)	-----	2.115*** (0.000)	-----	-----	-----	-----	-----
<i>LNFD_{it}</i>	-----	-----	2.866 *** (0.000)	-----	2.923*** (0.000)	-----	-----	-----	-----
<i>LNTDC_{it}</i>	-----	-----	-----	-----	-----	1.973*** (0.000)	-----	2.143*** (0.000)	-----
<i>LNTPC_{it}</i>	-----	-----	-----	-----	-----	-----	1.387*** (0.000)	-----	1.384*** (0.000)

Note: P-values are in parenthesis, ***, **, * shows level of significance at 1%, 5%, and 10% respectively.

In table 4.6 the results of DOLS test show that most of the variables are significant which indicates that in models the variables are significantly linked with dependent variable. In model 1 trade openness (TO_{it}) is our first variable of interest which is significant with positive sign which means trade openness plays an important role in economic growth and there exist long-run relationship between trade openness and economic growth. Our result is in line with the findings of (Rizavi et al., 2010 ; Paul and Das, 2011; Ulsan, 2012; Mercan et al., 2013) who argued that trade openness plays a significant role to increase the economic growth.

In second model, our main variable of interest is financial development using our interactive term trade openness and financial development ($LNTOF$) $_{it}$ which enter the model positively and significantly. The result indicates that financial development enhances the trade openness effects and both variables are complimentary for each other for economic growth. Our result is in line with (Zghidi & Abida, 2014) who found financial development and trade openness as complimentary for each other and suggested that in the presence of financial development variable trade openness worked more efficiently.

In model 3 we use our financial development index ($LNFD$) $_{it}$ to check the effect of financial development. Our result is in line with the findings of (Shahiki and Sheidaei, 2012; Goswami, 2013; Sabandi&Noviani, 2015; Sehrawat&Giri, 2016) who argued that financial development and trade openness play a significant role in economic growth of the economy.

In model 4 and 5 we check the financial development effect on economic growth through interactive term ($LNTOF$) $_{it}$ and financial development index ($LNFD$) $_{it}$ respectively, and we find both variables significant with positive sign. The positive sign of interactive term shows that trade openness and financial development are complementary and that a developed financial system increases the effect of trade openness. This means that there exist a long run relationship between financial development and economic growth (Jalil and Feridun , 2011; Sehrawat and Giri, 2016).

In model 6 and 7 we used financial development proxies individually to make interactive terms with trade openness, to check their effect on economic growth. In model 6 and 7 we used financial development proxies; domestic credit and private credit for inter active term respectively. We find both $LNTDC_{it}$ ($TO*DC$) and $LNTPC_{it}$ ($TO*PC$) variables significant with positive sign which means that trade openness, domestic credit and private credit respectively are complementary and that a well-functioning financial system increase the

effect of trade openness. Our results are in line with the findings of (Zghidi & Abida, 2014; Pradhan et al., 2014).

To analyze the role of domestic financial sector development in growth effectiveness of trade openness we used interactive term of domestic credit and private credit with trade openness in model 8 and 9 respectively. We find both $LNTDC_{it}$ (TO*DC) and $LNTPC_{it}$ (TO*PC) variables significant with positive sign which means that trade openness, domestic credit and private credit respectively are complementary and that a well-functioning financial development system increase the effect of trade openness.

All the control variables population growth, investment to GDP ratio and health expenditures are significant and positively contributed to economic growth. This means that in the process of long run economic growth of selected SAARC countries human capital, physical capital and population growth rate plays a significant role.

5. Conclusion

The main objective of this study is to investigate the role of financial sector development in the growth effectiveness of trade openness in case of SAARC countries. Considering nature of the data set the empirical estimations have been carried out through Fully Modified Ordinary Least Square (FMOLS) and Dynamic Ordinary Least Square (DOLS) estimations techniques. The results of the Panel Co-Integration showed the existence of long run relationship between ‘trade openness and economic growth’, and ‘financial development and economic growth’. The findings of the study show that trade openness contribute to the economic growth of the selected SAARC countries positively. The overall evidence verifies the hypothesis that financial development plays a vital role in long run growth process; as the index of financial development show statistically significant and positive sign. The other important finding of the study is that the interactive term of trade openness and financial development had a positive and statistically significant effect on economic growth. The positive sign of interactive term validate complementarities between domestic financial sector development and trade openness in the case of the SAARC countries. Findings of the study suggest that SAARC countries should increase growth effectiveness of trade openness in order to develop its domestic financial sector.

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