



Munich Personal RePEc Archive

Interdependence of SAARC-7 countries: an empirical study of business cycles

Devanthran, Haritharan

Universiti Malaysia Sarawak

2009

Online at <https://mpra.ub.uni-muenchen.de/32798/>
MPRA Paper No. 32798, posted 15 Aug 2011 03:31 UTC

INTERDEPENDENCE OF SAARC-7 COUNTRIES: AN EMPIRICAL STUDY OF BUSINESS CYCLES

Devanthran, H.*

Department of Economics, Faculty of Economics and Business,
Universiti Malaysia Sarawak, 94300 Samarahan, Sarawak, Malaysia.

Abstract

This research intends to study on the interdependence of South Asia Association of Regional Co-operation (SAARC-7) relationship. It consists of seven countries which include Sri Lanka, Pakistan, Nepal, Maldives, India, Bhutan and Bangladesh. This study utilizes yearly real GDP data that spans from 1970 to 2007 from the SAARC-7 countries. Three methods are used to determine the interdependence of SAARC-7 countries namely the correlation coefficient estimation method, the standard Dickey-Fuller (ADF) unit root test and the Granger non-causality test proposed by Toda and Yamamoto (1995). Empirical results show that there are mutual relationship and correlation among the real GDP growth between SAARC-7 countries in the long run. Results obtained from the Toda and Yamamoto Granger non-causality test indicate that there is a sturdy interdependence among the economies of SAARC-7 countries.

Keywords

Economy Integration, Business Cycles, SAARC-7

*Corresponding author: Hp Tel: +60109685890 E-mail: haree_om@hotmail.com

1.0 Introduction

The sustainable of the economic growth of countries nowadays rely much on the integration or regional economic alliance developed among countries. There are a number of regional economic blocs in this world such as North America Free Trade Agreement (NAFTA) with the United States, Mexico and Canada as their associates; European Union (EU), Economic Community of West African States (ECOWAS), Caribbean Common Market (CARICOM) and Southern Common Market (MERCASOUR). Meanwhile, integration effort can be seen in Asia region with the Association of Southeast Asian Nations (ASEAN) and Australia and New Zealand Closer Economic Relations Trade Agreement (ANZCERTA). This type of integration is gradually spreading to different part of the world including the South Asia. There are seven nations in this region namely Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka which have formed South Asia Association for Regional Co-operation (SAARC).

Principally, an economy which is closely associated with the regional countries has greater opportunity for trade, economic development and growth. Notwithstanding, any adverse economic condition in term of economic policy by one country could simply transmitted to another country (Mastromarco and Woitek, 2007). There are a few examples such as the long standing hostility between India and Pakistan and the global issues of international terrorism. Given that regional economic arrangement entails close interdependence among a group of economies, there is a tendency that problems in one country may be spread to its neighbors, particularly in this globalization era. Therefore, regional economic co-operation is crucial to curb or mitigate the negative impact of these adverse economic situations (Inkelaar *et al*, 2007). In related to that, SAARC-7 countries aware that co-operative among themselves is a necessity for improving their economic performances.

Several studies emphasizing study on the impact of macroeconomic variables towards a country's output (Masih & Masih, 1996; Shan & Sun, 1998; Doyle, 2001; Caporale *et al.*, 2002; Hamori, 2002). However, there are lack of empirical evidence on the interdependent relationship among countries' output, particularly among developing countries. As a result, the aim of this study is to disclose the interdependent relationships between the South Asia Association of Regional Co-operation (SAARC), namely, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka.

2.0 Related Literature Reviews

There are several related previous studies investigating the interdependence relationship among the South Asia countries. Rajapakse and Arunatilake (1997) investigated the impediments to intra SAARC bilateral trade from Sri Lanka perspective. Although there is a large potential for bilateral trade improvement with removal of trade restrictions, nevertheless, none can achieve sustainable economic growth via solely on intra trading. They suggested that the stability in economic and political climate is crucial in providing conducive investment that may expand the trade activities. Meanwhile, Jain (1999) proclaimed that establishment of South Asian Free Trade Agreement is essential in providing mutual beneficial for member countries. In addition, flexibility and tolerance are concern where larger countries indicate willingness to be sensitive towards the needs of smaller neighboring countries. Subsequently, Hassan (2001) stated that the intra trade SAARC countries were unfavorable in relative to other existing regional blocs and yet to achieve trade creation benefit. Khan and Khan (2003) declared that institutional changes for promoting economic development in South Asia is necessary to ensure a dynamic outward oriented

development in those countries. They also agreed on the approach of open regionalism and continent integration in Asia. In related to that, Saxena (2005) examined the possibility of the seven South Asian countries in establishing an optimal currency area. The findings indicated that the spillover benefits of forming a common currency would accumulate from the peace that economic integration would bring between India and Pakistan. Although, the finding proclaimed that those seven South Asia countries were not ready for a common currency area, however, there is existence of some positive aspects such as positive shocks across major economies and the prospects of increasing trade, which would be very beneficial for the region. Besides that, Camacho *et al.* (2006) proposed a comprehensive methodology to characterize the business cycle comovements across European economies and some industrialized countries. Findings indicated that the level of comovement across Euro area economies is not significantly enhanced due to the establishment of the Monetary Union. Furthermore, the study also showed essential proportion of the distances across business cycles using macro variables related to the structure of the economy, directions of trade and the size of the public sector. Finally, the linkages across European economies prior to the establishment of the union indicated that smooth transition of these economies towards a more integrated economic area. This could be due to previous strong business cycles correlations, fundamentally via trade.

3.0 Methodology

This section commence with a brief discussion on the research design, followed by model of research, variable discussion and method of analysis. Data of gross domestic product (GDP) of SAARC-7 countries from 1970 until 2007 are extracted from International Financial Statistics [IFS]. All data are transformed into natural logarithms in order to obtain more precise result for the study and minimize the problem of Heteroskedasticity that increase the scale difference among the variables in the study (Gujarati, 1995). In order to test the interdependence between economic growth, this study employs three methods namely the correlation coefficient estimating the GDP of SAARC-7 countries, Augmented Dickey-Fuller (ADF) (1979) unit root test and Granger non-causality test proposed by Toda and Yamamoto (1995). Augmented Dickey-Fuller (ADF) (1979) unit root test will be performed in order to identify the stationary properties of the time series. Since problem may arise in statistical inference derived from vector autoregression (VAR) or vector error correction (VECM) models, if there should be errors in the process of unit root and co-integration test, then estimation through an augmented VAR procedure proposed (Toda & Yamamoto, 1995) will be adopted. This is to ensure the asymptotic distribution of the MWald statistic and does away with the problem of coexistence of both a unit root and co-integration.

4.0 Empirical Findings and Discussion

Initially, a simple correlation analysis was conducted as to examine the linkage between the GDP of the SAARC-7 countries and the results are displayed in the matrix form in Table 1. All the coefficients of correlation indicated high positive values. This entails strong interdependence among the countries where an increase in one country's GDP will also increase the GDP of the other country.

Table 1: Correlation Matrix Test Results for SAARC-7 countries

	YB	YH	YI	YM	YN	YP	YS
YB	1.00	0.96	0.98	0.96	0.98	0.99	0.95
YH		1.00	0.99	0.96	0.99	0.95	0.97
YI			1.00	0.96	0.99	0.98	0.96
YM				1.00	0.97	0.95	0.98
YN					1.00	0.98	0.98
YP						1.00	0.95
YS							1.00

Notes: The notation applied in this figure followed: YS: Sri Lanka, YP: Pakistan, YM: Maldives, YB: Bangladesh, YI: India, YH: Bhutan and YN: Nepal. 0.0-0.3=weak relationship, 0.3-0.7= moderate relationship and 0.7-1.0= strong relationship.

Meanwhile, the ADF unit root test results are depicted in Table 2 where all the variables are non-stationary at their level. Hence, the null hypothesis cannot be rejected where the times series data contained a unit root. Nevertheless, the null hypothesis of unit root test is being rejected for all series tested at first difference. Therefore, the GDP of SAARC-7 countries are integrated of orders one, $I(1)$. ADF test is conducted in order to examine the stationary property of the data in order to obtain the d_{max} , the maximum lag of order of integration required in the Toda and Yamamoto test.

Table 2: Unit Root Test Results for Series in Level, and First Difference

Series	Augmented Dickey Fuller (ADF)			
	Level		First Difference	
	Intercept	Trend & Intercept	Intercept	Trend & Intercept
YS	0.36	-2.32	-6.80***	-6.77***
YP	-0.45	-2.05	-4.88***	-4.80***
YN	0.14	-2.41	-6.91***	-6.82***
YM	-0.33	-2.07	-5.19***	-5.11***
YI	0.03	-2.08	-3.94***	-3.86**
YH	1.46	-0.29	-4.54***	-4.78***
YB	-0.05	-3.54*	-3.20**	-6.83***

Notes: The notation applied in this figure followed: YS: Sri Lanka, YP: Pakistan, YM: Maldives, YB: Bangladesh, YI: India, YH: Bhutan and YN: Nepal. Asterisks (*), (**), and (***) denote statistically significant at 10%, 5% and 1% levels, respectively. The value presented is in t -statistic.

In Granger non-causality test, the true lag length (k) is chosen using the Schwartz Bayesian Criterion (SBC) presented in Table 3. For SAARC-7 analysis, although the optimal lag length, $k=1$, it have estimated the model using different lag structure, namely lag 1 and lag 2, to ensure that the results are robust. The results from our estimation of the system of $VAR(\rho = d_{max} + k = 2)$ and the computation of the MWald test statistic are presented in Table 4.

Table 3: The Choice of True Lag Length (k) Based on the SBC

Nlag*	SBC: SAARC-7
0	180.4638
1	487.6533**
2	484.0978
3	506.1490

Notes: The notation applied in this figure followed: YS: Sri Lanka, YP: Pakistan, YM: Maldives, YB: Bangladesh, YI: India, YH: Bhutan and YN: Nepal. *N lag is the number of lags used in VAR and ** Largest value of SBC

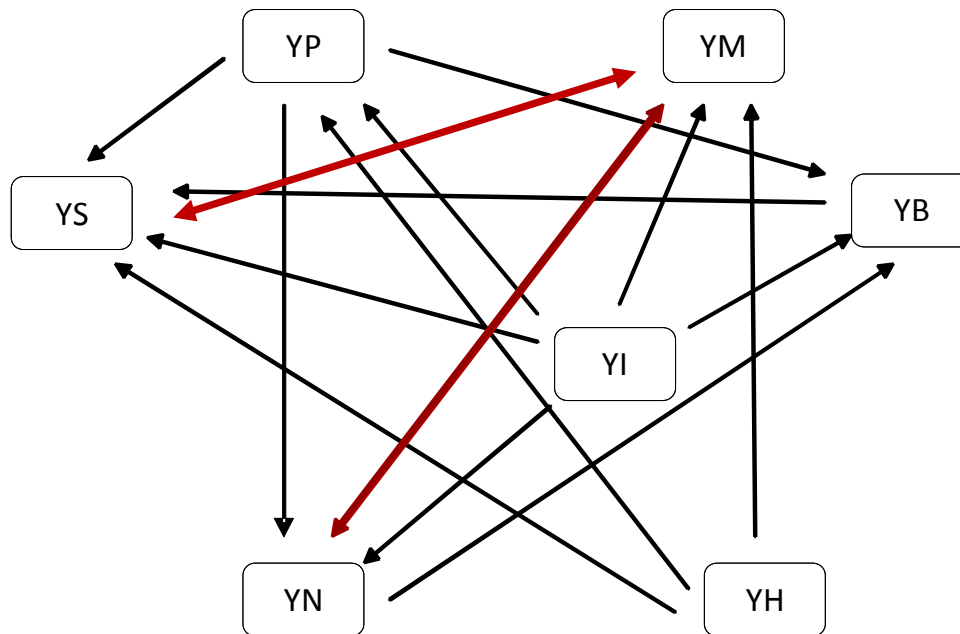
The major findings are summarized as follows: one-way and two-way causality is identified consecutively from all the SAARC-7 countries where indicates existence of intra regional trade where investors channel their investment internally as shown in Table 4 and Figure 1. Bi-directional causality is discovered in three out of the seven countries that include Sri Lanka, Maldives and Nepal. This indicates that there is a closer association exist or high interdependence among SAARC-7 countries particularly these three countries. On the other hand, the absence of causality for Pakistan, Bangladesh, India and Bhutan to the other three SAARC countries may due to the instability in the political and economic which disengage these four nations from the rest. Furthermore, the findings also discovered that the causality running from Sri Lanka, Maldives and Nepal to Pakistan, Bangladesh, India and Bhutan are not obvious. Following the convergence clubs theory it can separate the SAARC-7 countries into two groups respectively. Group 1 comprises of Sri Lanka, Maldives and Nepal while Group 2 includes Pakistan, Bangladesh, India and Bhutan. Although two convergence groups do exists, they eventually shown to have a strong interdependence links with each other. In related to that, India is the most influencing country in the region and therefore is the key factor in influencing growth and interdependence in this region.

Table 4: Granger Non-Causality Tests for SAARC-7

	Explanatory Variables (VAR(2))						
	YB	YH	YI	YM	YN	YP	YS
YB		0.12	0.30*	0.16	1.21***	0.83***	0.13
YH	0.21		0.16	0.20	0.05	0.02	0.07
YI	0.02	0.07		0.25	0.07	0.01	0.03
YM	0.15	1.28***	2.07***		1.28***	0.03	0.33*
YN	0.02	0.02	0.58**	0.98***		0.79***	0.04
YP	0.02	0.34*	0.30*	0.02	0.23		0.01
YS	1.85***	0.49**	0.52**	2.55***	0.08	1.77***	

Notes: The notation applied in this figure followed: YS: Sri Lanka, YP: Pakistan, YM: Maldives, YB: Bangladesh, YI: India, YH: Bhutan and YN: Nepal. Asterisks (*), (**), and (***) denote statistically significant at 10%, 5% and 1% levels, respectively.

Figure 1: Overall SAARC-7 Direction of Non-Causal Relations



Notes: The notation applied in this figure followed: YS: Sri Lanka, YP: Pakistan, YM: Maldives, YB: Bangladesh, YI: India, YH: Bhutan and YN: Nepal. X-Y indicates changes in X Granger-non cause changes in Y.

5.0 Conclusion

This study shows the existence of some positive aspects like positive shocks across major economies and the prospects of increasing trade, which would be very beneficial for the region, as access to the world markets may get limited in the future (Rajapakse & Arunatilake, 1997; Jain, 1999; Khan & Khan, 2003). The economies of the SAARC countries are analogous in factor endowments and cost structure. Therefore, inter industry trade based on comparative advantage is unlikely to be significant in the SAARC countries. Countries with similar patterns of demand are likely to trade more among themselves because goods, which have achieved economies of scale, can more easily be sold in another country having a similar preference pattern. Therefore, economies of scale can trigger profitable trade flows even in the absence of comparative advantage. While intra regional trade is small for most countries, except Sri Lanka, Nepal and Maldives, it has increased for Bhutan and Pakistan in the last decade and trade is likely to increase further once countries move to free trade agreements as preferential and free trade agreements have already been in place between India and other SAARC countries.

References

- Anam, M., & Rahman, S. S. (1991). Economic integration in South Asia: An exploratory analysis in trade, investment and finance. *Journal of Developing Societies*, 7, 139-158.
- Camacho, M., Perez-Quiros, G., & Saiz, L. (2006). Are European business cycles close enough to be just one? *Journal of Economic Dynamics & Control*, 30, 1698-1706.
- Caporale, G. M., Katsimi, M., & Pittis, N. (2002). Causality links between consumer and producer prices: Empirical evidence. *South Economic Journal*, 68(3), 703-711.
- Dickey, D. A., & Fuller, W. A. (1979). Distributions of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74, 427-431.
- Doyle, E. (2001). Export output causality and the role of exports in Irish growth: 1950-1997. *International Economic Journal*, 15(3), 31-54.
- Gujarati, D. N. (1995). *Basic econometrics* (3rd Ed.). New York: McGraw-Hill.
- Hamori, S. (2002). The transmission mechanism of business cycles among Germany, Japan, the United Kingdom and the United State of America. *Applied Economics*, 32, 405-410.
- Hassan, M. K. (2001). Is SAARC a viable economic block? Evidence from Gravity model. *Journal of Asian Economics*, 12, 263-290.
- Inklaar, R., Jong-A-Pin, R., & De Haan, J. (2007). Trade and business cycle synchronization in OECD countries-A re-examination. *European Economic Review* (forthcoming).
- Jain, S. C. (1999). Prospects for a South Asian free trade agreement: Problems and challenges. *International Business Review*, 8, 399-419.
- Khan, S. M. & Khan Z. S. (2003). Asian Economic Integration: A Perspective on South Asia, *Journal of Asian Economics*, 13,767-785.
- Masih, A. M. M., & Masih, R. (1996). Empirical test to discuss the dynamic causal chain in macroeconomic activity: New evidence from Thailand and Malaysia based on multivariate cointegration vector error-correction modeling approach. *Journal of Policy Modelling*, 15(5), 531-560.
- Mastromarco, C., & Woitek, U. (2007). Regional business cycles in Italy: Computational Statistics & Data Analysis.
- Rajapakse, P. & Arunatilake, N. (1997). Would a Reduction in Trade Barriers Promote Intra-SAARC Trade? A Sri Lankan Perspective, *Journal of Asian Economics*, 8(1), 95-115.
- Saxena, S. C. (2005). Can South Asia adopt a common currency? *Journal of Asian Economics*, 16, 635-662.

Shan, J., & Sun, F. (1998). Domestic saving and foreign investment in Australia: A Granger causality test. *International Economic Journal*, 12(4), 79-87.

Toda, H. Y., & Yamamoto, T. (1995). Statistical inference in vector autoregressions with possible near-integrated processes. *Journal of Econometrics*, 66, 225-250.