

Gazi Salah Uddin¹, M. Zakir Saadullah Khan², Ilhan Ozturk³

EXPORT-LED GROWTH REVISITED IN BANGLADESH: EVIDENCE FROM STRUCTURAL BREAK

The paper re-examines the causal relationship between export, import and economic growth in Bangladesh for the period 1971-2009 within the vector autoregressive (VAR) framework by considering the impact of trade liberalization in 1990. The results reveal a bidirectional causality between exports and economic growth in Bangladesh. However, unidirectional causality running from imports to exports and income to imports also in the case for Bangladesh. The results of the error correction model (ECM) suggest that there is a long-run unidirectional causality from exports to growth in Bangladesh. The negative sign on the EC term confirms the expected convergence process in the long-run dynamics of exports and output.

Keywords: export-led growth, structural break, Bangladesh.

Газі Салах Уддін, М. Закір Саадуллах Хан, Ільхан Озтюрк

АНАЛІЗ ЕКСПОРТОЗАЛЕЖНОГО ЕКОНОМІЧНОГО ЗРОСТАННЯ БАНГЛАДЕШ МЕТОДОМ СТРУКТУРНИХ РОЗРИВІВ

У статті переглянуто причинний зв'язок між експортом, імпортом і економічним зростанням в Бангладеш за період 1971-2009 рр. в рамках методології векторної авторегресії з урахуванням впливу лібералізації торгівлі з 1990 року. Результати показали, що для Бангладеш існує двонаправлений причинний зв'язок між експортом і економічним зростанням. Проте однонаправлений причинний зв'язок від імпорту до експорту і від доходів до імпорту також має місце. Результати моделі корекції помилок довели, що існує довгостроковий однонаправлений причинний зв'язок від експорту до економічного зростання. Негативний знак моделі підтвердив очікуваний процес збіжності в довгостроковій динаміці експорту і виробництва.

Ключові слова: експортозалежне економічне зростання, структурний розрив, Бангладеш.

Таб. 5. Літ. 34.

Гази Салах Уддин, М. Закир Саадуллах Хан, Ильхан Озтюрк

АНАЛИЗ ЭКСПОРТОЗАВИСИМОГО ЭКОНОМИЧЕСКОГО РОСТА БАНГЛАДЕШ МЕТОДОМ СТРУКТУРНЫХ РАЗРЫВОВ

В статье пересмотрена причинная связь между экспортом, импортом и экономическим ростом в Бангладеш за период 1971-2009 гг. в рамках методологии векторной авторегрессии с учетом влияния либерализации торговли с 1990 года. Результаты показали, что для Бангладеш существует двусторонняя причинная связь между экспортом и экономическим ростом. Однако однонаправленная причинная связь от импорта к экспорту и от доходов к импорту также имеет место. Результаты модели коррекции ошибок подтвердили, что существует долгосрочная однонаправленная причинная связь от экспорта к экономическому росту. Отрицательный знак модели подтверждает ожидаемый процесс сходимости в долгосрочной динамике экспорта и производства.

Ключевые слова: экспортозависимый экономический рост, структурный разрыв, Бангладеш.

¹ Department of Management and Engineering Economics, Linkoping University, Sweden.

² Department of Economics, Comilla University, Bangladesh.

³ Faculty of Economics and Administrative Sciences, Cag University, Mersin, Turkey.

1. Introduction. Economic growth as well as macroeconomic stability in an open economy such as Bangladesh mostly depends on the developments in the external sector. Exports stimulate economic growth and growth is affected negatively by reduction of imports of capital goods and intermediate goods which do not have domestic import substitutes. The contraction of import has significant affects on the expansion and growth of export ultimately affecting economic growth. Immediately after independence Bangladesh chose inward-looking trade policy and had high anti-export bias. Adoption of more restrictive import policies to protect local import substituting industries resulted in a slow growth of agro-based traditional exports and non-traditional exports did not receive any impetus for growth. By the end of the 1970s Bangladesh partially changed its anti-export bias policies and by the mid-1980s it undertook policies and programmes that resulted in consistent improvement in the incentive to export. By the 1990s Bangladesh became more export oriented and significant improvements have been made in export policy and administration. During the first half of the decade, liberalization policy taken by the governments for swelling imports gave support to the flow of inputs for export-oriented and domestic industries, and led to a surge in consumer and non-production related imports (Rahman, 2002). Subsequently, Bangladesh economy registered an average GDP growth rate of 5.0% in the 1990s, which was one full percentage point higher than that recorded in the previous decades.

Bangladesh economy underwent structural adjustment policies in the early 1980s, including institutional and policy level alterations. The financial and external sectors underwent substantial reforms in the mid-1980s and early 1990s that are likely to have influenced the real output. The real output is also likely to have structural breaks as a consequence to these reforms. In the past decade or so, Bangladesh economy's growth hovered around 5-6% per annum. After the restoration of parliamentary democracy in the 1990 and onwards, it has been observed that the periodic growth averages are much higher than the previous two decades. GDP growth has been much more volatile till 1990, which became much more stable and increasing in the subsequent years.

Analysis of such an economic nature and records has important implications for small emerging economies like Bangladesh. This paper first analyzes the time series properties of the important macroeconomic variables, the real GDP exports and imports. Non-stationarity in real output implies that shocks have permanent effects, is inconsistent with the view that business cycles are stationary fluctuations around a deterministic trend; instead, it suggests that shocks to real output have permanent effects (Nelson and Plosser, 1982). It can be argued that non-stationarity has important implications for government policies effectiveness. If real output contains a unit root, the logical implication is that government-initiated structural reform is of limited value. However, if real output is trend stationary, this implies that only large shocks such as government policies aimed at changing the fundamentals will have at least semi-permanent effects on the growth path.

The recorded economic characteristics give raise to the question whether there are causal relationships between export, import and growth; and if there are, to what directions such causality do exist. Therefore, this paper secondly investigates the causality between export, import and growth in Bangladesh which will help in for-

mulating growth stimulating trade policies. Finally, the impact of the reform policies on has been investigated using the impact of trade liberalization in 1990.

2. Literature Survey. The relationship between foreign trade and economic growth has been the debate of economic research in academia for long days. Trade, generally considered as the engine of growth and as the part of it both export and import have important role for economic progress and prosperity of a country. There has been a long debate regarding the relative importance of these 2 for economic growth. Trade policies — import substitution or export promotion — have been formulated based on the hypotheses of their expected outcome of growth and development.

Export earnings are the most important source of foreign exchange that can be used to ease the pressure of balance of payment and reduce the impact of external shocks on domestic economy. Import is an important channel for foreign technology and knowledge flow in a domestic economy (Grossman and Helpman, 1991; Lee, 1995; Mazumdar, 2001). Endogenous growth models have emphasized the importance of imports as new technologies could be embodied in imports of intermediate goods, capital goods that increases labour productivity over time as workers acquire the knowledge to “unbundle” the new embodied technology (Thangavelu and Rajaguru, 2004).

It is generally accepted that economies having high export performance also perform well in their GDP growth and vice versa, raising the question about the nature of the link between exports and GDP (Afzal et al., 2010). It is widely acknowledged that imports play a central role in the countries whose manufacturing is built on export oriented industries (Esfahani, 1991; Serletis, 1992; Riezman et al., 1996). Asafu-Adjaye and Chakraborty (1999) found the evidence that exports, imports and real output are cointegrated in inward-looking countries. Using the error correction models, they found causality running indirectly from exports to imports and then real output. Taking their findings, it is clear that import is an important channel to economic growth. If exports allow sufficient accumulation of foreign exchange, the economic growth is promoted by importing of high-quality goods and services, which in turn expand production possibilities and future economic growth (Baharumshah and Rashid, 1999). It means that there is trichotomy between growth, export and import.

Most of the studies focus only on the relationship between foreign trade and economic growth. Substantial investigation of the causal relationship between export and economic growth has also been made to examine the export-led growth hypothesis (Ozturk and Acaravci, 2010; Kilavuz and Topcu, 2012). As it is known, export-led growth (ELG) hypothesis refers to the relationship between exports and aggregate real output. The export-led growth suggests that the expansion of aggregate exports have a favorable impact on economic growth. Few have investigated the causality between import and growth (Kotan and Saygili, 1999; Dutta and Ahmed, 2004; Ugur, 2008).

Riezman et al. (1995) provided an investigation on export led growth that took account of import explicitly in the model. Using the forecast error variance decomposition, they found that the export-led growth would work both directly, import to export and export to growth and indirectly through export to import and import to growth in the countries of their study.

Baharumshah and Rashid (1999) using the time-series data of Malaysia detected the presence of a stationary long-run relationship between exports, imports and GDP. Ramos (2001), using Portugal data over the period 1865-1998, found the Granger causality between exports, imports and economic growth. The found is feedback effect between exports-output growth and import-output growth.

Mamun and Nath (2005) found unidirectional causality from exports to growth in Bangladesh for the period from 1976 to 2003. Paul (2011) found a significant evidence on export-led growth in Bangladesh for both the long run and the short run for the 1979-2010 period. It turns out that output growth also leads to export expansion.

Awokuse (2007) using multivariate cointegrated VAR methods in the neoclassical growth modeling framework investigated the role of exports and imports on economic growth of Bulgaria, Czech Republic, and Poland and concluded that the singular focus of many past studies on just the role of exports as the engine of growth excluding imports may be misleading or at best incomplete.

Hossain et al. (2009) investigated the relationship between exports, imports and GDP by applying cointegration and error correction models using annual time series from 1973 to 2008 in Bangladesh. The empirical evidence suggests a unidirectional causality from exports to GDP, also suggesting that export promotion strategy can contribute to Bangladesh's economic growth. Exports significantly affects import both in the long and short run. They also concluded that expansion of exports is not a guarantee for economic growth as exports is significantly affected by imports.

3. An Overview of the Export, Import and Growth in Bangladesh. Bangladesh has shown remarkable economic achievements in growth of gross domestic product (GDP) and GDP per capita in the last 2 decades and is approaching to join to middle income country group. The structural adjustment program started in mid-1980s, liberalization of trade and financial sector in early 1990s and the democratization of political institutions have contributed to such growth.

Economic Growth. From the low economic growth rate of 3.8% in 1970s and 1980s, Bangladesh has been registering a very high economic growth since mid-1990s. The average growth rate was 4.8% in 1990s which has dramatically increased to 5.8% by mid-2000s and more than 6% by the second half of the last decade. After the low and unstable economic growth in 1970s and 1980s, the economy registered a stable and steady growth in the last 2 decades. This resulted in an increasing per capita income from 0.87% in 1973 to over 3.5% in 1990 and around 6% in 2010. This achievement and the stable economic growth prove the effectiveness of the country's major policies. Bangladesh economy shows a trend of structural transformation of broad sectoral share in GDP from agriculture to industry, keeping service sector stagnant for several years, except minor variation year to year though the service sub-sector contribution has got major changes. The share of agriculture sector in GDP (at 95-96 constant prices) in the beginning of 1980s was 33.21%, whereas in the fiscal year 2009-10 this share falls to 20.5%. On the other hand, the share of industry sector during the same period has increased from 17.08% to around 30%. The structural transformation of GDP of Bangladesh reflects the positive trend of industrialization.

Exports. The immediate effect of independence on exports was to make them less diversified because Bangladesh lost some of its manufactured exports, partly due to

the difficulty of finding alternative markets and partly to reduced production. In the year immediate after independence jute in raw and manufactured forms accounted for 87% of the value of merchandise exports. By 1985/86 its share had fallen to 51%. The reduction in the share of jute was largely due to the increase in 2 items — ready-made garments and shrimps, since mid-1980s. The share of these two exports increased from negligible 1.5% of the total exports in the immediate post-independence years to 30% in 1985/86 and about 80% in 2009-10. Presently Bangladesh's exports have been heavily concentrated on garments and, more recently, on knitwear. Leather and leather products also play a major role.

Despite the debilitating effects of international trade condition export growth till mid-1980s was moderate. The average export growth during 1973-85 period was 4.9% in real terms. Since the early 1990s, overall growth of export has been fairly robust with exception of FY 1994 and FY 2002 when there was a sharp drop in this growth. Export sector registered the average growth rate of 14.53% per annum throughout the 1990s and 15.93% throughout the first decade of this millennium, even in the context of the contraction of global trade volume in the late years of the decade. The robust growth of exports put the country in the league of top 20 countries demonstrating fastest export expansion (Bhattacharya, 2005). More specifically, such export growth was possible due to the robust growth of export of frozen goods (18.80%), ready-made garments (25.64%), knitwear (60.55%), and chemicals (50.92%).

Imports. To rebuild the country destructed during the war for liberation, Bangladesh had to depend heavily on the imports of producers' goods, like machineries and transport equipments as well as import of grains and other food items. There has been little long-run change in the composition of imports as far as the broad categories are concerned, although year to year variations in some categories have often occurred.

During 1973-1985 period the average annual growth rate of import was about 4.5%, marked by substantial annual variation. The composition of import during this period remains almost same, except the grains that declined over the years which has been offset by corresponding increase in the share of non-grain food imports (mainly oilseeds, edible oil, milk and sugar). Throughout the 1990s, Bangladesh's import registered the average growth rate of about 11%. The positive tone of import growth was still maintained during last decade with the average growth of 16.87%.

4. Data and Methodology.

4.1. Data Sources. This study uses the annual data for the period 1971-2009 on Bangladesh economy from the World Development Indicators (WDI) published by the World Bank (WB 2010). The variables of the study are measured as follows: real gross domestic product (GDP) at 2000 constant US\$ prices, namely, LGDP. This study will use real exports of goods and services and real imports of goods and services where both are at 2000 constant US\$ prices; namely, LEXP and LIMP. All of the variables in the study are at their natural logarithm.

4.2. Methodology. The estimation process would begin with studying the time series properties of the variables and testing the order of integration. In order to establish the line of causality between the variables the famous Granger causality tests is carried out. In this study, we also estimate the model with the system-based reduced

rank cointegration approach by Johansen and Juselius (1990). While there are several ways to examine interaction between variables, the influential work of Sims (1980) made VAR model and innovation accounting useful in time-series studies. Other works in this line include Blanchard and Quah (1989), Evans (1989), King et al. (1991), and Pesaran and Shin (1998). As Hamilton (1994:291) asserted, impulse response functions and variance decompositions are used to summarize the dynamic relations between variables in a VAR. Hence, the methodological approach in this paper includes 3 steps:

1) It needs to be checked for a unit root in log real export (LEXP), log real import (LIMP) and log real GDP (LGDP) in levels. We are using 2 different types of unit root tests: the augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979, 1981), the Phillips-Perron (PP) test (Phillips and Perron, 1988).

2) If all the variables are I (1) then the cointegration analysis can be done to infer long-run relationship between variables. VAR will be inappropriate. Hence, it needs to be tested for cointegration.

3) If the variables are cointegrated, i.e. $C(1, 1)$, a vector error correction (VEC) model will be used to discover the long-run relationship. So, the third step is to test for causality by employing the appropriate types of causality tests. If the cointegration relations between the variables is absent, we can run them in a VAR and by that get variance decompositions and impulse responses.

5. Empirical Results.

Following the three-step procedure of VAR mentioned above, the empirical study has been made based on the annual data of the variables for Bangladesh. Before doing so, the descriptive statistics of the variables is presented to explore the magnitude of the variables, Table 1.

Table 1. Descriptive Statistics Output with Export and Import

	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
LGDP	24.168	24.107	25.084	23.454	0.481	39
LEXP	21.652	21.451	23.588	19.853	1.056	39
LIMP	22.351	22.253	23.697	20.976	0.691	39
DLGDP	0.039	0.047	0.092	-0.151	0.038	38
DLEXP	0.091	0.108	0.619	-0.349	0.153	38
DLIMP	0.031	0.071	0.462	-0.701	0.231	38

Table 2 shows the estimations for LGDP, LEXP and LIMP series. All the coefficients are strongly significant. Both series exhibit an upward trend along with a structural break at 1990 in the slope of the trend function.

Table 2. Detrending Output with Export and Import with a Structural Break

LHS Variables	Regressors		
	Constant	Trend	Break 1990
LGDP	23.462[0.013]***	0.032[0.001]***	0.019[0.002]***
LEXP	20.090[0.045]***	0.072[0.003]***	0.039[0.006]***
LIMP	21.684[0.120]***	0.017[0.009]*	0.070[0.017]***

Note: 1. *, ** and *** indicate the significance at the 10%, 5% and 1% levels, respectively.

2. Standard errors are in the parentheses.

3. The dummy "Break 1990" considers a structural break in the slope of the series beginning at 1990.

Nelson and Plosser (1982) found that most macroeconomic variables are characterized by unit-root processes. We also need to check the variables for the order of integration before we test them for cointegration. However, we run unit root tests in Table 3 to verify our hunch. The augmented Dickey-Fuller (Dickey and Fuller, 1979, 1981) and Phillips and Perron (1988) tests are widely used for this. Phillips and Perron (1988), however, proposed a modification of the Dickey-Fuller (DF) test and have developed a more comprehensive theory of unit root nonstationarity. Choi and Chung (1995) asserted that for low frequency data, as is the case with ours, the PP test appears to be more powerful than the ADF test. Though we run both tests, we will regard the PP tests as final if the results contradict.

Table 3. Unit Root Tests Output with Export and Import Residuals

	LGDP	P-values	Lag	Unit Root	LEXPR	P-values	Lag	Unit Root	LIMPR	P-values	Lag	Unit Root
ADF(μ)	-2.068	0.038	7	No	-3.982	0.000	6	No	-3.912	0.000	0	No
ADF(τ)	-1.970	0.297	7	Yes	-3.115	0.036	9	No	-3.886	0.004	0	No
PP(μ)	-7.204	0.000	4	No	-6.090	0.000	3	No	-3.884	0.000	2	No
PP(τ)	-7.214	0.000	4	No	-6.019	0.000	3	No	-3.920	0.005	1	No

Note:

1. The tests will not include any trend since they are already detrended. They will be tested without intercept, which is called "none" and with intercept. ADF (μ) and PP (μ) represents the most general model without intercept which is called none. ADF (τ) and pp (τ) is the model with a drift and without trend of the variables.
2. The null hypothesis states that the variable has a unit root. P-values are used to decide on the unit root at the 1, 5 and 10% significance levels.

Since the series are already detrended, we will test only the first 2 possibilities. There can be 3 specifications with unit root tests: the first type includes neither an intercept, nor a trend. The second type includes only an intercept, and the third type considers both an intercept and a trend. As Table 3 shows, the results of the ADF and PP tests that strongly indicate the absence of unit roots in LGDP represents for the real output residuals; LEXPR and LIMPR stand for the real exports and imports residuals respectively. LGDP, LEXPR and LIMPR are derived after the trend and structural break equation. Thus, both detrended series are TSP, supporting Perron (1989)'s findings that most macrovariables have stationary fluctuations around the trend function often with an inclusion of structural breaks. Now we avail these stationary series for VAR estimations.

Table 4 presents Johansen cointegration tests with LGDP, LEXPR and LIMPR. The λ_{trace} and λ_{max} statistics are calculated as per Johansen (1995). We have 3 variables and null hypotheses are thus 2 in number under each test. The corresponding λ -statistics and their critical values are shown in the first and second columns. As long as each λ -statistic is below its critical value, we will fail to reject the corresponding null hypothesis of no cointegration. The p-values are not reported here to save space. If we fail to reject the first hypothesis of no cointegrating relation, the second null hypothesis automatically becomes redundant. The fourth column against each null hypothesis in the table gives the number of cointegrating equations. The results of the cointegration tests in Table 4 are consistent suggesting 3 cointegration of the variables under the λ_{trace} and λ_{max} tests.

Table 4. Johansen Cointegration Tests

Cointegration Rank Tests:			λ Statistics	Critical Values	P- values	Cointegrating Equations
λ_{Trace} Tests						
	$H_0: r = 0$	$H_A: r > 0$	93.895	29.797	0.000	Present
	$H_0: r \leq 1$	$H_A: r > 1$	48.079	15.495	0.000	Present
	$H_0: r \leq 2$	$H_A: r > 2$	20.889	3.841	0.000	Present
λ_{Max} Tests						
	$H_0: r = 0$	$H_A: r = 1$	45.816	21.132	0.000	Present
	$H_0: r = 1$	$H_A: r = 2$	27.190	14.265	0.000	Present
	$H_0: r = 2$	$H_A: r = 3$	20.889	3.841	0.000	Present

Note:

1. The λ_{Trace} and λ_{Max} are calculated as per Johansen (1995) critical values are calculated for the 5% significance level.
2. λ_{Trace} indicates Trace and λ_{Max} states maximum eigen value unrestricted cointegration rank test, P-values are calculated as per Mackinnon et al. (1999). One asterisk (*) denotes significance at the 5% level.
3. r denotes the number of cointegrating vectors. The λ_{Trace} and λ_{Max} test statistics are computed by allowing for linear deterministic trends in the data.
4. The lag length is determined by the SBC (see Enders 2004:363). R stands for the rank of the matrix, which denotes the number of the cointegrating equations between the variables.

As for Bangladesh, the Granger causality in the ECM framework indicates the short-run and long-run relationship between the variables. The results reveal a bidirectional causality between exports and economic growth in Bangladesh. However, unidirectional causality running from imports to exports and income to imports also in the case for Bangladesh. However, the most important term in Table 5 is the sign and value of the coefficient on the EC term. The negative sign on the EC term confirms the expected convergence process in the long-run dynamics of exports and output.

Table 5. Results of Error Correction Model

	DLGDPR	DLEXPR	DLIMPR	ECT_{t-1} (t-statistics)
DLGDPR		20.652***	0.313	-2.932*** [-0.261]
DLEXPR	32.986***		11.705***	-1.626* [-1.260]
DLIMPR	32.986*	0.033		4.440 [-2.353]

Note: 1. **, *** rejects the null at the 5% and 1% levels of significance.

2. Standard errors are in the parentheses

This study applies cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) techniques based on ECM to check the stability of the model. The plots of CUSUM and CUSUMSQ statistics are well within the critical bounds, implying that all coefficients in the ECM model are stable. In addition, the results present the plot of CUSUM and CUSUMSQ test statistics that fall inside the critical bounds of 5% significance. This implies that the estimated parameters are stable over the sample period 1971-2009.

6. Conclusion. The aim of this paper is to re-examine the causal relationship between export, import and economic growth in Bangladesh for the period 1971-

2009 within the vector autoregressive (VAR) framework by considering the impact of trade liberalization in 1990. According to the results, there is a bidirectional causality between exports and economic growth in Bangladesh. However, unidirectional causality running from imports to exports and income to imports also found for Bangladesh. The results of the error correction model (ECM) suggest a long-run unidirectional causality from exports to growth in Bangladesh. Thus, the results support the export-led growth hypothesis for Bangladesh during 1971-2009 period. The export-led growth suggests that the expansion of aggregate exports has a favorable impact on economic growth.

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Стаття надійшла до редакції 30.09.2012.