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Export, Import and Economic Growth: The Case of Transition Economies

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Abstract This study analyses the relationships between export, import and economic growth for the 13 transition economies. Empirical results show that there is a unidirectional causality from economic growth to export. Empirical findings show that the growth-led export hypothesis is valid in those countries and growth is rather shaped by increase in import demand.

Keywords Export · Import · Growth · Causality

JEL Classification F43 · C23 · F15

Introduction

The relationships between export and economic growth have been a subject of much interest in the development and growth literature. The neoclassical view argues that there is a strong relationship between export expansion and economic growth, and that export expansion is one of the main determinants of growth. This causality from export to economic growth has been labeled in the literature as the export-led growth hypothesis.

The export-led growth hypothesis suggests that export growth leads to higher economic growth through such means as facilitating the exploitation of economies of scale by specialising in production (Helpman and Krugman 1985), relieving the

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foreign exchange constraint (McKinnon 1964), enhancing productive efficiency by increasing the degree of competition (Balassa 1978), and promoting the diffusion of technical knowledge (Grossman and Helpman 1991).

Growth performance of Asian Countries can be considered as a good example of export-led growth (compared to Latin American and African countries). These newly industrializing countries—in particular, Hong Kong, Singapore, Korea, Taiwan, Malaysia and Thailand—have doubled their living standards every 10 years. The World Bank perceives the experiences of these countries as a model for development (Giles and Williams 2000).

However, the support for export-led growth is not universal. Experiences particularly in East and Southeast Asian countries are criticized as they are rare in many respects, and attention is drawn to the point that these experiences are not absolutely applicable to other countries. On the other hand, it has also been put forward that the belief that "export-led growth policies bolster economy" in less developed countries may not result in sustainable economic growth due to the volatility and unpredictability in the world markets. Other inquiry that has been put forward is that markets of developed countries are not large enough to mass export demand of less developed countries. For this reason, some argue that protective strategies, i.e. import substitution, are a more suitable trade policy for less developed or developing countries compared to internationally open strategies (Giles and Williams 2000). In addition to these criticisms, opponents of the export-led growth hypothesis argue that compared to the export factor, other factors play a more important part in economic growth; since the less developed economies have to increase their production capacities before they increase their export volume. Growth in such countries may result from an increase in the number of basic inputs or improvement of productivity of the production factors, or both. Growth in production promotes diversification and improvement of capabilities upon adoption of division of labor and new technologies, and it also can increase national production-based export efforts for more extensive activity and competition strength.

Since import substitution policies increase the dependence on short term capital to achieve continuing imports, countries adopting such these policies were deeply affected by crises in the 1980s. Due to the effects of the crises, the belief in inward growth strategy was replaced to the export-led growth strategy in the middle of the 1980s (Bruton 1989) In many hypothesis, the importance and the effects of exports on economic growth were emphasized. During this period, the economists had suggested development strategies that aim to cancel market promotions and trade obstacles, and to allow foreign competition to enter the markets. The same suggestions had been proposed by the IMF, the World Bank and other multilateral institutions, and they also granted financial aids.

Between 1989 and 1991, a rapid transition process to market economy started as a result of political power shift observed in some European and Asian countries. In 27 countries, referred to as transition economies" as well, comprehensive reform packages aimed at transition to market economy were put into effect. International openness and convertibility had formed the basis for these reform packages (Edwards 1993).

The trade relationships of transition countries have surprisingly changed at the last decade. After the liberalization, some transition countries have removed trade restrictions immediately, but opening of the markets have given rise to the rapid increase of prices, decrease of real income. Consequently, they have given rise to the selective trading handicaps to be brought in once again. On the other hand, EU and WTO memberships and other selective trade agreements have raised the expectation that the international trade has a crucial effect on the economic development of these countries once again (Dawson and Hubbard 2004).

Contrary to Asian economics, there are not so many studies analyzing trade-growing nexus in these countries due to the fact that transition countries pass to the new market economy. There are only few studies testing the export-led growth hypothesis in these countries (Dawson and Hubbard 2004; Awokuse 2007). Unlike the other studies, in this study, the relationships between export, import and economic growth have been analyzed by using panel unit root, panel cointegration and panel causality tests. The study is organized as follows. Empirical literature is explained in the second part and data and methodology are clarified in the third part.

Literature Review

Many studies have tested the export-led growth hypothesis. Initial studies only investigated the relation between export and economic growth. These studies employed cross-sectional data and time series data and the ordinary least square method provided support for a positive relationship between export growth and economic growth (Michaely 1977; Balassa 1978; Heller and Porter 1978; Tyler 1981; Feder 1983; Kavoussi 1984).

Michaely (1977) found a strong positive correlation between the exports in developing countries and growth in GDP. Balassa (1978) studied the relationship between exports and economic growth in 11 developing countries during 1960–1973 and concluded that the growth in exports effects economic growth positively. Tyler (1981) analyzed the relationship between economic growth and expanding of exports for 1960–1977 periods and found an important positive correlation between economic growth and total exports. Feder (1983), researching the same relation for industrializing countries, achieved the same results with Tyler. Kavoussi (1984) tested the correlation between the exports in 73 developing countries and economic growth for 1960–1973 periods and attained the results that expansion in exports resulted in a much more high-level economic performance.

The empirical studies that are made in the recent years tend to focus on causality of direction between exports and economic growth by using causality tests. (Jung and Marshall 1985; Chow 1987; Sharma et al. 1991; Ghartey 1993; Sharma and Dhakal 1994; Islam 1998; Napoles 2001; Hatemi 2002; Balaguer and Cantavella-Jorda 2004; Çetintaş 2004; Mamun and Nath 2005; Mah 2005; Siliverstovs and Herzer 2006; Awokuse 2007; Bahmani-Oskooee and Oyolola 2007). It should be noted that while some of these studies have used simple Granger or Sims causality tests, others have used cointegration and error-correction model. The empirical studies conducted by using these tests are complex and generally contradictory to

each other. While some studies support the existence of a causality relationship between export and economic growth, some other studies prove that there is no important relationship between these two variables.[1] Therefore, contrary to strong empirical evidence used at the beginning, there may be some results which cause suspicion about the export-led growth hypothesis. The relationship between foreign trade and growth is complex and inconstant. The different selected countries and periods, the econometric method utilized in causality analysis and differences in data selection caused different results to emerge.

The first studies researching the relation by using the causality tests belong to Jung and Marshall (1985) and Chow (1987). Jung and Marshall (1985) investigated the direction causality between exports growth and growth of output for 37 countries and found statistical support for the export-led growth hypothesis only four cases. Chow (1987) found bidirectional causality between export growth and industrial output in most of newly industrialized countries.

Sharma et al. (1991) investigated the causal relationship between exports and growth in five industrialized countries. They concluded that Germany and Japan experienced export-led growth, while the US and the UK experienced a reverse causal relationship between exports and growth. They found no causal relationship between exports and growth for Italy. Ghartey (1993) found that exports growth causes economic growth in Taiwan, economic growth causes exports growth in the US, and a feedback causal relationship exists in Japan. Sharma and Dhakal (1994) investigated causality between export growth and output growth for 30 low and middle income developing countries. They found a bi-directional causal relationship between export growth and output growth in five countries and causality from export growth to output growth in other six countries. Output growth causes export growth in another eight countries and no causal relationship exits in the remaining countries. Islam (1998) tested the causality between exports and growth in 15 Asian countries. He found that there is causality from export expansion to growth in two-third of these countries. Napoles (2001) showed that the problems of export-led growth strategies in Mexico are related to trade liberalization policies.

Hatemi (2002) found that there is a bi-directional causality between export growth and economic growth in Japan. Balaguer and Cantavella-Jorda (2004) examined the export-led growth hypothesis for Spain. They found that there is bidirectional causality between exports and output. Çetintaş (2004) found a bidirectional causality between export and economic growth for Turkey. Al Mamun and Nath (2005) found that there is a long run unidirectional causality from export to economic growth in Bangladesh. Mah (2005) tested the causality between export and economic growth in China and found a bi-directional causality between them. Siliverstovs and Herzer (2006) tested the export-led growth hypothesis for Chile. They found support for export-led growth. Awokuse (2007) investigated the impact of export and import expansion on growth for Czech Republic, Bulgaria and Poland. He found that trade stimulates economic growth, as well as a bi-directional causal relationship between exports and growth in Bulgaria and causality from imports to economic growth in the Czech Republic and Poland. Bahmani-Oskooee and

[1] For detailed discussion about this issue see Giles and Williams (2000).

Oyolola (2007) investigated export growth and economic growth for 44 developing countries and provided support for the export-led growth hypothesis in 60% of the countries.

Data and Methodology

The balanced panel consists of quarterly data for 13 transition countries (Armenia, Belarus, Bulgaria, Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Poland, Russia, Slovak Republic and Slovenia) for 1995:2 2006:4. All the data is taken from the IMF online database. All the variables are converted into real values and transformed to natural logarithms.

Panel Unit Root Test

As with standard cointegration tests, it is important to know the stationarity properties of the data to ensure that incorrect inferences are not made. Testing for stationarity in panel data differs somewhat from conducting unit root tests in standard individual time series. The most widely utilized panel unit root tests are the Levin et al. (2002) test (hereafter LLC), Im et al. (2003) (hereafter IPS) and the Fisher type unit root test developed by Maddala and Wu (1999).

The LLC test is one of the first tests prepared to be used in panel data field. It tests unit root hypothesis using an ADF equation and proposes a three step procedure.

First, the ADF equation numbered 1 is estimated separately for each country. Appropriate lag level, P_i, is allowed to change between individuals.

$$\Delta y_{i,t} = \alpha_i + \delta_i y_{i,t-1} + \sum_{j=1}^{P_i} \beta_{i,j} \Delta y_{i,t-j} + \varepsilon_{i,t} \tag{1}$$

In the second step, two separate Eqs. 2 and 3 are estimated with the same lags in Eq. 1

$$\Delta y_{i,t} = \alpha_i + \sum_{j=1}^{P_i} \beta_{i,j} \Delta y_{i,t-j} + e_{i,t} \tag{2}$$

$$y_{i,t-1} = \alpha_i + \sum_{j=1}^{P_i} \beta_{i,j} \Delta y_{i,t-j} + v_{i,t-1} \tag{3}$$

and residuals are transformed. $\tilde{e}_{it} = \frac{\hat{e}_{it}}{\hat{\sigma}_{\varepsilon i}}$, $\tilde{v}_{it-1} = \frac{\hat{v}_{it-1}}{\hat{\sigma}_{\varepsilon i}}$

In the last step, the Eq. 4 is estimated in order to calculate panel test statistic.

$$\tilde{e}_{it} = \delta \tilde{v}_{it-1} + \tilde{\varepsilon}_{it} \tag{4}$$

Through analyzing t statistics of the δ coefficient in the equation numbered (4), no hypothesis is accepted or rejected.

Im et al. (2003) modify Levin and Lin's (1992) (hereafter LL) framework by allowing for heterogeneity of the coefficient on the lagged dependent variable. The

authors recommend the use of group-mean LM statistics in order to test for the null hypothesis that the coefficient on the lagged dependent variable is equal to zero across all members of the panel. Standard ADF regressions are estimated, and LM statistics are calculated. In simplistic terms, one calculates a statistic termed the *t*-bar statistic by the authors; this is based on the average of the augmented Dickey Fuller *t* statistics for individual countries. The authors have calculated the critical values for the components of their tests by using stochastic simulations, and they demonstrated that *t*-bar statistics converge to a standard normal distribution as the number of observations and the numbers of countries tend to infinity.

The form of IPS unit root test is:

$$t_{NT} = \frac{1}{N}\sum_{i=1}^{N} t_{i,t}(p_i) \tag{5}$$

where $t_{i,t}$ is the individual ADF t statistics for the unit root tests and P_i is the lag order in the ADF regression then the test statistic can be calculated as:

$$\Omega_{\bar{t}} = \frac{\sqrt{N(T)}[\bar{t}_T - E(t_T)]}{\sqrt{\mathrm{var}(t_T)}} \tag{6}$$

where t_{NT} is defined above and values for $E[t_{iT}(p_i,0)]$ and $\mathrm{var}[t_{iT}(p_i,0)]$ are obtained from the results of Monte Carlo simulations carried out by IPS and are available from their Table 2; they have tabulated them for various time periods and lags. When the ADF has different augmentation lags (p_i) the two terms $E(t_T)$ and $\mathrm{var}(t_T)$ in the equation above are replaced by corresponding group averages of the tabulated values of $E(t_T, p_i)$ and $\mathrm{var}(t_T, p_i)$ respectively.

The resultant test statistic $\Omega_{\bar{t}}$ converges to a standard normal distribution as T and $N \sim \infty$; therefore, unit root hypothesis can be tested by comparing the value obtained to the standard normal critical values.

The test statistics proposed by Maddala and Wu (1999) is based on combined P values of the test statistics pertaining to N independent ADF regression of the equation numbered (7). Fisher test is non-parametric test and test statistics are follows,

$$P(\lambda) = -2\sum_{i=1}^{N} \log_e \pi_i \tag{7}$$

Here, $P(\lambda)$ horizontal section for i is P value of the ADF test statistics. The Fisher test statistics $P(\lambda)$ has a chi square distribution having $2N$ independence grade. In the article published by Maddala and Wu (1999), this test is compared with IPS and LL unit root tests. Based on the result they reached, Maddala and Wu (1999) conclude in general that the Fisher test is better than the IPS and LL tests.

Panel Cointegration Test

To test cointegration firstly, we use the method developed by Pedroni (1999). This formulation allows one to investigate heterogeneous panels, in which heterogeneous

slope coefficients, fixed effects and individual specific deterministic trends are permitted. Pedroni (1999) suggested two types of test. The first is based on the within-dimension approach and includes four statistics. They are the panel-v statistics, panel-p statistics, panel PP statistics and panel-ADF statistics. These statistics pool the autoregressive coefficients across different members for the unit root tests on the estimated residuals. The second test by Pedroni (1999) based on the between-dimension approach, which includes three statistics. They are the group p-statistics, group PP-statistics and group ADF-statistics. These statistics are based on estimators that simply average the individually estimated coefficients of each member

In its simplest form, this consists of taking no cointegration as the null hypothesis and using the residuals derived from the panel analogue of an Engle and Granger (1987) static regression to construct the test statistic and tabulate the distributions. Cointegration equation is as follows.

$$\begin{gathered} Y_{i,t} = \alpha_i + \delta_i t + \beta_{1i} X_{1i,t} + \beta_{2i} x_{2i,t} + \ldots + \beta_{Mi} x_{Mi,t} + e_{i,t} \\ t = 1, \ldots, T; \quad i = 1 \ldots, N; \; m = 1, \ldots, M \end{gathered} \tag{8}$$

Based on co-integrated error terms, Pedroni (1999) developed seven panel cointegration test statistics. Heterogeneous panel and heterogeneous group average panel cointegration statistics developed by Pedroni (1999) are calculated as follows.

Panel v-statistics,

$$Z_v = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{it-1}^{2} \right)^{-1}$$

Panel p-statistics

$$Z_\rho = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{it-1}^{2} \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{e}_{it-1} \Delta \hat{e}_{it} - \hat{\lambda}_i \right)$$

Panel PP-statistic

$$Z_t = \left(\hat{\sigma}^2 \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{it-1}^{2} \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{e}_{it-1} \Delta \hat{e}_{it} - \hat{\lambda}_i \right)$$

Panel ADF-statistic

$$Z_t^* = \left(\hat{s}^{*2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{it-1}^{*2} \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{it-1}^{*} \Delta \hat{e}_{it}^{*}$$

Group p-statistic

$$\tilde{Z}_\rho = \sum_{i=1}^{N} \left(\sum_{t=1}^{T} \hat{e}_{it-1}^{2} \right)^{-1} \sum_{t=1}^{T} \left(\hat{e}_{it-1} \Delta \hat{e}_{it} - \hat{\lambda}_i \right)$$

Group PP-statistic

$$\tilde{Z}_t = \sum_{i=1}^{N} \left(\hat{\sigma}^2 \sum_{t=1}^{T} \hat{e}_{it-1}^{2} \right)^{-1/'2} \sum_{t=1}^{T} \left(\hat{e}_{it-1} \Delta \hat{e}_{it} - \hat{\lambda}_i \right)$$

Group ADF-statistics

$$\tilde{Z}_t^* = \sum_{i=1}^{N}\left(\sum_{t=1}^{T}\hat{s}_i^2\hat{e}_{it-1}^{*2}\right)^{-1/2}\sum_{t=1}^{T}\left(\hat{e}_{it-1}^{*}\Delta\hat{e}_{it}^{*}\right)$$

here,

$$\hat{\lambda}_i = \frac{1}{T}\sum_{s=1}^{k_i}\left(1-\frac{s}{k_i+1}\right)\sum_{t=s+1}^{T}\hat{\mu}_{i,t}\hat{\mu}_{i,t-s}, \hat{s}_i^2 \equiv \frac{1}{T}\sum_{t=1}^{T}\hat{\mu}_{it,}^2\hat{\sigma}_i^2 = \hat{s}_i^2 + 2\hat{\lambda}_i, \bar{\sigma}_{N,T} \equiv \frac{1}{N}\sum_{i=1}^{N}\hat{L}_{11i}^{-2}\hat{\sigma}_i^2$$

$$\hat{s}_i^{*2} \equiv \frac{1}{T}\sum_{t=1}^{T}\hat{\mu}_{i,t}^{*2}, \tilde{s}_{N,T}^{*2} \equiv \frac{1}{N}\sum_{i=1}^{N}\hat{s}_i^{*2}, \hat{L}_{11i}^2 = \frac{1}{T}\sum_{t=1}^{T}\hat{\eta}_{i,t}^2 + \frac{2}{T}\sum_{s=1}^{k_i}\left(1-\frac{s}{k_i+1}\right)\sum_{t=s+1}^{T}\hat{\eta}_{i,t}\hat{\eta}_{i,t-s}$$

and $\hat{\mu}_{i,t}, \hat{\mu}_{i,t}^*$ and $\hat{\eta}_{i,t}$ calculated using the following equations.

$$\hat{e}_{i,t} = \hat{\gamma}_i\hat{e}_{i,t-1} + \hat{\mu}_{i,t}, \hat{e}_{i,t} = \hat{\gamma}_i\hat{e}_{i,t-1} + \sum_{k=1}^{K_i}\hat{\gamma}_{i,k}\Delta\hat{e}_{i,t-k} + \hat{\mu}_{i,t}^*, \Delta y_{i,t} = \sum_{m=1}^{M}\hat{b}_{mi}\Delta x_{mi,t} + \hat{\eta}_{i,t}$$

Small sample size and strength powerful of all of these seven tests are discussed in Pedroni (1999). In samplings in which cross-section unit number is above 100, all statistics produce sufficiently persuasive results. In smaller panels, on the other hand, proofs are variable. However, as the time dimension of the panel is small ($T \approx 20$), Pedroni (1999) states that group ADF-statistics and panel-ADF statistics are generally the best indicators. Test by Kao (1999) is based on the Engle and Granger (1987) two step procedure, and impose homogeneity on the members in the panel. The null hypothesis of no cointegration is tested using an ADF-type test.

Larsson et al. (2001) (hereafter LLL) have developed a test which is based on Johansen's multi-variate cointegration framework. The heterogeneous vector error-correction model is

$$\Delta Y_{it} = \Pi_i Y_{i,t-1} + \sum_{k=1}^{k_i-1}\Gamma_{ik}\Delta Y_{i,t-k} + \varepsilon_{it} \quad i = 1, \ldots, \mathrm{N} \tag{9}$$

where, Π_i is of order $p \times p$. If Π_i.is of reduced rank, it is possible to let $\Pi_i = \alpha_i\beta_i'$where α_i and β_i are of order $p \times r_i$ and of full column rank. Equation 9 is estimated for each country N and the trace statistic is calculated. The hypothesis that all of the N countries in the panel have at most r cointegrating relationships among the P variables is tested. The following rank hypothesis is considered:

$$H_0 : rank(\Pi_i) = r_i \leq r \qquad \text{for all } i = 1, \ldots\ldots N, \tag{10}$$

Against the alternative

$$H_1 : rank(\Pi_i) = p \qquad \text{for all } i = 1, \ldots\ldots\ldots N, \tag{11}$$

Panel cointegration rank trace test statistics, $(\gamma_{\overline{LR}})$, is obtained by calculating the average of the N individual trace statistics, (LR), and then standardizing it as follows:

$$\gamma_{\overline{\mathrm{LR}}}\{H(r)|H(p)\} = \frac{\sqrt{N}(\overline{\mathrm{LR}}_{NT}\{H(r)|H(p)\} - E(Z_k))}{\sqrt{\mathrm{Var}(Z_k)}} \tag{12}$$

where, $E(Z_k)$ is the mean and var(Z_k) is, the variance of the asymptotic trace statistic, obtained from Larsson et al. (2001).

Panel Causality Test

As Granger (1969, 1988) points out, if there exists a cointegration vector between variables there is causality among these variables at least in one direction. Therefore to determine the direction of causality, the error correction models (ECM) given below are estimated.

$$\Delta gdp_t = \eta_0 + \sum_{i=1}^{a} \beta_{i1} \Delta gdp_{t-i} + \sum_{i=1}^{b} \lambda_{i1} \Delta \exp_{t-i} + \sum_{i=1}^{c} \alpha_{i1} \Delta \mathrm{imp}_{t-i} + \psi_1 \mathrm{ect1}_{t-1} + \varepsilon_t \tag{13}$$

$$\Delta \exp_t = \eta_1 + \sum_{i=1}^{k} \beta_{i2} \Delta gdp_{t-i} + \sum_{i=1}^{l} \lambda_{i2} \Delta \exp_{t-i} + \sum_{i=1}^{m} \alpha_{i2} \Delta \mathrm{imp}_{t-i} + \psi_2 \mathrm{ect2}_{t-1} + v_t \tag{14}$$

$$\Delta \mathrm{imp}_t = \eta_2 + \sum_{i=1}^{p} \beta_{i3} \Delta gdp_{t-i} + \sum_{i=1}^{r} \lambda_{i3} \Delta \exp_{t-i} + \sum_{i=1}^{s} \alpha_{i3} \Delta \mathrm{imp}_{t-i} + \psi_3 \mathrm{ect3}_{t-1} + \mu_t \tag{15}$$

In the above equations, ects are lagged values of error terms obtained from cointegrated equations. Through ect, the error correction model (weakly exogenous of dependent variable) provides an alternative causality test. For example; in case the null hypothesis in which "ect" value is zero and also γ_{i1} and δ_{i1} values are all zeros is not rejected, this means that the two variables are not Granger cause of GDP. The non-significance of both the t and Wald F-statistics in the ECM will imply that the dependent variable is weakly exogenous.

Empirical Results

Table 1 indicates unit root test results. As is seen from Table 1, the unit root hypothesis cannot be rejected at the 5% significance level for all variables. However, unit root test results suggest that series are stationary in their first differenced forms. In other words, test results suggest that GDP, export and import variables are integrated at the same level{I(1)}.

Secondly, on the basis of the results obtained in the first stages, the cointegration test is performed by using Pedroni's (1999) method, Kao's (1999) cointegration method and the LLL (2001) method. Results of Pedroni's cointegration appear in

Table 1 Panel unit root tests

A: levels	LLC	IPS	ADF-Fisher
GDP	7.509	8.041	1.012
Export	1.044	2.946	17.463
Import	1.842	4.146	13.857
B:first differences			
ΔGDP	−21.129*	−23.396*	364.800*
ΔExport	−5.388*	−8.916*	152.255*
ΔImport	−18.410*	−16.462*	189.311*

The number of lags was selected using Modified Akaike Information Criterion (Ng and Perron 2001)

Table 2. Except for only panel-v statistics, the null hypothesis of no cointegration is rejected by all other statistics. Nevertheless, as can be concluded from Table 2, the null hypothesis of no cointegration is rejected by Kao's (1999) cointegration test statistics.

Even if it certainly attracts attention to know that there is one or more long-relationship in the nonstationary data, it is of more interest to discover the nature of these relationships. Table 3 shows LLL cointegration test results. LLL test results suggest that export, import and economic growth are cointegrated. Thus, it can be seen that the export, import and economic growth move together in the long run.

The results of the Granger causality test based on the error correction model are summarized in Table 4. Table 4 has been divided into two sections; the first section comprising three columns shows short-term causality relationships between the variables. Short-run causality can be tested by looking the joint of the coefficients of independent variables in Eqs. 13, 14 and 15. The short-run effect can be considered transitory. There is a unidirectional causality from economic growth to export in the short run as seen in Table 4. Causality relationship between economic growth and import is bidirectional. Similarly, there is bidirectional causality between export and import.

Table 2 Pedroni and Kao panel cointegration test

Pedroni residual cointegration test	Test statistics	P-value
Panel v-stat	−0.8553	0.2767
Panel rho-stat	−8.0574	0.0000
Panel PP-stat	−11.5311	0.0000
Panel ADF-stat	−11.9843	0.0000
Group rho-stat	−7.7942	0.0000
Group PP-stat	−11.2827	0.0000
Group ADF-stat	−10.6839	0.0000
Kao residual cointegration test		
	6.1565	0.0000

The number of lags was selected using Akaike (1969) Information Criterion (AIC)

Table 3 Larsson et al. (2001) panel cointegration test

	$r = 0$	$r = 1$	$r = 2$	r
Belarus	30.6921	8.7995	0.6782	1
Bulgarian	81.2988	15.2898	0.0365	1
Czech Republic	39.3272	12.6484	4.8334	1
Armenia	34.4789	7.2625	0.3385	1
Estonia	32.5748	14.2882	1.6572	1
Kazakhstan	37.9067	13.6916	0.7301	1
Latvia	36.8896	14.9936	2.4760	1
Lithuania	39.7771	17.0814	5.0547	3
Hungary	19.0749	6.2787	0.6571	0
Poland	59.6225	14.8926	6.7296	1
Russia	41.2897	5.7949	0.8272	1
Slovak Republic	21.2285	5.0082	1.4316	0
Slovenia	23.4707	3.9296	0.4759	0
Average (TR)	3.692	1.048	0.190	
E(Z)	1.137	6.086	14.955	
Var(Z)	2.212	10.535	24.773	
Statistics	171.208	9.885	−17.866	

The number of lags was selected using Akaike (1969) Information Criterion (AIC)

Average (Tr), average trace statistics for individual country; $E(Z)$, average asymptotic trace statistics selected Larsson et al. (2001); Var(Z), average asymptotic trace statistics selected Larsson et al. (2001)

Table 4 Causality test based on multivariate error correction model

Dependent variable	Short term dynamics			Source of causality			
				ect	Short term dynamics and ect		
	Δgdp[d]	Δexp[d]	Δimp[d]	ECT (t-sta.)	∑Δgdp, ect	∑Δexp, ect	∑Δimp, ect
Δgdp[a]	–	2.169 (0.071)	2.466 (0.012)**	0.034 [1.728]	–	2.168 (0.056)	2.661 (0.005)*
Δexp[b]	5.004 (0.000)*	–	3.805 (0.002)*	−0.139 [−1.958]	4.156 (0.001)*	–	6.026 (0.000)*
Δimp[c]	6.347 (0.000)*	4.048 (0.000)*	–	−0.165 [−3.606]*	7.616 (0.000)*	5.584 (0.000)*	–

The number of lags in error correction model was selected using Akaike (1969) Information Criterion (AIC). Values in parenthesis are P values. Values in separator are t values. * and ** denotes 1% and 5% levels respectively

[a] $R^2 = 0.95$, Adj.$R^2 = 0.95$, DW = 2.2, F-sta. = 308.20 (0.000)

[b] $R^2 = 0.37$, Adj.$R^2 = 0.33$, DW = 2.01, F-sta. = 9.15 (0.000)

[c] $R^2 = 0.57$, Adj.$R^2 = 0.53$, DW = 2.03, F-sta. = 16.54 (0.000)

[d] These are independent variables

The second section of the table shows the causality between economic growth, export and import, and also indicates the source of such causality in the long run. Long run causality can be tested by looking (1) at significance coefficient of the error correction term (2) jointly at significance coefficients of the dependent variables and coefficient of the error correction term. The significance of the error correction term indicates the long run relationship of the cointegrated process, and so movements along this path can be considered permanent. In the long run, while the null hypothesis that economic growth is not a Granger cause of export is rejected at the 5% level of significance, null hypothesis that export is not a Granger cause of economic growth is not rejected at the 5% level of significance. Test results on based the error correction model show that there is an unidirectional causality between economic growth and export in the long run. The unidirectional causality from economic growth to export shows that export-led growth hypothesis is not valid for those countries. There exists a bidirectional causality relationship between economic growth and import as well as import and export.

Conclusion

In this study, the relationships between export, import and economic growth were investigated by employing panel unit root, panel cointegration and panel causality tests for 13 transition economies (Armenia, Belarus, Bulgaria, Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Poland, Russia, Slovak Republic and Slovenia). Panel unit root tests shows that series are integrated at the same level. Panel cointegration tests verify the existence of a relationship in the long run between economic growth, import and export.

While there is causality from growth to export between economic growth and export, our findings do not support the existence of a reverse causality. Unidirectional causality from economic growth to export suggests that the growth-led export hypothesis is applicable in those countries. In other words, the increased productivity in production brings about a rise in competitive powers of those countries in terms of price and quality and as a result, it leads to a boom in export in the long term. There is a bidirectional causality relationship between import and growth, which in return shows that import and economic growth interact with each other. This finding can be construed as: the import of inputs and technologies required for a faster growth of the countries recently entered into market economy plays an important role in economic growth. It is a most commonly accepted opinion in the literature that unavailability and absence of the import inputs required for industrialization of such countries produces negative effects on economic growth. When the production increases, the incomes of such countries also increase, and this increase observed in production and income causes more import compared to industrialized countries. Another finding of this study is the relationship between export and import. There is a feedback relationship between export and import. The relationship between import and export, and findings about the relationship between import and growth in these countries demonstrate that export has been affecting economic growth considerably through import.

Consequently, findings obtained in this study conclude that growth in transition economies is rather directed by the increase in import demand. Rapid expansion of import, in particular that of intermediate and investment goods are observed to emerge as a direct result of accelerating economic developments and even restructuring of these countries. Therefore, foreign trade policies focusing on export and excluding import as a growth engine of the economy may cause a slow-down not only in economic growth but also in the processes of restructuring these countries' experience. However, as import-based growth will lead to rapid increases in good and service demands, this may result in gradual deterioration in the foreign positions of these countries. Thus, in order to avoid serious financing problems and to maintain sustainable growth, it is important that import demands in those countries be covered with adequate export revenues.

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