




TRADE OPENNESS AND ECONOMIC GROWTH: A PANEL DATA ANALYSIS OF BALTIC COUNTRIES



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ABSTRACT

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The theoretical propositions suggest that trade openness leads to a greater economic activity, due to the spread of knowhow and technological transferability. In that framework, it is generally expected that as trade openness increases, economic growth will follow the same trend because of innovation and productivity. Henceforth, establishing the contribution of trade openness to economic growth is of high priority, especially in the case of developing countries such as the Baltic ones. The current paper examines the causal relationship between trade openness and economic growth in the case of three Baltic countries for the period 1990–2020, using the recently developed by Dumitrescu and Hurlin (2012) non-causal Granger test for heterogenous panel data. The findings of the current study suggested that there is a cross-sectional dependence on the model time series between the counties under investigation, which proved that Baltic countries have common factors and common economic links. The theoretical and empirical studies previously conducted, are useful starting points for the discussion on policies which could increase the development of Baltic countries. For the development to be increased, the developmental procedures in the Baltic countries should upload their “development chains”. Such transformation of the “development chains” will be achieved through investments in capital equipment, human capital and innovations by securing a favorable and stable economic climate.

Contribution/ Originality: This study contributes in the existing literature in the causal relationship between trade openness and economic growth. This study uses new estimation methodology of the second generation unit root test by Pesaran (2007) non-causal Granger test for heterogenous panel data by Dumitrescu and Hurlin (2012).

1. INTRODUCTION

The past few years, trade openness plays an increasingly significant role in economic growth. The traditional models developed by Smith and Ricardo, explain that trade openness should always be followed by policies that expand the provision of public education, vocational training, health care and infrastructure. Moreover, they supported that an extensive policy change towards trade openness should be gradually reinforced, in order for people to adjust to the increased levels of international competition and technological progress. Hence, countries specialising in goods and services production have comparative advantages when it comes to exporting goods and services. On the other hand, countries which don't have these advantages, will import from these countries and will specialise in other forms of goods and services. That leads to the resources distributions in the optimum way.

According to the Heckscher-Ohlin model, a country, which exports goods and services, is using these resources intensively. As a result, trade openness will increase for this country and the economy will shift into respective sectors to sustain the increase in productivity (see López (2005)).

The neoclassic productivity model by Solow (1956) and (Ramsey, 1928) shows that the continuing economic growth is a result of an exogenous production factor, that is, the passage of time. The neoclassic production function used in this theory, is related with the exports, capital equipment, as well as labour. If new technologies manage to increase labour productivity and capital and prevent a decrease in the rate of return on investment, then labour force will grow at an exogenous rate. This part of output growth which cannot be explained by the production coefficients is usually known as Solow residual or as the total productivity of the applied work factor. In conclusion, one would claim that neoclassic models suggest that technological progress and the stable development rate of exports are completely exogenous.

The theory of endogenous development suggests that economic development is primarily due to endogenous and not exogenous forces. In other words, we would say that the theory implies that investing in human capital, technology and innovation contributes significantly to economic development. Moreover, endogenous theory suggests that the long-run development rate depends on the economic policy measures every government takes. For example, funding for research and development increases the motivation for innovation and as a consequence the rate of development. In the model Romer (1986) and Lucas (1988) developed, they support that technology includes both human and natural capital. Moreover, they support that in that case, diminishing returns to capital do not exist. Grossman and Helpman (1991) develop a model envisioning both technology and foreign trade engagement in an endogenous manner. Also, Levine and Renelt (1992) showed that trade openness encourages direct foreign investments leading to the increase of long-run growth. Developed countries, develop their productivity by utilizing new developments. Also, based on the endogenous development theory, an increase in market openness, improves technology and increases productivity.

The relationship between trade openness and economic growth has been investigated for many years. That is because trade openness, which is represented by the ratio of imports, exports, or imports plus exports to the GDP, is the motivating force behind growth in developing countries. Henceforth, the direction of the causal relationship between trade openness and economic growth is worth being investigated.

The causal relationship between trade openness and economic growth means that the growth and industrialisation in these countries have been achieved in the form of external education together with increase in trade. In this case, the export-led growth hypothesis in the neoclassical approach is advocated to be valid. This outcome will increase productivity through exports by increasing the economies of scale. Moreover, new investments are taking place and therefore an increase in employment and real wages is observed. Nowadays, trade openness is considered to have a positive influence on growth.

The structure of the paper is as follows: Section 2 briefly reviews the literature. Section 3 presents data and variables. This is followed by section 4 which presents methodology. Empirical results are discussed in section 5. Concluding remarks are given in the final section.

2. LITERATURE REVIEW

The empirical findings of the relationship between trade openness and economic growth are a debatable matter in the international economic literature. A number of studies were conducted in various countries in order to investigate the causal relationship between trade openness and economic growth. Very few of them, though, have investigated this relationship using cross-sectional data. Such is the study by Dar and Amirkhalkhali (2003) which analysed the relationship between trade openness and economic growth in 19 OECD countries during the period 1971-1999. The growth accounting model applied was estimated with the random coefficients approach using time

series and cross-sectional data. The study results showed that the impact of trade openness in production growth and consequently in economic growth, differs between countries.

Gries and Redlin (2012) study a total of 158 countries and questioned the causal relationship between per capita GDP growth and trade openness during the period 1970-2009. In their study, they used panel cointegration tests and panel error-correction models (ECM) which were estimated using the GMM method of testing the causal relationship between economic growth and trade openness. The long-term outcomes suggest a positive one-way causality from trade openness towards economic growth. However, the short-term coefficients identified a negative short-run adjustment.

Zeren and Ari (2013) analyse the relationship between trade openness and economic growth in the case of the G7 countries; Germany, France, Canada, Japan, Italy, the United States, and the United Kingdom for the period 1970-2011. To test for causal effects between variables, the panel causality test introduced by Dumitrescu and Hurlin (2012) was used for heterogeneous panel data models with fixed coefficients. The study results conclude that there is a bidirectional causal relationship trade openness and economic growth.

In their study, Muhammad and Jian (2016) investigated the relationship between trade openness and growth in selected Muslim countries. The choice of Muslim countries has been down in order to investigate economies with different religious, economic and social characteristics. The study used a random and fixed effect model as well as cointegration tests by Pedroni and Kao for the long-term relationship between the variables under examination. The results from random and fixed models show that trade openness has significant and positive effect on economic development for all Muslim countries under consideration.

Mangir, Kabaklarlı, and Ayhan (2017) analysed data from 10 African countries during the period 1990-2015. Using the pool mean group estimator (PMG) and the panel Autoregressive Distributed Lag (ARDL) model, they conclude that trade openness has a positive impact on economic growth in the long run for all the countries under investigation.

Finally, Alam and Sumon (2020) studied the causal relationship between economic growth and trade openness in the case of 16 Asian countries between 1990-2017. They applied panel cointegration and causality approaches in order to examine the causal relationship between the underlined variables. The panel vector error correction model Granger causality shows a bidirectional causal relationship between economic growth and trade openness.

Dritsaki (2015) examined the impact of trade openness and foreign direct investment on economic growth for three Baltic countries during the period 1993-2011. The impact of variables on economic growth is achieved using three models; pooled Model, Fixed Effects Model (FEM) and Random Effects Model (REM). The results of the paper present an important effect of trade openness and foreign direct investment on economic growth, while Random Effects Model, which is selected for conducting the panel data analysis, denotes that trade openness has an impact on economic growth for the three Baltic countries.

Silajdzic and Mehic (2018) investigated the impact of trade openness on economic growth in Central and Eastern European (CEE) countries for the period 1995-2013. For the analysis on their paper, they use two different estimation methods. Fixed effect panel which is applied by estimating Prais-Winsten-correlated panels corrected standard errors (PSCE) method due to the presence of autocorrelation and heteroscedasticity and the dynamic least squares dummy variable method (LSDVC). The results of their paper showed that trade openness not only from exports side but also from the increase of imports from technologically innovative EU countries, is positively connected with economic growth.

(Guei & Roux, 2019) examined the relationship between trade openness and GDP per capita among 15 countries of Economic Community of Western African States (ECOWAS) for the period 1990-2016. Their initial analysis was based on a regression model for each of 15 examined countries which tried to find a long run relationship between variables. Afterwards, they investigated the relationship between trade openness and GDP per capita using Pooled Mean Group (PMG) models and the Autoregressive distributed lag (ARDL) model. Their

results showed a long-run relationship between variables except for Ghana, Guinea-Bissau, Mali, Senegal and Togo. Furthermore, estimations indicate that trade openness has negative effect on GDP per capita in the long run.

Bonga-Bonga and Kinfack (2019) assessed the relationship between trade openness and economic growth for 38 countries of Africa using annual data for the period 1970-2016. On their analysis, they employed a Panel Smooth Transition Regression (PSTR) model which represents non linearity and endogeneity on the related variables. The results present that African countries are not homogenous mainly on trade openness and economic growth. Also, the paper denotes that the relationship between trade openness and economic growth varies from country to country according to their development rate. Conversely, for middle and high income countries, there is a positive relationship.

3. DATA

This study, we investigated the causal relationship between trade openness and economic growth in the three Baltic countries (Estonia, Latvia, Lithuania) for the period 1990–2020. Economic growth (EG) is measured using per capita GDP with constant 2015 EUR, and trade openness (TO) is measured exports plus imports as a share of GDP. The data used in the paper are sourced from the AMECO. Both variables are employed with their natural logarithms.

EXP=Exports goods and services at 2015 prices.

IMP=Imports goods and services at 2015 prices.

GDP=Gross domestic product at 2015 reference levels.

GDPH=Gross domestic product at 2015 reference levels per head of population.

4. ECONOMETRIC METHODOLOGY

4.1. Dumitrescu and Hurlin Causality Test

The current study uses Dumitrescu and Hurlin (2012) causality test, which is a new test of non-causality of Granger (1969) for models with heterogenous panel data and constant factors. This test takes into account two dimensions of heterogeneity.

- The model heterogeneity of the regression used for the Granger causality test.
- The heterogeneity of the causality relationships.

If y and x are two constant variables observed in N cross-sectional units in T periods. For every cross-sectional unit $i = 1, \dots, N$ during the period $t = 1, \dots, T$ we consider the linear model below:

$$y_{i,t} = \alpha_i + \sum_{k=1}^K \gamma_i^{(k)} y_{i,t-k} + \sum_{k=1}^K \beta_i^{(k)} x_{i,t-k} + e_{i,t} \quad (1)$$

Where

$\beta_i = (\beta_i^{(1)}, \dots, \beta_i^{(k)})'$ and α_i are the cross sectional results which we assumed to be constant in the course of time.

We also assumed that the lags order K is the same for cross-section units of the panel data. We should also point out that the autoregressive coefficients γ_i^k and the regression coefficients β_i^k differ between the cross sectional units.

Generally, the assumptions made for the causality test by Dumitrescu and Hurlin could be summarised as below:

1. For every cross-sectional unit $i = 1, \dots, N$, the cross-sectional residuals $e_{i,t}$ are independent and normally distributed with $E(e_{i,t}) = 0$ for every $t = 1, \dots, T$ and finite heterogenous variance $E(e_{i,t}^2) = \sigma_{e,i}^2$.
2. Heterogenous residuals $e_i = (e_{i,1}, \dots, e_{i,T})'$ are independently distributed across all sections. As a results there will be $E(e_{i,t}e_{j,s}) = 0$ for every $i \neq j$ and for every (t, s) .
3. Both cross-sectional variables $y_i = (y_{i,1}, \dots, y_{i,T})'$ and $x_i = (x_{i,1}, \dots, x_{i,T})'$ have constant covariance with $E(y_{i,t}^2) < \infty$ and $E(x_{i,t}^2) < \infty$.

Therefore, the null hypothesis H_0 could be described as:

H_0 : There is no causal relationship for any cross-sectional unit.

[Homogenous Hypothesis of non-causality (HNC)].

The hypothesis is defined as:

$H_0 : \beta_i = 0$ for every $i = 1, \dots, N$.

The alternative hypothesis is defined as the Heterogeneous Non-Causality hypothesis-(HENC)]. In the alternative hypothesis we have two cross-sectional sub-categories.

There is a causal relationship from variable x towards variable y for the first sub-category, but it is not based necessarily in the same regression model.

For the second sub-category, there is no causal relationship from variable x towards variable y . We assume a heterogenous category of panel data in a model with constant coefficients (during the whole period)in this category. This alternative hypothesis is the following:

$H_1 : \beta_i = 0$ for every $i = 1, \dots, N_1$.

$H_1 : \beta_i \neq 0$ for every $i = N_1 + 1, N_1 + 2, \dots, N$.

We assume that β_i could differ among the cross-sectional categories and there exist.

$N_1 < N$ individual procedures with no causality from coefficient x towards coefficient y . N_1 is unknown but satisfies the relationship $0 \leq N_1 / N < 1$.

The statistic average for the hypothesis of Homogenous Non Causality (HNC) is shown below:

$$W_{N,T}^{HNC} = \frac{1}{N} \sum_{i=1}^N W_{i,T} \tag{2}$$

where $W_{i,T}$ shows the individual (cross-sectional) statistics by Wald for the i th cross-section unit which corresponds to the individual test $H_0 : \beta_i = 0$ (see Dumitrescu and Hurlin (2012)).

The standardized test statistic $Z_{N,T}^{HNC}$ for $T, N \rightarrow \infty$ is as follows:

$$Z_{N,T}^{HNC} = \sqrt{\frac{N}{2K}} (W_{N,T}^{HNC} - K) \xrightarrow{T, N \rightarrow \infty} N(0,1) \text{ (see Theorem 1 Dumitrescu and Hurlin (2012))} \tag{3}$$

Also, the standardized test statistic for fixed T samples is as follows:

$$\tilde{Z}_N^{HNC} = \sqrt{\frac{N(T-2K-5)}{2K(T-K-3)}} \left[\left(\frac{T-2K-3}{T-2K-1} \right) W_{N,T}^{HNC} - K \right] \xrightarrow{N \rightarrow \infty} N(0,1) \text{ (see Theorem 2 (Dumitrescu & Hurlin, 2012))} \tag{4}$$

Note: provided $T > 5 + 3K$ as a necessary condition for the validity of results.

4.2. Cross Sectional Dependence Test

The causality test by Dumitrescu and Hurlin (2012) assumes that stationarity of variables y and x . Before applying unit root tests in panel data, we need to examine the existence of a dependence between the cross-sectional unit and the variables of the model under examination. The cross-sectional non-dependence argues that the error terms are not cross-correlated and the zero error covariance is a very significant factor in the unit root tests of the panel data and the cointegration tests. For the cross-sectional dependency tests between the units we use tests by Breusch and Pagan (1980) LM, Pesaran scaled LMs (Pesaran., 2004) Pesaran CDp, and Baltagi, Feng, and Kao (2012) bias-corrected scaled LMBC. In all above tests the null hypothesis could be define as:

H_0 : There is no cross-sectional dependence between the units.

4.2.1. Breusch-Pagan LM test

The most well-known diagnostic test for cross-sectional dependency is the test by Breusch and Pagan (1980) using the Lagrange Multiplier (LM) test statistic.

If we have a model with panel data of the form $y_{it} = \beta'_{it} x_{it} + u_{it}$ $\forall i = 1, 2, \dots, N$ and $t = 1, 2, \dots, T$, then the null hypothesis of non cross-sectional dependency according to Breusch-Pagan is derived from the correlations of disturbance terms and different cross-sectional units. Therefore, the null hypothesis could be written as:

$$H_0: \hat{\rho}_{ij} = \text{Corr}(u_{it}, u_{jt}) = 0 \text{ for } i \neq j$$

where

$$\hat{\rho}_{ij} = \hat{\rho}_{ji} = \frac{\sum_{t=1}^T u_{it} u_{jt}}{\sqrt{\sum_{t=1}^T u_{it}^2} \sqrt{\sum_{t=1}^T u_{jt}^2}}$$

In seemingly unrelated regressions the null hypothesis according to Breusch-Pagan for the cross-sectional dependence is given using the Lagrange Multiplier (LM) test statistic below:

$$LM = T \sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij}^2 \tag{5}$$

LM follows asymptotically the X^2 distribution with $\frac{N(N-1)}{2}$ degrees of freedom.

4.2.2. Pesaran LM Scale Test

In the case of many cross-sectional units N, Breusch-Pagan test is not reliable. Hence, Pesaran. (2004) suggested a standardized version of Lagrange Multiplier (LM) which will take the form below:

$$LM_s = \sqrt{\frac{1}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N (T_{ij} \hat{\rho}_{ij}^2 - 1) \quad (6)$$

LM_s follow asymptotically the normal distribution $N(0,1)$.

4.2.3. Pesaran CD_p Test

In order to deal with the differentiation of the magnitude of cross-sectional units with the Lagrange LM and LMS statistics, Pesaran. (2004) suggested an alternative statistic, based on the average of the pairwise correlation coefficients given by:

$$CD_p = \sqrt{\frac{2}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N (T_{ij} \hat{\rho}_{ij}^2) \quad (7)$$

CD_p follow asymptotically the normal distribution $N(0,1)$.

4.2.4. Baltagi, Feng, and Kao LM_{BC} Test

Baltagi et al. (2012) recommend an amendment into Pesaran. (2004) for the scale of Lagrange Multiplier test (LMS), which take the form below:

$$LM_{BC} = \sqrt{\frac{1}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N (T_{ij} \hat{\rho}_{ij}^2 - 1) - \frac{N}{2(T-1)} \quad (8)$$

LM_{BC} follow asymptotically a normal distribution $N(0,1)$.

Once the dependence or non-dependence between the cross sectional units is determined, we move on to the first generation tests (non-dependence) or the second generation tests (dependence) of cross-sectional units.

4.3. Panel Unit Root Test

4.3.1. First Generation Panel Unit Root Tests (Cross-Country Independence)

In the first generation category, we test for the homogeneity hypothesis with Levin, Lin, and Chu (2002) test, while the heterogeneity hypothesis is tested with Im, Pesaran, and Shin (2003) test.

4.3.1.1. Levin-Lin-Chu test

Assume a variable, which is detected in N countries during T periods, and also assume a model with individual effects. Levin, Lin and Chu test examines a model whose lagged dependent variable is homogenous across all panel units.

$$\Delta y_{i,t} = \alpha_i + \rho y_{i,t-1} + \sum_{z=1}^{p_i} \beta_{i,z} \Delta y_{i,t-z} + \varepsilon_{i,t} \quad (9)$$

for $i = 1, \dots, N$ and $t = 1, \dots, T$.

We assume the errors $\varepsilon_{i,t}$ i.i.d. $(0, \sigma_{\varepsilon_i}^2)$ are independent across the units of the sample under investigation.

Levin-Lin-Chu test is depending upon the following hypotheses:

$$H_0 : \rho = 0 \text{ (every cross-sectional unit included a unit root).}$$

against the alternative hypothesis.

$$H_1 : \rho = \rho_i < 0 \text{ (every cross-sectional unit is stationary).}$$

For all $i = 1, \dots, N$ with auxiliary assumptions about the individual effects ($\alpha_i = 0$ for all $i = 1, \dots, N$ under H_0).

The alternative hypothesis is restrictive, because the autoregressive parameters are identical across the panel.

4.3.1.2. Im, Pesaran and Shin

Im et al. (2003) test is based on the cross-sectional independence assumption. In contrast to Levin et al. (2002) test, Im et al. (2003) test allows the heterogeneity in the value of ρ_i under the alternative hypothesis. Im et al. (2003) use Levin et al. (2002) model (6) and replace ρ with ρ_i . Hence, their model with individual effects could be written as:

$$\Delta y_{i,t} = \alpha_i + \rho_i y_{i,t-1} + \sum_{z=1}^{p_i} \beta_{i,z} \Delta y_{i,t-z} + \varepsilon_{i,t} \quad (10)$$

Null hypothesis is defined as:

$$H_0 : \rho_i = 0 \text{ for all } i = 1, \dots, N \text{ whereas the alternative hypothesis is defined as:}$$

$$H_1 : \rho_i < 0 \text{ for } i = 1, \dots, N_1 \text{ and } \rho_i = 0 \text{ for } i = N_1 + 1, \dots, N \text{ with } 0 < N_1 < N.$$

Alternative hypothesis occasionally allows some (but not all) individual series to have unit roots.

Im et al. (2003) use separate unit root tests for every cross-sectional unit. If t_{ρ_i} is an individual t -statistic for the null hypothesis test $\rho_i = 0$, for every i , then the test is based on the average of all individual statistics of the augmented Dickey-Fuller test defined as:

$$\bar{t} = \frac{1}{N} \sum_{i=1}^N t_{\rho_i} \quad (11)$$

If this statistics is correctly standardised, then it asymptotically follows a normal distribution..

4.3.2. Second Generation Panel Unit Root Tests (Cross-Country Dependence)

If a cross-sectional dependency exists in panel data, then the first generation unit root tests cannot be used. In this case, we use the second generation unit root tests, such as SURADF, CADF and CIPS tests.

4.3.2.1. The Pesaran Tests

In the case that a cross-sectional dependence, Pesaran (2007) suggests a one-factor model with heterogeneous loading factors for residuals for the unit root test. This model instead of relying on unit root tests on deviations

from the estimated common factors, increases Dickey-Fuller (ADF) model with the cross section average of lagged in the levels and the first difference of the individual series.

If the residuals are not serially correlated, then the regression used for the i^{th} unit is given by:

$$\Delta y_{i,t} = \alpha_i + \rho_i y_{i,t-1} + c_i \bar{y}_{t-1} + d_i \Delta \bar{y}_t + v_{i,t} \tag{12}$$

where

$$\bar{y}_{t-1} = \frac{1}{N} \sum_{i=1}^N y_{i,t-1} \quad \text{and} \quad \Delta \bar{y}_t = \frac{1}{N} \sum_{i=1}^N \Delta y_{i,t}$$

Let us denote $t_i(N, T)$ the t-statistic of the OLS estimate of ρ_i .

Pesaran’s unit root test is based on individual cross-sectionally augmented ADF statistics written as CADF. Pesaran’s philosophy was to modify Im, Pesaran and Shin’s test with the IPS t-bar on the average of individual CADF, written as CIPS which is defined as (see Pesaran (2007)):

$$CIPS = \frac{1}{N} \sum_{i=1}^N t_i(N, T) \tag{13}$$

5. EMPIRICAL FINDINGS

5.1. Dumitrescu and Hurlin Causality Test

In order to determine the causal relationship between trade openness and economic growth, according to Dumitrescu and Hurlin (2012) test, coefficients on panel data should be stationary. Prior to applying the unit root test on panel data, we examine if a dependence relationship exists among the cross-sectional units in the model variables under examination. Table 1, presents the results of the cross-section dependence test for the variables.

Table-1. The results of cross-section dependence test for the variables.

Variab.	LM		LM _s		CD _p		LM _{BC}	
	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.
LGDPH	86.68	0.000	34.16	0.000	34.11	0.000	9.38	0.000
LTO	86.46	0.000	34.07	0.000	34.02	0.000	9.29	0.000

Note: The null hypotheses of tests are of presence of no cross sectional dependence in panel.

Results of the table above show that there exists a cross-section dependence across countries in the 1% significance level for the time series LGDPH (Gross Domestic Product per head of population) and LTO (Trade Openness).

Therefore, the second-generation unit root tests should be applied. On the basis, that cross-sectional dependence between countries has been defined, the second generation of panel unit root tests (Pesaran’s CIPS test) should be applied. This procedure begins with the OLS estimation for the i^{th} cross section in the panel considering the following Cross-Sectional Augmented Dickey Fuller (CADF) regression. Table 2 presents the results of the second generation of panel unit root tests CIPS.

Table-2. Second generation of panel unit root tests (pesaran’s cips test).

Variables	LGDPH	LTO	Critical values		
			1%	5%	10%
Intercept	-3.12	-2.97	-2.60	-2.34	-2.21
Intercept and Trend	-4.64	-6.15	-3.15	-2.88	-2.74

Note: CIPS: Cross-sectionally augmented IPS. Critical values have been obtained from (Pesaran, 2007).

According to the Pesaran CIPS test result presented in Table 2, the null hypothesis of all panels contain unit roots is rejected at the 1%, 5% and 10% significance level. Therefore, we could argue that the variables are stationary and as a result, we could define the causal relationship between trade openness and economic growth based on the Dumitrescu and Hurlin test. The Dumitrescu and Hurlin causality test results are presents in Table 3 below.

Table-3. The results of dumitrescu and hurlin panel causality test.

Null Hypothesis:	$W_{N,T}^{HNC}$	\tilde{Z}_N^{HNC}	Prob.
LTO does not homogeneously cause LGDPH	33.978	23.042	0.047
LGDPH does not homogeneously cause LTO	18.7197	14.7379	0.029

Note:

Pairwise Dumitrescu Hurlin Panel Causality Tests

Lags: 2

The results of the table above, show that both statistics (global panel statistic $W_{N,T}^{HNC}$ and the standardized statistic \tilde{Z}_N^{HNC}) are statistical significant at the 5% level of significance.

6. CONCLUSION

The relationship between trade openness and economic growth is considered a controversial one in the economic literature. It has received greater attention particularly in the past few years, considering the difference in economic performance especially between the developing countries. The difference in the catching-up processes between transition economies, such as those of Baltic countries (Estonia, Latvia, Lithuania), the form and their dynamics of joining into the European and international economic structures, remained to a great extent difficult to explain due to the unexplained different economic, political and institutional factors that followed. This issue becomes even more controversial, on the basis that transitional economies have followed similar process towards economic liberation during the first years of their transition period. Henceforth, the benefits of trade openness remain controversial and being discussed even further in the international and academic political debates.

Nonetheless, trade openness is considered a significant and determinant factor for wages and economic growth. Trade integration allows the more effective allocation of resources through economies of scale as well as through increased competition. It facilitates knowledge diffusion and technology transfer, which affect the cost and productivity standards, which promote technological advancement and lead to greater efficiency. In this framework, it is generally believed that as trade openness increases, economic growth is expected to increase with the rise of technology innovation and productivity.

The current study investigated the causal relationship between market openness and economic growth in the case of Baltic countries. For that purpose we employed the non-causality Granger test for heterogenous panel data, which was developed by Dumitrescu and Hurlin (2012). The findings of the study confirm the existence of a cross-sectional dependence of model time series between the countries under examination, which confirms that Baltic countries share common factors and common ties. The time series dependence led us to use the second-generation unit root test by Pesaran (2007) which showed that time series are stationary. Therefore, we could use the Dumitrescu and Hurlin (2012) test which meets both prerequisites; cross-sectional dependence and stationarity. The results of Dumitrescu and Hurlin test revealed a bidirectional causality between trade openness and economic growth in Baltic countries. The use of Dumitrescu and Hurlin test contributes to this study being differentiated from previous ones which investigated the causal relationship between trade openness and economic growth. Baltic countries experienced a strong economic growth and a rapid closure of income gap with developed countries until the beginning of global financial crisis. Since then, Baltic countries have experienced a deceleration of economic growth. The later led to the discussion of whether Baltic countries could get away from the trap of mediocre growth. Mediocre growth could be due to lack of coordination between various economic factors which hold back

production and market openness. Such result could be alarming as unfavourable prospects could reduce investments in natural capital, human capital and organisation progress.

Those responsible for engraving policies could assist in easing production for a quicker and more stable growth, taking measures to tackle structural coordination issues in Baltic countries. The production that relies on knowledge requires investment in humans and human capital. Also, it needs reforms which reinforce education and accumulation of abilities in every level. Finally, investments in capital equipment and intellectual capital will primarily burden private businesses so the availability of funding is essential. The current study focused on Baltic countries, but in essence the discussions and methodology of this study could be applicable and transferable to other countries, such as the countries of Central and Eastern Europe.

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