Trade Openness and Economic Growth: Empirical Evidence from Transition Economies

Sabina Silajdzic
University of Sarajevo, School of Economics and Business, Bosnia and Herzegovina
Sabina.silajdzic@efsa.unsa.ba

Eldin Mehic
University of Sarajevo, School of Economics and Business, Bosnia and Herzegovina
eldin.mehic@efsa.unsa.ba

Abstract. Trade liberalization is often found to be key determinant of economic growth in the literature. However, in this paper we argue that the relationship between trade openness and economic growth is more ambiguous and controversial from both theoretical and empirical point of view. With regard to the latter theoretical propositions in favour of trade liberalisation rests on arguments of greater economic efficiency enhanced by lower costs of trade, lower transaction costs, increased specialisation, scale economies, and competitive pressure, which in turn foster better economic performance and increases in economic growth rates. On the other hand, it has been argued that 'passive' trade liberalisation may not necessarily lead to optimal or positive economic outcomes in the context of less (technologically) advanced economies given their limited ability to reap off the benefits of free trade including limited absorptive capabilities, pervasive market and coordination failures inhibiting development of strategic, infant or new industries, and potential 'crowding out' effect of trade liberalisation on domestic firms and industries. In view of this, when examining the effect of trade on economic growth it is important to control for the differences in the degree of industrial development and technological sophistication between trading countries, as well as the importance of scale economies and policy stances. As far as empirical work on the matter is concerned lot of controversies are related to methodological issues including the measurement of trade openness, methods of investigation and preferred specifications of the model. In this paper, we argue at length that measuring trade openness as the volume of export and imports as a share of total GDP may lead to misleading conclusions about benefits of trade liberalisation fostering income and economic growth. This is to say that different trade openness indicators are important to be considered when analysing the relationship between economic growth and trade, pointing to the dichotomy between trade protection and/or trade liberalisation indicators vs trade intensity and trade potential indicators, which may lead to different outcomes and policy conclusions. In light of this discussion, this paper embarks from previous literature in that i) it examines the impact of and policy implications of different trade openness indicators on economic growth in transition economies, ii) it studies the relationship between trade barriers and economic growth in transition economies that have not been previously investigated, iii) as well as it relies on different panel data estimators i.e. static and dynamic while accounting for the endogeneity issues. The empirical analysis covers Central and Eastern European transition economies in the period from 1992-2014.

The results of our analysis point to the importance of specification of trade, proper treatment of the possible simultaneity bias in the relationship, and the differences in the levels of industrial and technological development across countries. Specifically, we find positive and significant impact of trade intensity indices on economic growth in CEE countries robust to different methods of investigation, model specification and sensitivity tests. However, the results of this empirical study do not render support to the hypothesis that trade liberalisation policy is beneficial to growth performance in the specific context of selected transition economies.

Keywords: trade openness, economic growth, trade liberalisation, transition economies

1 Introduction

The relationship between economic growth and openness remains to be one of the prominent issues in both theoretical and policy context. This issue has gained even more attention in recent years considering the persistent and widespread differences in economic performance among countries, especially among developing countries (Lall, 2004) in wake of growing international trade integration. Similarly, differences in the catching up processes among transition economies reflected in the diverse scope, character and the dynamics of their integration into European and global economic structures have remained largely unexplained and subject to different and even opposing views regarding the relative importance of different economic, policy and institutional factors that might explain the differences (De Melo et al.,1997; Lee and Jeong, 2006; Berg et al. 1999). This question becomes even more controversial given that transition economies have followed similar economic liberalisation path and pursued trade liberalisation policies right in the early years of transition. In view of this, it comes as no surprise that the benefits of trade liberalisation remained controversial and increasingly debated in international and academic policy discourse.

While trade is considered an important determinant of income and growth, with theoretically well substantiated channels of welfare transmission trough trade, the effects of trade policy are theoretically less known or are rather ambiguous. Trade integration allows for more efficient allocation of resources through economies of scale and scope as well as through increased competition. It facilitate knowledge diffusion and technology transfer, all of which affect costs, and productivity patterns that foster technological progress and lead to greater efficiency. Notwithstanding this, theoretical propositions relating to market and coordination failures including a need for 'investment coordination', 'infant industry argument', indivisibilities and risks related to investments in (new) technology, technological interdependencies and complementarities, as well as its tacit elements which hinder its diffusion and knowledge transfer, have all given rise to targeted state intervention predominantly through trade policy and protection of strategic sectors. This is to say that although trade and in particular export-led growth are commonly viewed as important determinant of growth process, trade policy is subject to a lot of controversy. As in line with Rodrigues and Rodrik (2001) propositions, the effects of trade policy and trade although interrelated are dichotomous and pose conceptually different issues that need be incorporated in empirical investigation.

The theoretical uncertainty related to the impact of trade policy on trade patterns and changes in technological composition in those patterns led to growing interest in empirical testing of the opposing hypothesis, namely the neoliberal hypothesis which advocates trade liberalisation irrespective of the level of development of an individual country, and an alternative predominantly neo-technological hypothesis which perceives (targeted and temporary) trade protection as response to market imperfections that might be beneficial depending on the level of technological prowess of an individual country. This theoretical uncertainty is yet associated with mixed and inconclusive empirical evidence on the matter i.e. the impact of trade policy on economic growth.

Given the theoretical basis underpinning the benefits of trade and the mechanism influencing growth performance of individual countries, in this paper we highlight the importance of integrating the conceptual framework of trade relations which reflect on the importance of trade policy, that is dichotomous from trading as such. This is to say that countries may explore benefits from trading with each other, but that in itself cannot be used as an argument to promote 'passive' trade liberalisation policies per se. Put differently, the concept of trade openness should imply 'neutrality' [1], which cannot be synonymous with the idea that trade or export intensity of individual country is associated with an individual country's 'neutrality' in this sense. Export orientation of individual country may come as a

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[1] 'Neutrality means that incentives are neutral between saving a unit of foreign exchange though import substitution and earning a unit of foreing exchange through exports' (Harrison, 1996, p.420).

result of export-led growth strategy and the use of various incentive structures for exporting industries including export subsidies, tax and fiscal privileges. Notwithstanding this, nowadays 'trade openness' has increasingly been measured by trade intensity variables (in view of the difficulties associated with precise measuring of the type of trade orientation or regime followed by individual country), and its meaning has increasingly been incorrectly associated with the notion of 'free trade'. In light of this discussion, in this paper we investigate the effect of distinctive trade measures divided into two broad categories: (i) indicators of trade volumes proxied by the conventional trade intensity variables and (ii) indicator of trade policy proxied by trade restrictions on economic growth in the selected transition economies, namely the ten Central-Eastern European Economies (CEECs-10) including Poland, Czech Republic, Slovakia, Hungary, Slovenia, Bulgaria, Romania, Estonia, Latvia and Lithuania. We find that while higher trade volumes enhanced growth performance of these countries, trade liberalisation policy has not been associated with positive growth performance under period of investigation 1995-2013. This finding has important policy implications discussed in this paper.

We postulate that these countries provide an important and isolated experimental framework, advantageous to study the impact of trade integration and trade openness (i.e. trade policy regime) on economic growth. First we highlight the importance of striking similarities relating to the overall transition policy framework, and in particular the timing and the character of economic policies pursued by the CEECs countries in the course of transition. The policies of economic liberalisation including far-reaching trade liberalisation, modelled in the context of the integration process into the European Union (EU), were implemented following similar time dynamics and sectoral coverage. The pace and character of trade integration (measured by trade volumes and trade intensity) of these countries has, however, been different. Though trade patterns are related to trade policy they are not the sole function of liberal trade regime per se. In view of this, it is worthwhile mentioning that the theoretical economic growth literature has predominantly been focused on the relationship between trade openness that is on trade policy regime and economic growth, and not on trade volumes per se.

This is to say that CEECs countries pose almost a perfect basis to analyse the impact of trade liberalisation policy in a cross-country framework, and when relying on aggregate macroeconomic data. Second, although these countries followed similar policy pattern, their economic systems are inherently distinctive giving rise to the importance of understanding the differences in the initial conditions of countries - mostly relating to the differences in the level of industrial and technological development among CEECs-10 countries at the beginning of transition- when studying the impact of trade policy on economic growth. The importance of symmetries between trading partners in acquiring benefits from trade integration is well substantiated in the theoretical literature (Grossmann and Helpman, 1990; Matsuyama, 1992) Third, EU countries present the major trading partner of the selected transition economies, with similar geographical propositions of trade relations with the most developed EU countries, considered important when examining the impact of trade on economic growth in a cross-country analytical framework. Last but not least, empirical evidence on the impact of trade integration in transition economies is rather weak, and we aim to fill in the gap in the existing literature.

The paper is structured as follows. Next section gives brief overview of empirical findings and theoretical propositions relating to the impact of trade on economic growth. We discuss the relevance of understanding the broader picture of economic system and its development characteristics when discussing the benefits of trade liberalisation. Third section explains the methodological framework of empirical investigation, in section 4 we discuss the results and policy implications. Conclusion follows.

2 Literature review

Why growth rates differ, and how beneficial is trade liberalisation remains an open and increasingly debated question. Benefits of trade openness to economic growth have been relatively well substantiated in the theoretical growth literature. However, market imperfections and economies of scale have also been considered important in determining those benefits. According to theoretical propositions and endogenous growth theory, asymmetric context of trading partners implies considerable differences in production functions, technology and endowments which may result in adverse effect of trade openness on countries with inferior technological prowess (Grossmann and Helpman, 1991; Young, 1991; Lucas, 1998). Likewise, trade intensity indicators may be misleading proxies of trade openness since they are also determined by the relative importance of external sector of individual country which varies depending on country size, income and geographical propositions.
A large number of studies have dealt with the trade policy issue, and attempted to examine the effect of trade policy usually proxied by average tariff rates and indices of non-tariff barriers to trade   on economic growth. The problems of inadequate measurement of individual country trade regime and orientation have occupied researchers for many years. The difficulty in measuring trade openness acted as *spiritus movens* underpinning increasing interest of researchers to develop an 'ideal' proxy for trade liberalisation. The increasing interest of researchers has resulted in number of trade indices that attempt to combine both tariff and non-tariff barriers to trade, and measure individual country trade orientation (Anderson and Neary, 1992; Leamer, 1988; Sachs and Warner, 1995).

All things considered, and especially no simple and clear theoretical explanations on the effect of trade restrictions and economic growth, it comes as no surprise that the empirical evidence on the benefits of trade openness measured using various trade policy indices reveals mixed results and inconclusive evidence. Number of studies have analysed the relationship between trade restrictions and economic growth relaying on average tariff rates. Yanikkaya (2003) study gives rise to the hypothesis that trade restrictions can promote growth. In his study he finds evidence that trade restrictions in the form of tariffs, as well as trade-related taxes are positively associated with economic growth relying on a large sample of both developing and developed countries, and concludes that the relationship between trade openness and growth is complex and depends on the level of development and the size of the economy of an individual country as consistent with theoretical propositions. Similarly, contrary to the conventional view that trade barriers are distortive and detrimental to growth, Rodriguez and Rodrik (2001) have found that average tariff growth rates positively affect total factor productivity growth (TFP) for the sample of 46 countries over the 1980-1990 period, while Edwards (1998), Sala-i-Martin (1997) and Clemens and Williamson (2001) suggest rather weak relationship between trade restrictions and economic growth. Contrary to these findings, a studies by Harission (1996) and Edwards (1998), for example, found significant and negative effect of tariff rates on economic growth. Notwithstanding the inconsistency in the results obtained from empirical investigation of the effect of trade restrictions on economic growth, other studies, that rely on trade intensity measures (e.g. export and import to GDP ratio, export to GDP ratio etc) by and large reveal evidence on positive impact of trade on economic growth (Alcala and Ciccone, 2002; Krueger and Berg, 2003; Dollar and Kraay, 2004; Lee, 2004; Chang, 2009; Busse and Koniger, 2012). However, in this paper we argue at length that papers which attempt to use conventional measures of trade openness i.e. trade intensity ratios as proxy for trade openness suffer from serious inconsistencies between theoretical propositions and empirical framework designed to test these hypothesis.

Contemporary trade theories integrated in endogenous growth models (Romer, 1990; Krugmann, 2001; Rivera-Batiz and Romer, 1991; Grossman and Helpman, 1990; Matsuyama, 1992) imply that trade may be beneficial to economic growth with the underlying mechanism of influence relating to increases in economies of scale, technology transfer and knowledge related externalities, as well as increased competition. These mechanisms are all expected to positively affect productivity patterns of

local firms and industries, rising value added and income. However, these mechanisms or rather a country ability to rip off the benefits of trade, are conditional on endogenous nature of technological change and subsequent growth and diversification of industrial production and export base. Essentially, the theoretical framework (extensions of neoclassical trade and growth theories) presupposes that the differences in the levels of industrial development and technological capabilities across countries may well be associated with possible different outcomes of trade openness (in the sense of 'neutrality' and passive trade liberalisation across all sectors) on economic growth depending on the size of the economy, technological proficiency and degree of industrial diversification (Xie, 1993; Young, 1991; Lucas, 1998, Grossman and Helpman, 1991). Finally world trade integration may rise global economic growth rate, but adversely affect individual countries.

The presence of underdeveloped or infant industries with latent (defy) comparative advantage, imperfect markets and endogenous pattern of knowledge accumulation in less developed, transition or developing countries which are well substantiated in the theoretical growth and development literature (Lall, 1995; Wade, 2016:2014:2012; Weiss, 1998), may call for strategic trade policy orientation with the combination of import substitution and export industrialisation trade measures, that if applied 'correctly' (see Lall, 2004) may affect comparative advantages of local industries which in turn positively affect economic growth in the long run. As indicated by Rodrik (2001) higher growth rates seem positively associated with higher tariff rates in the 1990s according to graphical presentation of data on 66 countries. Moreover, using trade volume and trade intensity indicators as a proxy for trade openness may be entirely misleading. Apart from differences in size of the economies and the overall level of development proxied by GDP pc (usually incorporated in estimated trade-growth equations), higher export and import shares to GDP may well reflect on a countries' technological prowess and its industries' ability to boost growth via exports and/or imports of technology, production related factor inputs and intermediary products. Essentially, this is to say that increased trade integration and in particular, internationalisation thorough exports may not necessarily be related to government's exercise of trade related 'neutrality principle'. In line with this propositions, Busse and Koniger (2012) found that the relationship between trade openness and growth predominantly depends on trade specification. Moreover, they postulate the importance of investigating the relationship in a dynamic framework.

On the other side, as shown by Rodriguez and Rodrik (1999) study trade openness may lead to increases in income but does not cause economic growth in the long run. The same hypothesis has been supported by Brunner (2003). He found that trade openness has significant positive impact on income nut not on economic growth. Hence a later study by Rigobon and Rodrik (2004) after accounting for endogeneity and a country heterogeneity issues in examining the relationship between trade openness and economic growth reveals that trade openness measured as trade share in GDP has negative effect on economic growth.

Overall, trade openness in the sense of 'neutrality' or neutral trade orientation of an economy may have positive impact on economic growth in the short run by enlarged trade sector e.g. trading related investments in the economy, boosted imports via increases in income and aggregate demand. However, at the same time the relationship between trade openness and economic growth in the long run is determined by host of factors but predominantly by the abilities of local firms and industries to adjust and cope with the international productivity levels, and their ability to develop 'imitative' and 'absorptive' capabilities necessary to internalise economies of scale and knowledge externalities related trade. The scope of possible 'crowding out' effect on local firms and industries through trade openness is given by the degree of, and the existence of considerable differences in technologies and endowment of trading partners. If considerable differences are present, trade openness in the form of passive trade liberalisation may lead to ruined potential to build comparative advantage capabilities of local firms/industries. Obviously, although significant in understanding trade openness economic

growth nexus, the lost potential of acquiring comparative advantage locally trough trade liberalisation, is almost impossible to measure or estimate the effect with certainty in a cross-country analysis. Notwithstanding this, lost potential of trade integration of local industries undermines sustained economic growth potential in the long run.

All in all, given the theoretical propositions and the empirical evidence, first we argue that trade openness in the sense of 'neutral' trade regime and passive trade liberalisation may not be an optimal policy choice, and may adversely affect individual countries in view of persistent differences in technology and endowments across countries. In case the trading occurs between partners that are at different stages of technological and industrial development the effect of trade openness on economic growth may not be positive and instantaneous. For this purpose we rely on trade of CEECs with developed supposedly technologically superior and innovative EU-15 countries, to test the hypothesis on whether trade restrictions (measured by average tariff rate) have adversely affected economic growth of the group of transition economies. Having said this, we investigate how homogenous trade liberalisation regime across CEECs countries (there is no variability in the data i.e. average effective tariff rate applied across CEECs since 1995) has affected economic growth of transition economies. Second, we investigate the impact of trade openness measured by trade volumes and various trade intensity ratios (e.g. share of exports and imports to GDP, share of exports to GDP, share of imports to GDP). It is worthwhile noticing that these, trade intensity variables may be misleading proxy of trade openness per se, following the discussion on theoretical assumptions relating to trade integration and trade openness. Instead we assume that both exports and imports may have positively affected growth performance in the period under investigation. Although different mechanisms are at work in comprehending the influence of exports and imports on economic growth, both may reflect on individual country capability to rip off the benefits of increasing trade integration of these countries that is expected to be revealed by higher trade intensity rations. Importantly, following new trade theories and endogenous growth according to which international trade leads to more efficient use of resources at lower costs and apart from early emphasis on exports, imports of intermediary products, resources and technology are likewise important in acquiring comparative advantage trough trade (Edwards, 1993; Yanikkaya, 2002). For this purpose we include independently imports and export shares into growth regression. Finally, given the similar policy context and similar economic structure of CEEC economies in terms of size (i.e. small open economies), differences in technology and patterns of industrial development and restructuring (Landesmann and Shehrer, 2001; Silajdzic, 2011) should be captured by different growth performance of technologically more advanced versus least developed transition economies as in line with the catching up hypothesis. For this purpose we include Dummy variable which depicts the group of least developed CEE economies into growth regression, and examine the relevance of expected higher growth performance of least developed CEE economies. Finally, we estimate growth equation in an integrated and dynamic framework.

3 Empirical analysis

3.1 Methodology

The possible explanation for the observed inconsistency in the empirical results in studies examining the relationship between trade openness and growth reflects on methodological shortcomings and the overall difficulty in developing a proper empirical framework to investigate the impact of trade policy on economic growth. The dynamic and endogenous character of trade and economic growth relationship need be integrated in an empirical framework. The importance of incorporating time dynamics in investigating the impact of trade restrictions on economic growth seems worthwhile from theoretical stand point. This is to say that trade restrictions may be beneficial to growth if considered (applied) as a temporary phenomena in relation to building (defy) comparative advantage in specific sector(s). In line with the 'infant industry argument', although trade restrictions or protectionist

measures may have ambiguous possible impact on economic growth in the short run, the temporary protection of specific sectors may in fact have positive effect on sustained growth in the long run via underlying increases in levels of productivity and technological prowess of protected sectors.

Moreover, in empirical growth modelling one needs to take into account the problems of endogeneity when examining the impact of trade on economic growth. The problems of endogeneity are related to both i) the proposition of potential reverse causality between economic growth and trade, as well as ii) common unobserved factors of influence that may give rise to positive biased estimations. Last but not least, researchers do acknowledge that it is difficult to account for the heterogeneous profile of countries when examining the relationship between economic growth and trade using cross-country data. However, as shown by Rodriguez and Rodrik (1999) positive correlation between trade indicators and economic growth may be due to methodological deficiencies and factors of influence that researchers do not consider. The specificities relating to remarkable technological differences across countries, the differences in size, and specificities relating to regional patterns as well as geographical factors may be crucial in comprehending the relationship relying on a pooled data. Having this in mind in this study we emphasise the importance of the similarities in the context of policy and institutional framework of EU integration of CEE countries, and given the problem of endogeneity through omitted variable and reverse causality we highlight the importance of analysing the relationship between trade openness and economic growth relying on methods of investigation that accounts for the dynamics of the relationship.

3.2 Methods of investigation

In light of this discussion, we estimate the growth regression using two different estimation methods, namely the fixed effect Panel applied by estimating Prais-Winsten correlated panels corrected standard errors (PSCE) method due to presence of heteroscedasticity and autocorrelation, and the dynamic Least Squares Dummy Variable (LSDVC) method. The purpose is to elaborate on an in depth assessment of implications of results obtained when the impact of trade barriers and trade intensity on economic growth is estimated using dynamic (LSDVC) versus static econometric (PCSE) framework. Essentially, in applying PCSE method to account for, among others, the presence of autocorrelation we loose important dynamic information and the impact of trade openness on economic growth is estimated relying on averaging data across within group time dimension. For robustness check, and deeper understanding of the relationship we then estimate the same models relying on a dynamic LSDVC regression.

Specifically, as indicated above we first we estimate growth equation using Prais-Winsten correlated panels corrected standard errors PSCE method. In this analysis we deeply consider an appropriate estimation method to obtain robust estimates of individual effects in presence of heteroscedasticity and serial correlation. We treat the problems of encountered heteroscedasticity and serial correlation, with cautiousness. In an attempt to compute heteroscedasticity-robust standard errors and eliminate serial dependence in times series we follow Plümper et al.'s (2005) recommended technique, and use a combination of panel-corrected standard errors with Prais-Winsten transformation (AR1). Specifically, here we follow Beck and Katz's (1995) recommended procedure and use panel-corrected standard errors, with corrections for first-order auto-regression, and imposition of a common rho for all cross-sections. Furthermore, following Wagner (2004) we test for the cross-sectional dependence in the data, and additionally use corrected-standard errors across panels as an estimation strategy to avoid spuriousness in the obtained results. This option is possible with using modified PSCE method of estimation that corrects standard errors correlated across panels. For a detailed discussion of econometric problems and the implications of cross-sectionally correlated residuals see for instance Wagner (2004). Importantly, we test for the presence of reverse causality using Granger causality test. Precisely, the results of Granger causality test using LSDV dynamic regression (AH estimator)

indicate that the growth variable shift GDPpc(t-1) does not cause Trade Openness in CEE countries in the observed period. Further the results of the Granger test indicate that the null hypothesis that Trade Openess does Granger cause economic growth can be rejected. In short, the assumption that Trade oppeness affects economic growth is confirmed, while the inverse causality is rejected. In view of this we believe that the obtained results of PCSE estimations are robust to endogeneity issues that may be caused by inverse causality. The results of Granger causality test are not reported here due to space limitations.

Notwithstanding this, the results of the PCSE estimations may still be subject to simultaneity problems. In order to properly account for the problems of endogeneity and possible inconsistency in parameters obtained due to omitted variable bias, we carry additional robustness test and estimate the dynamic version of the model using LSDVC dynamic regression. In other words, we integrate lagged dependant variable into growth equation to remedy for the simultaneity bias. Kiviet (1995) proposes a Bias Corrected LSDV (Least Squares Dummy Variables) estimate, by estimating the sample bias from an uncorrected LSDV estimate and using this to remove the inconsistency in the parameter estimates. Essentially, we postulate that this method which attempts to account for the importance of time dynamics in examining the relationship between trade openness and economic growth and accounts for the simultaneity bias in the data is important sensitivity analysis. LSDVC is considered appropriate method for small samples with small number of cross-section groups, and imbalanced panels which is consistent with the nature of our dataset. The properties of LSDVC method are discussed in detail in studies by Bruno (2004:2005), Judson and Owen (1999), while Keele and Kelly (2005) further point to least bias and preferential properties of models integrating lagged dependant variable. Keele and Kelly (2005,2) warn that: 'When testing theories that have a dynamic component, then, lagged dependent variable models are more than just theoretically preferable to static models with corrections for autocorrelation. A dynamic process modelled with a static model is invariably misspecified and therefore incorrect.' Essentially, the potential biases in the estimators resulting from endogenity related to both reverse causality and omitted variable bias is lessened (removed) by incorporating lag-dependant variable in the growth equation to be estimated. Thus, the LSDVC model is our preferred model. Table 3 presents the results of estimated models using both methods of investigation. We compare the results and discuss the robustness of the variables of interest, in the sections to follow.

3.3 The Model and the variables

In line with the theoretical propositions and previous empirical analysis discussed, we specify the following growth equation to be estimated:

$$RGDPpcG_{it} = \beta_0 + \beta_1 TRate_{it} + \beta_2 \ln GDPpc_{it} + \beta_3 GFCF_{it} + \beta_4 GB_{it} + \beta_5 Openness_{it} + \beta_6 CountryDummy + \beta_7 Time + \varepsilon_{it}$$

where:
the dependent variable, $RGDPpcG_{it}$ denotes changes of real GDP per capita (GDPpc) of the country i in the period t; $TRate_{it}$ denotes effectively applied tariff rate in the country i in the period t; GDPpc denotes log GDP per capita of the country i in the period t -1; DI_{it} – domestic investment of the country i in the period t; GB_{it} denotes government balance (%GDP) of the country i in the period t; $Openess_{it}$ denotes exports and imports share in GDP of the country i in the period t; ε_{it} – random error (structure e_{it} depends on whether the model is estimated using OLS, FE or RE model). We also control for individual country effects (CountryDummy), and specific time effect (Time). Importantly Openness variable in this analysis is measured using three different proxies of trade openness that are integrated individually in growth equations to be estimated due to possible multicolinearity issues indicated by the correlation between trade openness measures (see Correlation matrix below). The

problem of measurement of trade openness in our analysis is lessened by integrating both trade barrier variable proxied by average tariff rate, as well as using conventional trade intensity indicators X+M/GDP, X/GDP, M/GDP to analyse the relationship between trade and economic growth.

In this research, the independent variable (RGDPpc$_{it}$) and the convergence variable (lnGDPpc) are measured in USD and the source of data for these variables is IMF. The latter variable is assumed to capture the convergence influence on a country's economic growth rate. Along the lines of catching up hypothesis, there should be a strong tendency for convergence among industrialising economies including transition economies. Therefore we anticipated a negative and significant effect of the initial income levels on growth rates in CEE countries. However, given the non-significant coefficient obtained on the convergence variable in all estimations, when including its lagged values, we proceed by estimating growth equations using log values of GDPpc in period *t*, to account for the differences in human capital and technological advancement of CEE countries. The results presented in the table 3 relate to logGDPpc measured as log of income levels in time *t*. The Tarriff rate data are based on World Bank data and computation of effective tariff rate applied. The source of all other variables is EUROSTAT.

Considering the relatively heterogeneous characteristics of CEE countries related to size, scope, and structure of the economies considered on one side, and homogenous characteristics of trade policy it is postulated that these specificities of the dataset indicate advantageous framework to analyse the impact of trade policy liberalisation on countries with supposedly different industrial structure and levels of technological proficiency. In particular, we emphasise the vital importance of establishing econometric framework for analysing patterns of catching up trough trade integration with the more advanced EU countries, in an attempt to investigate how homogenous trade policy regime has affected transition economies depending on their level of development and technological prowess captured by the dummy variable in the extended growth model. The dummy variable is set to be 1 for the less developed transition economies namely Romania, Bulgaria, Latvia and Lithuania, accounting for the differences in the initial conditions and patterns of industrial catching up (Silajdzic, 2011). Moreover, although trade intensity indicators may fail to accurately capture the effect of trade openness or precisely trade policy regime, in our empirical setting higher trade intensity ratios are effectively capturing individual country ability to rise economic efficiency and boost technology transfer via increased trade integration with technologically innovative EU countries. Therefore we expect positive relationship between trade intensity variables and economic growth. Apart from this, average tariff rate is incorporated in growth regression to investigate how liberalisation policy has affected growth performance in a general transition and dynamic framework by estimating growth regression relying on LCDVC technique.

Although an ideal measure of trade openness will be an index that takes into account all trade distortion measures as well as all privileged instruments applied to export production to reflect on the concept of 'neutrality', average tariff rate may generally be considered a viable proxy of trade orientation among transition economies. Not only that these countries have relatively weaker institutional and technical capacity and underdeveloped instruments of trade protection by the means of non-tariff barriers to trade compared to high-income EU industrialised countries, but essentially the integration into EU economic structures implied homogenous trade-related regulatory framework including application of the mutual recognition principle when it comes to non-tarrif barriers to trade effective as of 1998. In this study we rely on average tariff rate as a proxy for trade policy among CEE countries. Considering graphical presentation of the tariff data we conclude that CEECs have followed a rapid trade liberalisation policies and homogenous trade regime has been applied in the context of EU integration. Last but not least the EU integration process, which implied universal institutional and policy setting and transitory requirements of the EU enlargement implies systematic reduction in transaction costs often related to national regulatory regimes and rules of doing business.

The impact of different regulation on trade can be examined by assuming minimum or no transaction costs across transition economies. Table 1 and Table 2 present the descriptive statistics of variables and the correlation matrix among variables, respectively.

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
rGDPpcgrowth	203	3.64	4.53	-14.55	13.08
Tariff rate	220	2.46	1.43	1.02	6.27
GDPpc	208	8744.98	6094.11	1102.10	27501.81
Trade to GDP	190	108.18	31.57	43.7	183.4
ExportstoGDP	190	52.21	16.93	22.1	93.8
ImportstoGDP	190	55.97	15.14	20.7	89.6
GFCF	190	24.51	5.15	5.4	38.4
Government deficit/surplus	188	-3.27	3.07	-15.1	2.9

Table 2: Correlation matrix

	rGDPpc growth	Tariff rate	GDPpc	Total trade to GDP	Total exports to GDP	Total imports to GDP	Domestic investment (GFCF)	Government deficit/surplus
rGDPpc growth	1.00							
Tariff rate	-0.01	1.00						
GDPpc	-0.17	-0.59	1.00					
Trade to GDP	-0.02	-0.38	0.60	1.00				
Exports to GDP	-0.10	-0.36	0.63	0.98	1.00			
Imports to GDP	0.06	-0.39	0.55	0.98	0.93	1.00		
GFCF	0.25	-0.11	0.18	0.17	0.08	0.27	1.00	
Gov't balance	0.40	-0.06	-0.11	0.09	0.04	0.14	0.11	1.00

4 Results

Table 3 presents the results of the growth equation model estimated using PCSE and LSDVC estimation methods as explained earlier. The three different specifications of the models relate to three distinct measurement of trade openness variables export, import and total trade to GDP indices, as explained. We begin the discussion with Openness and the three distinctive measures of trade intensity. The results of our empirical investigation support the hypothesis that trade volumes are positively associated with growth performance, which is consistent with earlier empirical findings. This is to say, that CEE countries which are more integrated with the EU economies through trade are likely to grow faster than other supposedly less integrated countries. Essentially, CEEC seem to have benefited from increasing trade integration in terms of growth rates. All openness variables are

significant and positive in all models estimated. The coefficient on openness variable measured as total trade to GDP (model 1) is 0.079 .implying that a 10% increase in trade share will increase GDP pc growth rate by and average of about 8%. The marginal effect of both exports and imports share to GDP is positive and significant, and thus estimated at about 0.15 and 0.14 respectively, implying that both export and imports positively affect economic growth with a similar magnitude. These results are robust to sensitivity analysis applied using LSDVC econometric framework which accounts for the likelihood of reverse causation between growth and trade volumes emphasised in number of empirical studies. The obtained coefficients of all trade intensity measures are about the same value in the LSDVC estimations pointing to the consistent and robust estimate of trade effect on economic growth relying on both estimation techniques.

Table 3: Results

	Model 1 (Trade to GDP)			Model 2 (Exports to GDP)		Model 3 (Imports to GDP)	
	PCSE	LSDVC	PCSE	PCSE	LSDVC	PCSE	LSDVC
rGDPpc growth (lag)		.095 (.083)			.115 (.082)		.08 (.99)
Tariff rate	-.405 (2.75)	1.34** (.073)	-.405 (2.75)	.279 (2.77)	1.099 (.716)	-.72 (2.70)	1.42** (0.73)
lnGDPpc	-.77 (2.31)	-1.07 (2.01)	-.77 (.2.31)	-1.49 (2.77)	-1.72 (1.98)	-.264 (2.29)	-.60 (-2.04)
Trade to GDP	.079*** (.026)	.076*** (.022)	.079*** (0.026)				
Exports to GDP				.151*** (.052)	.138*** (.045)		
Imports to GDP						.149*** (.047)	.149*** (.042)
Domestic investment (GFCF)	.451*** (.88)	.378** (.082)	.451*** (.88)	.534** (.96)	.432** (.090)	.36*** (.089)	.311*** (.079)
Government deficit/surplus	.26** (0.74)	.315*** (.095)	.26** (0.74)	.24*** (0.75)	.31*** (0.096)	.277*** (.073)	.326*** (.094)
Dummy LD	4.67** (2.12)						
R-squared	*0.75*			*0.74*		*0.75*	
Wald chi2 Prob>F	*0.000*			*0.000*		*0.000*	
No. of observations	*184*			*184*		*184*	

***,**,*denotes significance at 1%, 5% and 10% respectively. Standard Errors are in parenthesis.

However, this is not to say that these conventional trade openness measures reflect on trade orientation of CEE countries. These measures have important shortcomings discussed in number of studies indicated previously in the paper. Therefore, in this paper we do not rely on these measures and do not discuss the impact of these variables in economic growth in the context of trade policy impact.

Instead, the other trade-related variable, namely the Tariff Rate variable is used to measure the effect of trade restrictions on economic growth in CEE countries. Essentially, the results of our analysis do not support the hypothesis that trade barriers are harmless to economic growth. On the contrary, while the results of PCSE estimations point to the insignificant effect of trade barriers on economic growth, although negatively related to economic growth in Model 1 and 3, the obtained coefficients are highly insignificant with the p value of over 0.88. The results of the LSDVC estimations, which are estimated in an attempt to remove simultaneity bias point to, however, significant and yet positive effect of trade barriers on economic growth. The obtained coefficient is significant at 5% in Models 1 and 3, while it becomes insignificant in Model 2 in which we use export to GDP variable. It is noteworthy to emphasise the LSDVC estimator has superior properties if compared to static panel estimators when correcting for autocorrelation, and results obtained with respect to dynamic model should implicitly be considered robust to possible simultaneity bias.

Given the inconsistency in the results obtained it is perhaps safe to conclude that we find no evidence that trade restrictions negatively affected growth performance of transition economies. On the contrary the results of the dynamic growth model estimations support the hypothesis that trade restrictions may be beneficial to growth performance depending on the symmetries between trading partners. Given the homogenous trade policy regime among individual countries in our data set we conclude that trade liberalisation across CEE countries has not been positively associated with growth performance of CEECs, and we find some evidence that trade restrictions have seemingly had positive effect on growth performance of CEECs countries if accounting for the dynamic relationship between economic growth and trade openness.

Finally, the results obtained with respect to Dummy variable capturing the growth performance of less developed CEE countries relative to other CEECs suggest that these countries have been growing faster than other supposedly more developed CEE in the period under investigation. This results is in accordance with the theoretical proposition and the catching up hypothesis. All other variables enter the growth regression with expected signs and significance, pointing to the importance of macroeconomic stability in the growth process captured by the government balance variable, as well domestic investments depicted by Gross Fixed Capital Formation.

5 Conclusions

In this paper we investigate the impact of trade openness on economic growth in CEE countries over the 1995-2013 period (the actual data set considering the missing observations in the data before 1995 for the trade intensity indicators) .Essentially, we use variety of trade openness measures to deepen our understanding on how trade volumes affect growth performance on one side, and how effective has been trade liberalisation policy per se in enhancing growth performance of CEECs. The results of our empirical investigation provide robust evidence that trade intensity measures are positively associated with economic growth, pointing to the benefits of trade integration through not only exports but also increasing imports from technologically innovative EU countries to less advanced CEE economies. The results seem not sensitive to simultaneity issues, robustness check and different model specifications applied.

Apart from this, in this paper we postulate that trade intensity indicators do not reflect on trade policy regime. Given the particularities of our dataset referring to homogenous trade policy regime applied

among CEE countries in the context of EU integration and the econometric framework used, the effect of trade barriers on economic growth in transition countries proxied by average tariff rate seem ambiguous. Although, the results obtained with respect to the impact of tariff rate on economic growth are not robust to different methods of estimation and sensitivity analysis, we conclude that tariff barriers have not been negatively associated with economic growth in the selected transition countries. Surprisingly, unlike the traditional perception on the negative link between trade barriers and economic growth well substantiated in the empirical literature, we find some evidence that trade barriers may be beneficial to growth performance while relying on a dynamic econometric framework and when removing the possible simultaneity bias. The results of this analysis have important theoretical and policy implications implying that trade openness and economic growth is not a simple relationship and that its effects depend on differences in the levels of development, size and technological proficiency which seem consistent with the growth and development literature.

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