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LONG-RUN RELATIONSHIP BETWEEN EXPORTS AND IMPORTS IN TRANSITION EUROPEAN COUNTRIES

An important aspect of macroeconomic policy is to monitor the time path of the current account, which can be considered as a measure of national net indebtedness. If current account deficit is stationary, the external debt is sustainable. In this paper we test the long-run relationship between imports and exports in sixteen transition European countries, using quarterly data from different years in the 1990s to the end of 2006. In order to test the possible cointegration between exports and import in the sample countries, we apply the Johansen approach. We find existence of cointegration in 10 out of 16 analyzed countries. However, restrictions on long run coefficient suggest that current account deficit is sustainable only in 5 countries.

Key words: Johansen cointegration, exports, imports, current account sustainability

1 Introduction

An important aspect of macroeconomic policy is to monitor the time path of the current account, which is generally taken as the measure of change in the level

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of country indebtedness. External debt is believed to be sustainable if current account deficit is stationary. To measure the sustainability in current accounts one commonly estimates the cointegration between imports and exports. In order to be cointegrated, both exports and imports time series must be $I(1)$, while there must be a linear combination of both time series that is $I(0)$, with the cointegration vector equals to (1, -1). In other words, exports and imports should be cointegrated with a long run coefficient of unity.

The main contribution of this study to the literature is that it applies Johansen cointegration method to 16 transition European countries in order to check the sustainibility of their current accounts. Hence we start the empirical section of the paper with unit root test. We use augmented Dickey-Fuller test (Dickey and Fuller, 1979) on series with a drift and series with a drift and a trend. Then, we apply Johansen method (1995) in order to test the possible cointegration between exports and imports. Thereafter we impose restrictions on cointegrating space to check whether long run coefficients are equal to unity and to determine. We also test for weak exogeneity of exports and imports.

In order to address the issues described above, the paper is organized as follows. Section 2 reviews the literature, while section 3 discuses a theoretical background. Section 4 explains the data, methods and discusses the results. Conclusions are provided in the final section of the paper.

2 Literature review

In the last two decades, numerous studies have analyzed the long-run relationship between exports and imports. A part of the studies is based on data from the U.S. economy (see, Husted (1992), Fountas and Wu (1999)). However, there are studies employing data for other developed countries (see e.g., Bahmani-Oskooee (1994), Bahmani-Oskooee and Hyun-Rhee (1997), and Wu et al. (2001)). Holmes (2006) uses panel cointegration approach in order to test the current account sustainibility in 11 OECD countries. His results suggest that sustainability is present in six countries. Moreover, sustainability is generally a characteristic of the non-Euro countries.

As far as developing countries are concerned, Arize (2002) found the presence of long-run relationship between exports and imports in 35 of the 50 countries, both developing and OECD economies making the sample reasonably representative on the world level. In most countries where the slope coefficient on the export variable is positive, the cointegrating coefficient is also unity. However, when compared to other regions, cointegration space does not appear to be stable for countries in the Middle East, Latin America and Europe. Narayan and Narayan (2005) examined current account sustainability in 22 least developed African and Asian countries. Their findings suggest that exports and imports are cointegrated only for six out of the 22 countries, and the coefficient on exports is less than one. Holmes (2004) tests the current account sustainability in Russia and 9 Central and Eastern European countries using panel data approach. The results of the study indicate that over half of the sample (the Czech Republic, Estonia, Hungary, Poland, Romania and the Slovak Republic), are characterized by current account sustainability where the impact of a current account shock on external debt will not be permanent. Erbaykal and Karaca (2008) conclude that exports and imports in Turkey are cointegrated, but due to the fact that the slope coefficients obtained from the equations derived from exports and imports series is not equal to 1, current account deficit is not sustainable. Aristovnik (2006) employs two accounting approaches in order to asses the current account sustainability in 17 Central and Eastern European countries. The results show that if the observed level of foreign direct investment (FDI) flows is sustained at the same level in the medium run, almost all countries could even increase their current account deficits. The most notable exeptions are: the Baltic States, Hungary, Macedonia, Moldova and Romania. Roubini and Wachtel (1999) underscore the importance of assessing current account sustainability. Given the fact that exports and imports series at the time when this paper was written were not sufficiently long, the authors provide a descriptive analysis of possible indicators of current account sustainability of Central and Eastern European countries in early transition.

It is worth noting that these investigations have reported conflicting results about the relationship between imports and exports. For example, by using US quarterly data for the period 1967-1989, Husted (1992) found there is a long-run relationship between exports and imports yielding the conclusion that the US trade deficits are sustainable. This result implies that the US exports and imports may drift apart in the short run, but converge toward equilibrium in the long run. In contrast, Fountas and Wu (1999) using again US quarterly data but for somewhat longer period 1967-1994 have found that the hypothesis of no long-run relationship between exports and imports cannot be rejected. One may wonder whether these conflicting results are due to different time period used in analyses or due to different testing techniques employed.

3 Theoretical background

Husted (1992) offers a simple framework that implies a long-run relationship between exports and imports. The analysis assumes that a representative consumer who resides in an open economy with no government control. It is assumed that the consumer uses one-period financial instruments to borrow and lend in international markets. The consumer's current-period budget constraint is

$$C_0 = Y_0 + B_0 - I_0 - (1+r)B_{-1} \tag{1}$$

where C_0 is the current consumption, Y_0 is the income, I_0 is the investment, B_0 is the international borrowing, and t is the one-period world interest rate. (1+r)B_1 is the initial debt size. Husted makes several assumptions, among which is that imports and exports follow a random walk with drifts and that the world interest rate is stationary with mean r. Husted proposes a testable model:

$$EX_t = \alpha + \beta IM_t + \varepsilon_t \tag{2}$$

where *EX* is the exports of goods and services and *IM* is the imports of goods and services. For a sustainable current account deficit two conditions are needed: (i) β should be equal to one and (ii) ε_t should be a stationary process. In other words, current account deficit is sustainable if exports are cointegrated with imports and if the cointegration coefficient β is one. However, if exports are cointegrated with imports, while β is less than 1, the economy is not capable to satisfy its budget constraint.

4 Empirical analysis

In our empirical excercise we use a sample comprised of 16 transition European and CIS countries. The countries are chosen to obtain a sample that is representative of former communist economies: Belaruss, Bulgaria, Kazakhstan, Georgia, Armenia, Russia, Czech Republic, Slovakia, Estonia, Latvia, Hungary, Lithuania, Croatia, Slovenia, Poland, and Romania. We use two time series: total exports of goods and services and total imports of goods and services, both in national currencies. All series are seasonally adjusted and transformed to logarithms. The data is taken from the International Monetary Fund International Financial Statistics CD-ROM. All data are in quarterly frequency and in general they cover the period from various years in nineties to the end of 2006. The exact starting year for each series is available in Table 1.

We start the empirical analysis with unit root test. We use augmented Dickey-Fuller test (Dickey and Fuller, 1979) on series with a drift and on series with a drift and a trend. After we established the level of the integration of each series, we move to Johansen cointegration test. We use this method to check whether the behavior of foreign trade (i.e. exports and imports of goods and services) in ex-communist countries is sustainable in the long-run. If the export and import series of a country are found to be cointegrated and the elasticity of imports with respect to exports is equal to one, we may conclude that the current account deficit recorded in that country is sustainable. We also test for weak exogeneity of imports and exports. In order to apply the Johansen test all series must be I(1) or higher, i.e. series in levels must not exhibit mean reverting properties. Moreover, each pair of series tested for cointegration must be of the same level of integration.

The results of Augmented Dickey-Fuller (ADF) test in levels and first differences are displayed in Tables 1 and 2. The results suggest that most of the series are indeed I(1), with or without a stochastic trend. However, there are some exceptions: export series with included drift and a trend for Kazakhstan, Georgia, Latvia, Croatia and Slovenia as well as export and import series with included drift for Romania seem to be I(0). However, we continue with our analysis by assuming all series are I(1) for three reasons. Firstly, we are not sure of the true data generating process and secondly, the null hypothesis of the ADF test in levels was never rejected in both test specifications of any series, i.e. when a drift was included and when a trend and a drift were included. Finally, if one of the tested series was indeed stationary, the number of cointegration vectors found in VAR containing that particular series will be equal to 2, which will enable us to exclude that particular country from the analysis.

Table 1.

ADF TEST – IN LEVELS

Name of the variable	Period	Trend components	Chosen time lag	t-value (ADF)	Beta	Sigma	t- value (lag)	AIC
BU_EX	1994(1) - 2006(4)	constant	4	-2.601	0.92691	0.2308	-1.573	-2.811
BU_EX	1994(1) - 2006(4)	trend & constant	3	-2.568	0.88100	0.2308	1.763	-2.830
BU_IM	1994(1) - 2006(4)	constant	2	-2.655	0.93474	0.2116	-2.474	-2.985
BU_IM	1994(1) - 2006(4)	trend & constant	4	-1.942	0.90979	0.2132	-2.165	-2.952
KZ_EX	1994(1) - 2006(4)	constant	0	-0.04643	0.99898	0.1170	-	-4.248
KZ_EX	1994(1) - 2006(4)	trend & constant	2	-3.543*	0.65871	0.1030	2.285	-5.441

Name of the variable	Period	Trend components	Chosen time lag	t-value (ADF)	Beta	Sigma	t- value (lag)	AIC
KZ_IM	1994(1) - 2006(4)	constant	2	0.1293	1.0017	0.05827	-3.819	-5.562
KZ_IM	1994(1) - 2006(4)	trend & constant	4	-1.969	0.78829	0.05616	-2.517	-5.617
GE_EX	1996(1) - 2006(4)	constant	4	-1.502	0.95926	0.09666	-1.663	-4.529
GE_EX	1996(1) - 2006(4)	trend & constant	1	-5.048**	-0.12671	0.08474	1.930	-4.837
GE_IM	1996(1) - 2006(4)	constant	2	1.231	1.0352	0.07375	-2.592	-5.115
GE_IM	1996(1) - 2006(4)	trend & constant	2	-1.599	0.81489	0.07085	-1.716	-5.172
BEL_EX	1995(1) - 2006(4)	constant	2	-2.369	0.97348	0.1421	-1.336	-3.811
BEL_EX	1995(1) - 2006(4)	trend & constant	2	-0.2093	0.99189	0.1436	-1.413	-3.770
BEL_IM	1995(1) - 2006(4)	constant	1	-2.456	0.97278	0.1393	2.125	-3.874
BEL_IM	1996(3) - 2006(4)	trend & constant	1	-0.5866	0.97835	0.1411	1.902	-3.827
AR_EX	1994(4) - 2006(4)	constant	1	-1.011	0.96526	0.1144	-2.619	-4.269
AR_EX	1994(4) - 2006(4)	trend & constant	1	-2.106	0.66034	0.1107	-1.321	-4.314
AR_IM	1994(4) - 2006(4)	constant	1	-1.524	0.93755	0.07790	-2.890	-5.037
AR_IM	1994(4) - 2006(4)	trend & constant	4	2.737	0.58549	0.07250	1.896	-5.119
RU_EX	1993(3) - 2006(4)	constant	2	-1.535	0.97979	0.09720	-2.254	-4.582
RU_EX	1993(3) - 2006(4)	trend & constant	5	-2.207	0.87367	0.09512	1.453	-4.554
RU_IM	1993(3) - 2006(4)	constant	2	-1.176	0.98773	0.06347	-1.618	-5.435
RU_IM	1993(3) - 2006(4)	trend & constant	4	-2.444	0.86462	0.06055	1.357	-5.474
CZ_EX	1991(1) - 2006(4)	constant	1	-0.9698	0.98960	0.03988	1.366	-6.393
CZ_EX	1991(1) - 2006(4)	trend & constant	1	-2.811	0.81429	0.03780	2.072	-6.484
CZ_IM	1991(1) - 2006(4)	constant	2	-2.517	0.95540	0.06314	-1.293	-5.458
CZ_IM	1991(1) - 2006(4)	trend & constant	5	-2.281	0.82931	0.05775	2.859	-5.576
SL_EX	1993(1) - 2006(4)	constant	5	0.1531	1.0015	0.03133	-1.805	-6.797
SL_EX	1993(1) - 2006(4)	trend & constant	4	-3.479	0.56335	0.02864	-0.02168	-6.977
SL_IM	1993(1) - 2006(4)	constant	0	-1.082	0.98541	0.04520	-	-6.154
SL_IM	1993(1) - 2006(4)	trend & constant	0	-3.095	0.72236	0.04193	-	-6.285
EE_EX	1993(1) - 2006(4)	constant	0	-1.404	0.98124	0.05189	-	-5.878
EE_EX	1993(1) - 2006(4)	trend & constant	5	-2.107	0.87306	0.04990	-1.086	-5.850
EE_IM	1993(1) - 2006(4)	constant	1	-1.167	0.98607	0.04479	2.834	-6.153
EE_IM	1993(1) - 2006(4)	trend & constant	1	2.638	0.85974	0.04262	3.308	-6.234
LV_EX	1992(1) - 2006(4)	constant	4	0.9353	1.0122	0.04076	-2.213	-6.296
LV_EX	1992(1) - 2006(4)	trend & constant	1	-2.601	0.86648	0.04106	3.756	-6.314
LV_IM	1992(1) - 2006(4)	constant	5	0.2250	1.0032	0.05945	-1.610	-5.525
LV_IM	1992(1) - 2006(4)	trend & constant	4	-1.878	0.87163	0.05898	1.752	-5.557
HU_EX	1995(1) - 2006(4)	constant	1	-1.802	0.98037	0.03036	3.825	-6.920
HU_EX	1995(1) - 2006(4)	trend & constant	1	-2.407	0.91701	0.02935	3.983	-6.966

Name of the variable	Period	Trend components	Chosen time lag	t-value (ADF)	Beta	Sigma	t- value (lag)	AIC
HU_IM	1995(1) - 2006(4)	constant	1	2.634	0.96798	0.03351	2.383	-6.723
HU_IM	1995(1) - 2006(4)	trend & constant	1	-2.501	0.91011	0.03272	2.465	-6.749
LT_EX	1993(1) - 2006(4)	constant	3	-2.110	0.94695	0.07227	2.015	-5.160
LT_EX	1993(1) - 2006(4)	trend & constant	4	-4.608**	0.63433	0.06232	2.542	-5.422
LT_IM	1993(1) - 2006(4)	constant	0	-1.427	0.96327	0.07473	-	-5.149
LT_IM	1993(1) - 2006(4)	trend & constant	0	-2.236	0.85218	0.07300	-	-5.176
CRO_EX	1994(1) - 2006(4)	constant	5	0.5855	1.0233	0.05286	-3.418	-5.741
CRO_EX	1994(1) - 2006(4)	trend & constant	4	-6.676**	-0.37100	0.04312	2.606	-6.167
CRO_IM	1994(1) - 2006(4)	constant	5	-1.145	0.96485	0.04480	-1.685	-6.072
CRO_IM	1994(1) - 2006(4)	trend & constant	5	-1.914	0.77252	0.04380	-1.322	-6.099
SI_EX	1995(1) - 2006(4)	constant	1	0.1323	1.0015	0.02653	-	-7.212
SI_EX	1995(1) - 2006(4)	trend & constant	5	-3.715*	0.43930	0.02334	2.292	-7.346
SI_IM	1995(1) - 2006(4)	constant	4	0.06985	1.0011	0.03697	-1.951	-6.464
SI_IM	1995(1) - 2006(4)	trend & constant	3	-2.943	0.45600	0.03487	2.081	-6.581
PL_EX	1990(1) - 2006(4)	constant	4	-3.433*	0.97230	0.04763	-1.534	-5.997
PL_EX	1990(1) - 2006(4)	trend & constant	4	-1.723	0.94637	0.04774	-1.386	-5.978
PL_IM	1990(1) - 2006(4)	constant	3	-2.441	0.97332	0.06692	1.821	-5.331
PL_IM	1990(1) - 2006(4)	trend & constant	1	-1.167	0.96152	0.06866	-2.161	-5.295
RO_EX	1997(1) - 2006(4)	constant	1	-3.929**	0.93227	0.07846	-2.637	-5.006
RO_EX	1997(1) - 2006(4)	trend & constant	1	-0.7355	0.94998	0.07966	-2.524	-4.950
RO_IM	1997(1) - 2006(4)	constant	0	-3.631*	0.96299	0.04829	-	-5.946
RO_IM	1997(1) - 2006(4)	trend & constant	0	-0.9833	0.95137	0.04901	-	-5.947

Note: ADF - Augmented Dickey-Fuller; optimal time lag chosen according to AIC; all series are seasonally adjusted and in logarithms; ** null hypothesis about existence of unit root rejected at 1 percent level of significance; * hypothesis about existence of unit root rejected at 5 percent level of significance.

Source: calculation of the authors.

Table 2.

ADF TEST – IN DIFFERENCES

Name of the variable	Period	Trend components	Chosen time lag	t-value (ADF)	Beta	Sigma	t- value (lag)	AIC
BU_EX	1994(1) - 2006(4)	constant	3	-3.121*	0.35300	0.2494	1.491	-2.673
BU_EX	1994(1) - 2006(4)	trend & constant	0	-5.044**	0.24922	0.2502	-	-2.707
BU_IM	1994(1) - 2006(4)	constant	3	-3.568*	0.29371	0.2295	2.184	-2.840
BU_IM	1994(1) - 2006(4)	trend & constant	3	-4.111*	0.11945	0.2229	2.533	-2.879
KZ_EX	1994(1) - 2006(4)	constant	0	-5.78**	0.12894	0.1155	-	-4.272
KZ_EX	1994(1) - 2006(4)	trend & constant	0	-5.783**	0.12149	0.1162	-	-4.239
KZ_IM	1994(1) - 2006(4)	constant	4	-5.16**	-0.1103	0.05797	3.906	-5.589
KZ_IM	1994(1) - 2006(4)	trend & constant	3	-5.096**	-0.11018	0.05870	3.767	-5.544
GE_EX	1996(1) - 2006(4)	constant	3	-5.64**	-1.9135	0.09627	1.662	-4.556
GE_EX	1996(1) - 2006(4)	trend & constant	3	-5.738**	-2.0171	0.09618	1.807	-4.536
GE_IM	1996(1) - 2006(4)	constant	3	-5.02**	-0.7939	0.07366	1.438	-5.092
GE_IM	1996(1) - 2006(4)	trend & constant	3	-6.121**	-1.1655	0.06725	1.677	-5.251
BEL_EX	1995(1) - 2006(4)	constant	0	3.458*	0.51339	0.1523	-	-3.716
BEL_EX	1995(1) - 2006(4)	trend & constant	1	-4.656**	0.19439	0.1407	1.816	-3.829
BEL_IM	1995(1) - 2006(4)	constant	0	-3.87**	0.43663	0.1496	-	-3.752
BEL_IM	1996(3) - 2006(4)	trend & constant	0	-4.765**	0.26152	0.1411	-	-3.847
AR_EX	1994(4) - 2006(4)	constant	0	-9.51**	-0.3788	0.1154	-	-4.271
AR_EX	1994(4) - 2006(4)	trend & constant	0	-9.424**	-0.38348	0.1166	-	-4.229
AR_IM	1994(4) - 2006(4)	constant	0	-9.14**	-0.3558	0.07974	-	-5.011
AR_IM	1994(4) - 2006(4)	trend & constant	0	-8.999**	-0.37586	0.08030	-	-4.975
RU_EX	1993(3) - 2006(4)	constant	1	5.633**	0.30290	0.09017	2.697	-4.750
RU_EX	1993(3) - 2006(4)	trend & constant	1	-5.580**	0.28312	0.09079	2.743	-4.717
RU_IM	1993(3) - 2006(4)	constant	0	-5.342**	0.39398	0.06154	-	-5.535
RU_IM	1993(3) - 2006(4)	trend & constant	2	-5.304**	0.22333	0.06108	1.318	-5.491
CZ_EX	1991(1) - 2006(4)	constant	1	-5.49**	0.05499	0.04006	1.188	-6.383
CZ_EX	1991(1) - 2006(4)	trend & constant	0	-6.108**	0.17494	0.04044	-	-6.364
CZ_IM	1991(1) - 2006(4)	constant	5	-3.221*	0.02175	0.05702	2.664	-5.614
CZ_IM	1991(1) - 2006(4)	trend & constant	5	-3.546*	-0.26511	0.05635	2.994	-5.623
SL_EX	1993(1) - 2006(4)	constant	4	-4.99**	-0.3127	0.03056	2.197	-6.862
SL_EX	1993(1) - 2006(4)	trend & constant	4	-4.928**	-0.30584	0.03076	2.104	-6.832
SL_IM	1993(1) - 2006(4)	constant	0	-7.99**	-0.15691	0.04546	-	-6.142
SL_IM	1993(1) - 2006(4)	trend & constant	0	-7.969**	-0.16314	0.04576	-	-6.109

Name of the variable	Period	Trend components	Chosen time lag	t-value (ADF)	Beta	Sigma	t- value (lag)	AIC
EE_EX	1993(1) - 2006(4)	constant	1	-3.415*	0.39533	0.04956	-1.559	-5.950
EE_EX	1993(1) - 2006(4)	trend & constant	0	-5.873**	0.19297	0.04981	-	-5.940
EE_IM	1993(1) - 2006(4)	constant	0	-4.49**	0.39632	0.04536	-	-6.146
EE_IM	1993(1) - 2006(4)	trend & constant	0	-4.527**	0.38417	0.04557	-	-6.118
LV_EX	1992(1) - 2006(4)	constant	3	-4.73**	0.16655	0.04068	1.923	-6.314
LV_EX	1992(1) - 2006(4)	trend & constant	3	-4.749**	0.10242	0.04073	2.011	-6.295
LV_IM	1992(1) - 2006(4)	constant	2	-3.446*	0.21569	0.05862	-1.824	-5.601
LV_IM	1992(1) - 2006(4)	trend & constant	0	-7.609**	-0.046	0.05985	-	-5.577
HU_EX	1995(1) - 2006(4)	constant	0	-3.139*	0.59368	0.03158	-	-6.863
HU_EX(!)	1995(1) - 2006(4)	trend & constant	0	-3.376	0.54024	0.03140	-	-6.852
HU_IM	1995(1) - 2006(4)	constant	0	-3.63**	0.49300	0.03604	-	-6.599
HU_IM	1995(1) - 2006(4)	trend & constant	0	-4.073*	0.39128	0.03523	-	-6.621
LT_EX	1993(1) - 2006(4)	constant	4	-3.124*	0.18988	0.06301	2.622	-5.415
LT_EX	1993(1) - 2006(4)	trend & constant	0	-9.421**	-0.26285	0.07264	-	-5.185
LT_IM	1993(1) - 2006(4)	constant	0	-7.48**	-0.08632	0.07622	-	-5.108
LT_IM	1993(1) - 2006(4)	trend & constant	0	-7.504**	-0.094712	0.07637	-	-5.085
CRO_EX	1994(1) - 2006(4)	constant	1	-9.75**	-0.6703	0.04435	2.784	-6.167
CRO_EX	1994(1) - 2006(4)	trend & constant	5	-5.352**	-1.7264	0.04402	1.393	-6.086
CRO_IM	1994(1) - 2006(4)	constant	4	-4.21**	-0.3703	0.04554	1.426	-6.055
CRO_IM	1994(1) - 2006(4)	trend & constant	3	-3.887*	-0.13901	0.04660	2.543	-6.009
SI_EX	1995(1) - 2006(4)	constant	0	-5.18**	0.17860	0.02632	-	-7.227
SI_EX	1995(1) - 2006(4)	trend & constant	0	-5.121**	0.17810	0.02665	-	-7.179
SI_IM	1995(1) - 2006(4)	constant	3	4.063**	-0.7339	0.03692	1.967	-6.484
SI_IM	1995(1) - 2006(4)	trend & constant	3	-3.998*	-0.73136	0.03744	1.934	-6.436
PL_EX	1990(1) - 2006(4)	constant	2	-4.56**	0.23026	0.05193	2.343	-5.853
PL_EX	1990(1) - 2006(4)	trend & constant	3	-5.369**	-0.20766	0.04901	1.400	-5.938
PL_IM	1990(1) - 2006(4)	constant	2	-3.021*	0.30079	0.07003	-3.068	-5.254
PL_IM	1990(1) - 2006(4)	trend & constant	2	-3.830*	-0.07256	0.06774	-1.971	-5.306
RO_EX	1997(1) - 2006(4)	constant	1	-3.322*	0.07866	0.09343	-1.520	-4.655
RO_EX	1997(1) - 2006(4)	trend & constant	0	-10.73**	-0.56196	0.07203	-	-5.175
RO_IM	1997(1) - 2006(4)	constant	0	-4.28**	0.25260	0.05641	-	-5.691
RO_IM	1997(1) - 2006(4)	trend & constant	0	-5.839**	-0.04471	0.04946	-	-5.927

Note: ADF - Augmented Dickey-Fuller; optimal time lag chosen according to AIC; all series are seasonally adjusted and in logarithms; ** null hypothesis about existence of unit root rejected at 1 percent level of significance; * hypothesis about existence of unit root rejected at 5 percent level of significance, (!) – hypothesis about existence of unit root rejected at 10 percent level of significance.

Source: calculation of the authors.

The results of cointegration tests are presented in Table 3. Results show that one cointegration vector was detected in 10 out of 16 countries. This suggests that exports and imports in these countries behave according to a long-run equilibrium relationship. These countries are: Bulgaria, Armenia, Russia, Czech Republic, Slovak Republic, Lithuania, Croatia, Slovenia, Poland and Romania. In case of Kazakhstan, Belarus, Latvia and Hungary cointegration matrix had full rank, thus indicating that either their export or import series (or both) is stationary. No cointegration between exports and imports was found in case Estonia and Georgia, thus implying exports and imports in these countries are not determined by a long-run equilibrium relationship and hence do not share a common trend.

Table 3.

RESULTS OF JOHANSEN COINTEGRATION

Country	Rank	Eigenvalue	Log-likelihood	trace test	p-value	lags included
BULGARIA	0	-	77.3	26.8	0.004***	5
	1	0.35	87.3	6.7	0.147	
	2	0.13	90.7	-	-	
KAZAKHSTAN	0	-	104.1	27.1	0.004***	5
	1	0.31	112.5	10.3	0.029**	
	2	0.20	117.7	-	-	
GEORGIA	0	-	80.1	10.7	0.577	1
	1	0.16	84.0	3.0	0.585	
	2	0.07	85.5	-	-	
BELARUS	0	-	61.3	73.0	0.00***	1
	1	0.57	81.3	32.9	0.00***	
	2	0.50	97.8	-	-	
ARMENIA	0	-	77.0	30.7	0.001***	1
	1	0.41	89.5	5.6	0.23	
	2	0.11	92.3	-	-	
RUSSIA	0	-	120.8	18.5	0.086*	2
	1	0.21	127.0	6.2	0.18	
	2	0.11	130.1	-	-	
CZECH REPUBLIC	0	-	225.8	25.7	0.007***	8
	1	0.28	234.9	7.5	0.11	
	2	0.12	238.6	-	-	

Country	Rank	Eigenvalue	Log-likelihood	trace test	p-value	lags included
SLOVAKIA	0	-	173.9	33.3	0.000***	2
	1	0.40	187.9	5.3	0.26	
	2	0.09	190.5	-	-	
ESTONIA	0	-	202.7	16.6	0.148	2
	1	0.15	207.1	7.7	0.09	
	2	0.13	211.0	-	-	
LATVIA	0	-	145.4	34.7	0.000***	1
	1	0.35	157.9	9.6	0.04**	
	2	0.15	162.7	-	-	
HUNGARY	0	-	165.3	34.7	0.000***	1
	1	0.73	196.1	9.6	0.003**	
	2	0.27	203.6	-	-	
LITHUANIA	0	-	131.1	35.1	0.000***	2
	1	0.42	146.0	5.5	0.246	
	2	0.10	148.7	-	-	
CROATIA	0	-	152.2	32.9	0.000***	6
	1	0.43	165.0	7.2	0.118	
	2	0.15	168.6	-	-	
SLOVENIA	0	-	184.3	29.8	0.001***	8
	1	0.43	195.5	7.2	0.118	
	2	0.17	199.1	-	-	
POLAND	0	-	220.2	24.1	0.013**	7
	1	0.30	231.1	2.2	0.731	
	2	0.04	232.2	-	-	
ROMANIA	0	-	98.6	22.6	0.021**	2
	1	0.38	107.6	4.6	0.346	
	2	0.11	109.9	-	-	

Note: In order to determine the optimal lag length of VAR tested for cointegration, AIC and F-tests for the significance of each lag and for joint significance of lags were used.

Source: calculation of the authors.

After identifying countries whose exports and imports are cointegrated, we resume with testing various restriction on cointegration space for these countries. Hence in Table 4 we present long-run coefficients (β) and adjustment parameters (α) for each country's import and export before and after testing the restriction that β written in vector form equals -1. As can be seen from the table, the restriction of unit elasticity of imports with respect to exports was accepted in case of Bulgaria, Slovak Republic, Slovenia, Croatia and Romania. This suggests that for these countries, imports in the long-run tightly follow the movement of exports and vice versa, the movement of exports closely follow imports. In other words, current account deficits generated in these economies are sustainable. For all other countries, such statement can not be made.

Besides testing for unit elasticity of imports with respect to exports, we also tested for weak exogeneity of exports and imports (each one in its own turn). These results are shown in the last column of Table 4. If, for example, imports are found to be weakly exogenous, this means that in case when the long-run comovement of imports and exports is disrupted, only exports adjust in order to restore the equilibrium path in the short-run. Weak exogeneity restriction for exports is accepted in case of Armenia, Russia and Romania, while weak exogeneity of imports is accepted in case of Croatia. One must also note that weak exogeneity of imports or exports was imposed to cointegration space jointly with unit import elasticity restriction in the cases where the latter restriction was accepted. Since in the case of Romania and Croatia both restrictions were accepted, we can conclude the following: while in Romania imports closely follow the export movements in the long-run, in the short-run only imports change to restore the equilibrium. The opposite applies to Croatia, where the equilibrium in the short-run is restored through the changes in exports, while imports remain unaffected.

Table 4.

PROPERTIES OF COINTEGRATION VECTOR

Country	Variable in cointegrating vector	Before imposing restriction		After imposing restriction		Testing restriction	Testing weak exogeneity
		β	α	β	α	β=-1 Chi^2(1)	α=0 Chi^2(1)
BULGARIA	Export	1.00	0.78	1.00	0.69	-	10.2*** [0.006]
	Import	-0.98	0.90	-1.00	0.75	0.607 [0.44]	15.6*** [0.0004]
	Constant	0.05	-	0.25	-	-	-
ARMENIA	Export	1.00	-0.02	1.00	-0.05	-	0.036 [0.85]
	Import	-1.77	0.27	-1.00	-0.04	19.07*** [0.00]	13.3*** [0.0003]
	Constant	9.83	-	-0.02	-	-	-

Country	Variable in cointegrating vector	Before imposing restriction		After imposing restriction		Testing restriction	Testing weak exogeneity
		β	α	β	α	β=-1 Chi^2(1)	α=0 Chi^2(1)
RUSSIA	Export	1.00	0.10	1.00	-0.14	-	1.71 [0.19]
	Import	-1.32	0.10	-1.00	-0.08	3.35* [0.067]	5.74** [0.02]
	Constant	1.91	-	-0.68	-	-	-
CZECH REPUBLIC	Export	1.00	0.10	1.00	-0.03	-	4.18** [0.04]
	Import	-1.31	0.17	-1.00	-0.04	5.58** [0.018]	10.02*** [0.002]
	Constant	2.04	-	-1.18	-	-	-
SLOVAKIA	Export	1.00	0.01	1.00	0.02	-	21.18*** [0.00]
	Import	-1.41	0.01	-1.00	0.02	0.41 [0.52]	9.9*** [0.007]
	Constant	7.86	-	2.04	-	-	-
CROATIA	Export	1.00	-0.05	1.00	-0.06	-	17.5*** [0.0002]
	Import	-1.02	-0.01	-1.00	-0.01	0.0007 [0.98]	1.89 [0.39]
	Constant	-0.53	-	-0.66	-	-	-
SLOVENIA	Export	1.00	0.05	1.00	0.03	-	6.05* [0.05]
	Import	-1.04	0.12	-1.00	0.06	0.138 [0.71]	18.2*** [0.0001]
	Constant	0.95	-	1.48	-	-	-
POLAND	Export	1.00	0.09	1.00	0.19	-	19.6*** [0.000]
	Import	-1.28	0.09	-1.00	0.19	8.54*** [0.004]	10.78*** [0.001]
	Constant	3.75	-	0.34	-	-	-
ROMANIA	Export	1.00	0.12	1.00	0.10	-	2.90 [0.23]
	Import	-1.06	0.24	-1.00	0.27	2.20 [0.14]	13.1*** [0.001]
	Constant	1.04	-	0.42	-	-	-

Source: Authors calculation.

5 Concluding remarks

In this paper, cointegration approach is aplied to check whether the behavior of foreign trade (i.e. exports and imports of goods and services) in European transition economies (former communist regimes) is sustainable in the long run. If the export and import series of a country are cointegraited and the elasticity of imports with respect to exports is equal to one, one may conclude that the current account deficit recorded in that country is sustainable.

The results of the empirical exercise suggest that one cointegration vector was detected for 10 out of 16 transition European countries. This indicates that exports and imports in Bulgaria, Armenia, Russia, Czech Republic, Slovakia, Lithuania, Croatia, Slovenia, Poland and Romania share a common time trend and determine each other in the long run. The restriction of unit elasticity of imports with respect to exports (i.e restriction on β coefficient) was accepted only for 5 countries (Bulgaria, Slovakia, Slovenia, Croatia and Romania), thus suggesting that in these countries current account deficits are sustainable. Weak exogeneity restriction for exports is accepted in case of Armenia, Russia and Romania, while weak exogeneity of imports is a valid assumption in case of Croatia. This finding suggests that in the case when the long-run comovement of imports and exports is disrupted, in Armenia, Russia and Romania only imports adjust in order to restore the equilibrium path in the short-run. In Croatia, only exports adjust in order to restore the equilibrium.

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DUGOROČNI ODNOS IZMEĐU UVOZA I IZVOZA EUROPSKIH TRANZICIJSKIH ZEMALJA

Sažetak

Nadgledanje vremenske putanje tekućeg računa bilance plaćanja, kojeg možemo smatrati mjerom neto zaduženosti privrede, važan je aspekt makroekonomske politike. Naime, ako je tekući račun stacionaran, vanjski dug je održiv. U ovom radu testiramo dugoročni odnos uvoza i izvoza roba i usluga za šesnaest europskih tranzicijskih zemalja koristeći tromjesečne podatke od devedesetih godina prošlog stoljeća do kraja 2006. Koristi se Johansenova kointegracija da bi se detektiralo postojanje kointegracije između uvoza i izvoza u zemljama iz uzorka. Kod deset zemalja potvrđeno je postojanje kointegracijskog odnosa između uvoza i izvoza. Međutim, uvođenjem restrikcija na dugoročne parametre, zaključuje se da je deficit tekućeg računa bilance plaćanja održiv u svega pet zemalja.

Ključne riječi: Johansen kointegracija, izvoz, uvoz, održivost tekućeg računa bilance plaćanja