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TWIN DEFICITS AND THE IMPORT PROPENSITY IN POST-TRANSITION COUNTRIES

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This article uses co-integration and related techniques to test for a long-run causal relationship between the fiscal and external deficits of three post-transition countries in Central and Eastern Europe. In addition, an import propensity model is tested by applying OLS and GMM. All theresults reject the Twin Deficits Hypothesis. Instead, the resultsdemonstrate that specific transition factors such asa high import intensity of exports and net capital inflows affect the trade balance.

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В работе используются коинтеграция и связанные методы тестирования долгосрочной причинно-следственной взаимосвязи между дефицитом государственного бюджета и дефицитом торгового баланса в трех странах Центральной и Восточной Европы, прошедших переходный период развития. Кроме того, проводится оценка склонности к импорту на основе методов OLS и GMM. Все полученные результаты позволяют отвергнуть гипотезу двойных дефицитов. Напротив, такие специфические факторы переходного периода, как высокое отношение экспорта к импорту и чистый приток капитала, оказывают воздействие на торговый баланс.

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1. The Research Question

In many countries, including post-transition countries in Europe, fiscal and external deficits occur concurrently. In the economics literature, the Twin Deficit Hypothesis (TDH) states that a direct and causal relationship exists between fiscal and external deficits, from the fiscal balance to the external balance. The widely accepted advice provided to politicians is to cut fiscal deficits in order to avoid a financial crisis of the open economy. Laski argued (2009: 58f) that a direct and causal relationship occurs if and only if private savings equals private investment. In this specific circumstance, an increase in government consumption will not affect either private savings or investment, but government consumption will greatly affect the value of imports. Despite lacking statistical support for this premise of a saving-investment equilibrium, most politicians, many journalists and many economists are concerned with the simultaneous increase in public debt and disrupted external balances. This concern may result from the strong belief that the savings-investment equilibrium exists in an inter-temporal framework, where market forces drive short-term deviations in the savings-investment balance back to equilibrium. The purpose of this article is to test TDH from two different perspectives: First, this article applies modelling techniques (co-integration, error-correction and Granger causality tests) that are believed to detect the 'true' causal relationship between the fiscal and external balances while assuming that a long-run (inter-temporal) equilibrium exists between private savings and investment. Second, the article provides a new approach in testing TDH, namely, a model that explains the reason for an increasing propensity to import in post-transition countries. The idea behind the model is that the two deficits might be endogenous to a third variable, systemic transition. Because 'transition' is not observable in statistical terms, I add two variables to the fiscal variable that are specific to the transition process in Central and Eastern Europe: (i) the inclusion of these countries into international production networks measured in terms of the import intensity of exports and (ii) the massive net capital inflows following financial liberalization. The empirical investigation is performed for three countries: the Czech Republic, Hungary, and Poland. The empirical results reject TDH, but they support a model that explains the external deficits by an increasing import intensity of exports and possibly by net capital inflows.

The paper proceeds as follows: The premises of TDH are discussed in section two. A non-trivial version of TDH will be defined as to be an increasing import-gdp ratio of the economy

due to fiscal imbalance. In section three, the traditional approach in TDH testing – reduced forms of national account equations – is performed with co-integration, error-correction (EC) or Granger causality tests. I narrow my approach to direct testing of the relationship of both deficits and leave out discussions of Ricardian Equivalence or the Feldstein-Horioka tests, which both play also a role in the TDH literature. Section four presents the structural model for an explanation of the three economies' propensity to import, which is tested with co-integration, Ordinary Least Squares (OLS) and Generalized Methods of Moments (GMM) modelling. Section five concludes.

2. On the premises of the TDH

The balance identity of an open economy with a public sector is equation (1), where S^p is private savings, $D$is the government deficit and $M$is total imports. Investment I includes private and public investment:[1]

$$S^P - I = D + (X - M) \tag{1}$$

Dividing both sides of equation (1) by real income (GDP), one obtains with small letters

$$s^p - \bar{i} = d + (x - m) \tag{2}$$

where s^p is the private propensity to save from real income and m is as the economy's propensity to import. A direct causal relationship exists between D and net exports only if $S^P = I$. In such a case, $(m - x) = d$ holds. When exports are not driven by domestic demand and, specifically, by fiscal balance, a change in fiscal deficit is necessarily linked to a change in the economy's propensity to import:

$$\Delta m = \Delta d \tag{3}$$

Equation (3) is a core conclusion of TDH and is based on the $S = I$ equilibrium. If the savings-investment assumption is not fulfilled, then equation (2) states clearly that the fiscal deficit or its change will be completely or partially absorbed both by private savings and imports as well asby other aggregates.[2] The households' propensities to save and import

[1] Public investment could be part of the government financial deficit and, hence, would be added as a second independent public expenditure on the right side of equation (1). Such an addition would not change the conclusions of all considerations that follow.

[2] The tax rate, for example, has to be considered in the income creation process after a fiscal stimulus.

determine this distribution. Here, we have the income multiplier in the Keynes-Kalecki model at work. A fiscal expansion will almost always disrupt the external balance from higher imports after higher income. Thus, a higher external deficit following a fiscal expansion would be a trivial version of TDH. But, interpreting TDH as Keynesian (Celik and Denis, 2009; Corsetti and Müller, 2005) is misleading. In the Keynes-Kaleciki framework, the multiplier effects are crucial, but a non-trivial interpretation of TDH denies the multiplier. Here, an increase in the fiscal deficit will *not* affect real income and private savings; therefore, equation (3) applies, and a complete transfer of a higher fiscal deficit into the external balance will occur. Indeed, equation (3) no longer follows the Keynes-Kalecki model of the standard capitalist economy, where changes in aggregate demand, including fiscal expansion, work through the income multiplier and the quantity responses by firms; instead, firms respond with price adjustments. A situation of $S_p = I$ would reflect a temporary moment at best, where the economy produces at capacity output and any increase in effective demand causes price increases in the private sector.

In earlier TDH literature based on the Mundell-Fleming Model, a fiscal expansion boosts aggregate demand above aggregate output. The private sector responds with higher prices, and the financial sector responds with higher interest rates; thus, capital inflows cause the real exchange rate to appreciate. With the given output, the propensity to import increases, and savings out of real income remains constant. Recent TDH literature applies an inter-temporal approach to household behaviour. When households assess a tax reduction (a government deficit) as permanent, they will not change their consumption plans. When there is constant inter-temporal income, private savings will also remain constant, and the fiscal deficit will become an inter-temporal external deficit (Corsetti and Müller, 2006).

Because savings-investment balances are rarely in equilibrium in actuality, the detecting of inter-temporal effects that a fiscal deficit exerts on the external balance require specific econometric modelling, such asco-integration tests, VARs or error-correction (EC) models with level data of the variables. Levels are assumed to present long-term relationships while first differences or rates of change, such as those used in the multiplier approach, are assumed to have only a short-term effect, reflecting the market forces' adjustment back to equilibrium.

A brief review of the literature reveals that only a few authors have tested TDH for one or more Central or Eastern European countries within a larger group of countries with co-integration equations (Fiddrmuc 2003; Celik and Denis, 2009; Ketenci and Uz, 2010). The

common foundation for these studies is a reduced-form equation in the national accounts framework of[3]

$$X_t - M_t = (Y_t - T_t - C_t) - (T_t - G_t) - I_t = S_t^P + S_t^G - I_t \quad (4)$$

with real income Y. Dividing all items by Y, an empirically testable equation is:

$$x_t - m_t = \gamma_0 + \gamma_1(s_t^P) + \gamma_2(t_t - g_t) - \gamma_3 invt_t + \varepsilon_t \quad (5)$$

With the explicit assumption (Fidrmuc, 2003, p. 137, and Ketenci and Uz, 2010, p. 4) that private savings equals investment, a reduction of government savings will disrupt the trade balance. Equation (5) may be subject to a test for co-integration if time series are non-stationary. If TDH holds, γ_2 must be positive, and $\gamma_3$must be negative. In addition, a country would be perfectly integrated in the world economy when both coefficients are close to 1. In this case, the budget deficit and investment would be financed by world financial markets. If, however, γ_3 were significantly lower than 1, the Feldstein-Horioka puzzle would hold. Fidrmuc (2003) applied co-integration tests for individual countries and found a negative impact of the fiscal deficit on the trade balance from 1990 to 2001 in Poland and Hungary. Results for Bulgaria and the Slovak Republic were not significant. With panel co-integration, Celik and Denis, 2009, found a positive and significant relationship between the fiscal balance and the trade deficit for six emerging markets, including the Czech Republic. Ketenci and Uz (2010) found strong evidence of a co-movement between the two deficits for five of the six EU members (Poland was the exception). Their approach, a bounds tested autoregressive distributed lag (ARDL) model, allows for the combination of variables at different orders of integration and, therefore, a mix of level and first difference variables. However, in all of these studies, conclusions regarding causation – from fiscal to external deficit – are not well addressed since co-integration also allows for the reverse relationship. Increased competition for imports may disrupt the budget balance because of the decline of domestic production and decreased tax revenues (Summers, 1988). Szakolczai (2006), without any econometric testing, finds that both the fiscal and the external deficits of Hungary 'are to a certain extent independent, have autonomous causes, and must therefore dealt with separately' (Szakolcai, 2006, p. 41).

In my study, tests and model estimates use quarterly national account data for the three countries from the first quarter of 1995 until the fourth quarter of 2010. Data are taken from

[3] I follow the presentation of Fidrmuc (2003), and Marinheiro (2006, for Egypt).

Eurostat (GDP, gross fixed capital formation, final consumption of private households and general government balance), Main Economic Indicators of the OECD (trade balance in % of GDP), International Financial Statistics of the IMF (current account in percentage of GDP) and national statistical offices of the three countries via Data stream (export and import data). Private savings out of GDP were calculated as the sum of gross fixed capital formation, the budget position, and net exports. All data are nominal; inflation biases should be reduced by using ratios or shares in regressions. All variables are season ally adjusted with Census 2012. As usual, data are sensitive to revisions. Two different sets of trade data since EU entry must be integrated (intra-EU and extra-EU trade), and recent revisions in the Czech Republic and Poland tend to increase import data. For Poland, general government data were available only from the first quarter of 1999 on, though other earlier years include the central budget. Data from the first quarter of 1995 were estimated using a regression of general government data and central budget data from the first quarter of 1999 through the fourth quarter of 2010.The latter data were provided by the WIIW. The correlation has a significantly positive but not very high coefficient; therefore, estimated data should be considered with caution.

3. Fiscal and external balances

3.1. A visual inspection

A visual examination of private savings and investment rejects the idea of a 'rough' identity between both aggregates (Figure 1). The reader should note that there is a significant correlation between private savings and investment ('Horioka-Feldstein-Puzzle'). Hence, both variables are *not* endogenous to "external savings".

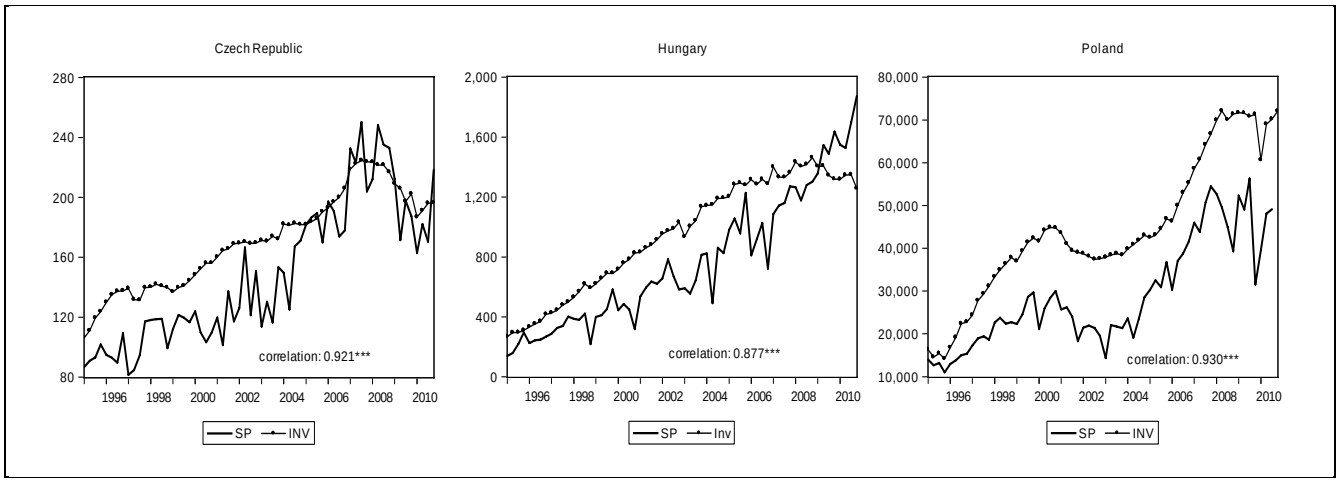

Figure 1: Private savings und gross fixed capital formation (national currency units)[a]

[a] Czech Republic and Hungary: billions, and Poland; millions of national currency units. - ***, **, *: significances at the 1 %, 5 % and 10 % confidence levels. – SP: private savings, INV: investment.

Sources: Eurostat; own calculations.

Figures 2 and 3 illustrate the relationship between the fiscal balance and the external balances. The left panel of both figures presents actual data. Figure 2 suggest a rejection of the TDH with respect to the trade balance. The correlations are either nonsignificant (Hungary and Poland) or negative (Czech Republic); however, they should be positive in support of the TDH. With respect to the current account, only Hungary has a significantly positive correlation (Figure 3). This result could be explained by profit repatriations of foreign firms that extensively influenced Hungary's current account in the past. Baxter (1995) argued that causality and correlation might be distorted by the business cycle where the budget balance improves during a recovery but where the trade balance might deteriorate and the propensity to import increases. The right panel shows the trend of the time series obtained by the Hodrick-Prescott filter. The results are not different from actual data, and one can perform tests with the former that include more information than trend data.

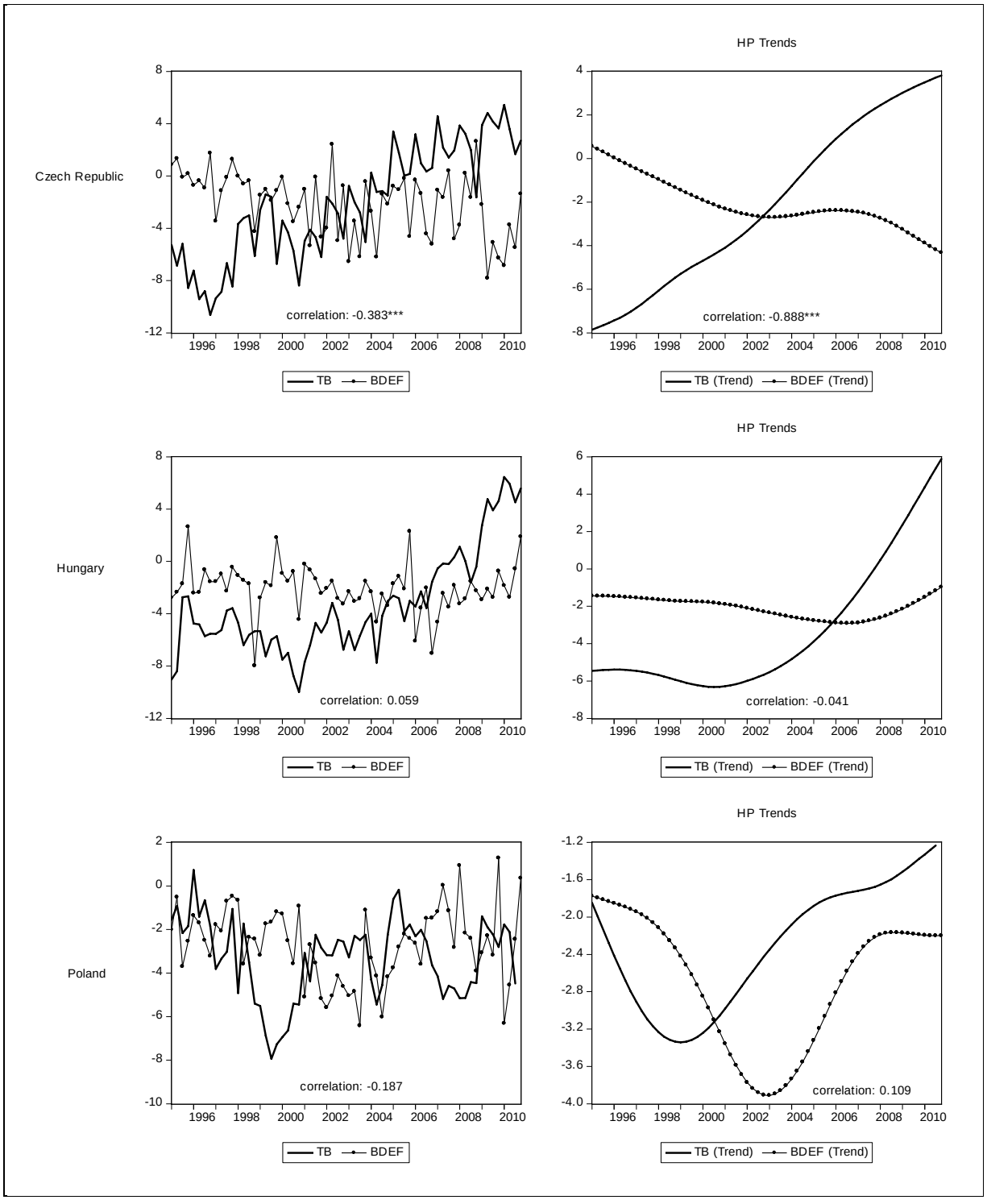

Figure 2: Trade Balance and Fiscal Balance (in % of GDP)

***, **, *: significances at the 1 %, 5 % and 10 % confidence levels. TB: trade balance; BDEF: budget deficit.

Sources: Eurostat; own calculations.

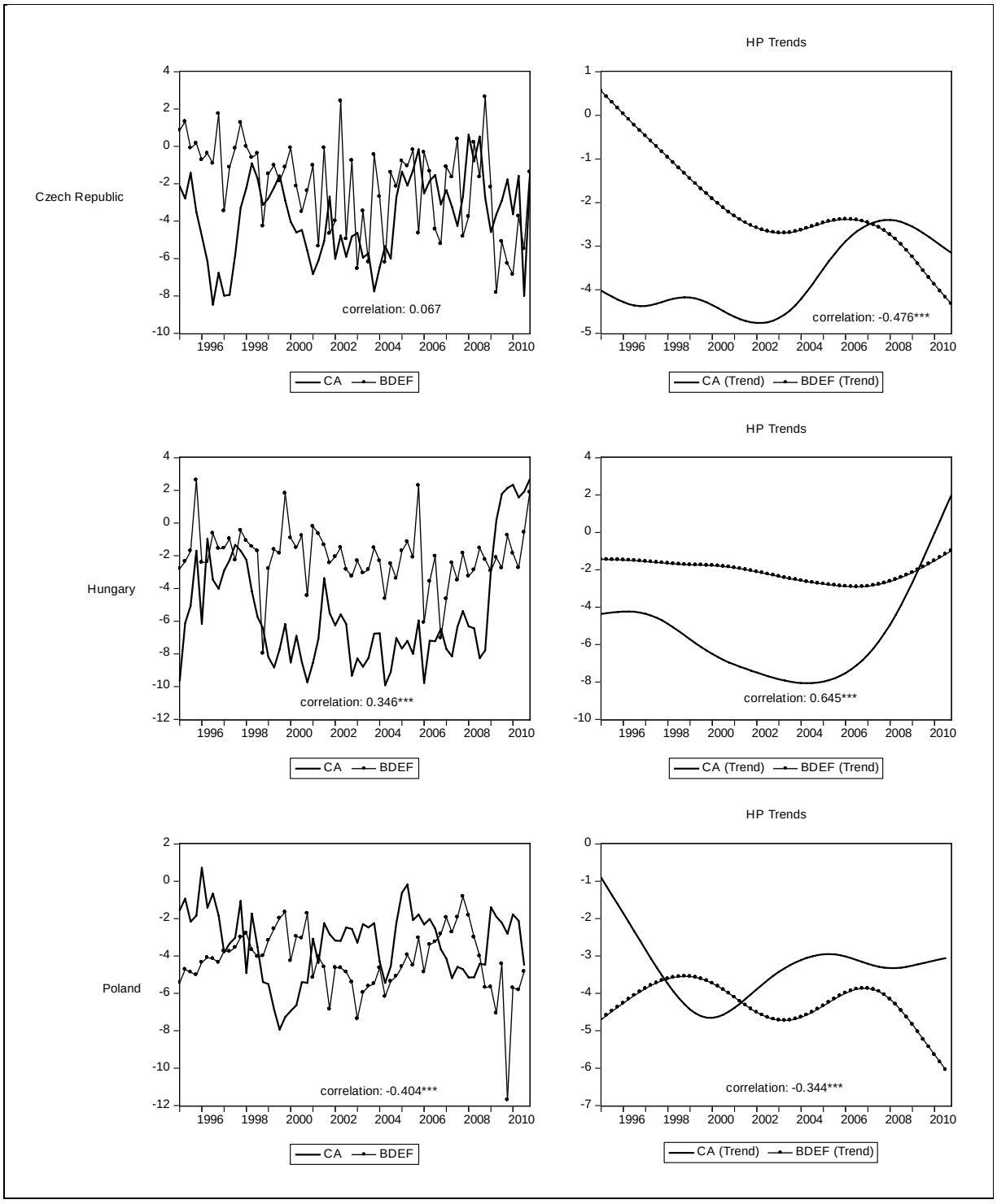

Figure 3: Current Account Balance and Fiscal Balance (in % of GDP)

***, **, *: significances at the 1 %, 5 % and 10 % confidence levels. CA: current account (deficit); BDEF: budget deficit.

Sources: Eurostat; own calculations.

3.2. Co-integration

The rationale behind co-integration modelling is that inter-temporal equilibrium forces may be overlapped by other determinants in statistical or reporting errors with (primarily) short-term character; hence, statistical data might be 'contaminated' by real world phenomena, such as non-economic variables or institutional differences. Co-integration is assumed to be a technique for revealing the 'true' world and the long-run adjustment process of two or more variables. From a technical point of view, non-stationary time series that are integrated at I(1) show a long-run co-integrating relationship that is understood to be in equilibrium. A Vector Error Correction Model (VECM) may help to identify the statistical causality; in addition, VECM shows the short-term adjustment of the variables to the long-run equilibrium path through the Error-Correction (EC) term.

The equation that will be tested for co-integration is a version of equation (5) that excludes private savings and investment.

$$exbal_t^i = \alpha_0^i + \alpha_1 (BDEF_t^i) + \varepsilon_t^i \qquad (6)$$

with $exbal_t^i$ as either the trade ($TB_i^t = x_t^i - m_i^t$) or the current account (CA) balance of country *i* at time *t*. *BDEF* is the budget variable (*t*-*g*) and is mostly in deficit. The exclusion of private savings and investment are legitimate when one wants to test the TDH using the assumption of a long-run equilibrium for both aggregates. (Note that this assumption is certainly not confirmed by the statistical data, but it might hold in a somehow 'true' world.)With this assumption, the TDH cannot be rejected when α_1 is positive in the co-integration equation. If the assumption can be rejected, then *S*=*I* does not hold true over the long run. I abstain from panel modelling, because the modelling benefit of more observations can be counterbalanced by disadvantages that are typical of combining significantly different countries. Moreover, I do not use a bounds testing approach, because the mix of level and first difference data contradicts the purely long-term character of the TDH (which requires using variables of the first order only). Table A1 in the Annex presents the results of the ADF test for all variables, which enter the test stage in this article. The strategically crucial variable BDEF is stationary (I(0)) for the Czech Republic and Hungary, where TB is I(1) for all three countries and CA is I(0) for the Czech Republic only. Therefore, the application of co-integration tests is reduced to Poland's budget and trade deficits. Both the trace and maximum likelihood test statistics reveal the possibility of a weak co-integration between the trade balance ratio and the fiscal balance ratio at the 10 % significance level.

A co-integrating relationship exists, when tests statistics reveal a co-integrating relationship at least at the 10 % level of significance. In this case, a VECM can be applied to detect which of the variables is endogenous and which is exogenous. The Johansen co-integration test identifies one weak co-integrating relationship for Poland at the 10 % significance level (trade and maximum likelihood test results in Table A2). The lag-length is one with a linear trend in the levels of the data; only an intercept in the co-integration equation was assumed.

The co-integration equation for Poland is (t-value in brackets):

$$TB_t^{PL} = 7.381 + 1.818 * (BDEF)_t^{PL} \qquad (7)$$

(3.573)

The hypothesis of co-integration in the sense of the TDH cannot be rejected since the coefficient to the budget balance has a positive sign and is significant at the 1% level. However, what is the causality? A VECM provides further in sight. Causality can be assumed if only one of the two possible error-correction (EC) terms is significant and has a negative sign. If both EC terms were negative and significantly different from zero, no causality could be determined, and both variables would be endogenous. In the case of Poland, the estimated two EC equations (t-values in brackets) are:

$$\Delta BDEF_t = \underset{-0.002)}{-0.004} - \underset{(-2.848)}{0.365}(\Delta TB_{t-1}) - \underset{(-0.785)}{0.392}(\Delta TB_{t-1}) - \underset{\mathbf{(-2.348)}}{0.232}(EC_t) \qquad (8a)$$

$$\Delta TB_t = \underset{(0.069)}{0.003} - \underset{(-1.160)}{0.151}(\Delta BDEF_{t-1}) - \underset{(-0.138)}{0.005}(\Delta BDEF_{t-1}) - \underset{(-1.144)}{0.030}(EC_t) \qquad (8b)$$

The EC term is negative in both equations but significant only in equation 8a) where a short-term adjustment of the fiscal balance is proposed.

For the Czech Republic and Hungary, the testing procedure can be reduced to Granger-causality tests with levels (BEDF and CA in case of the Czech Republic) or first differences (BDEF and TB for both). The Granger causality tests with first differences of the trade and current account balance for the Czech Republic and Hungary yield no results that support the

TDH. The weak causality in case of Hungary (1 lag) is only significant at the 0.0997 % level (Table 1).[4]

Table 1: Pairwise Granger Causality Tests with first differences (t-values in brackets)

	Czech Republic		Hungary	
	1 lag	2 lags	1 lag	2 lags
ΔBDEF does not Granger Cause ΔCA	0.078	0.041	1.961	1.533
ΔCA does not Granger Cause ΔBDEF	0.943	4.221**	0.542	0.122
BDEF does not Granger Cause ΔTB	0.047	0.321	2.797*	1.871
ΔTB does not Granger Cause ΔBDEF	0.016	0.116	0.412	0.234

**, *: significances at the 5 % and 10 % confidence levels.

In summary, the co-integration tests, VEC modelling (for Poland) and Granger causality tests (for the Czech Republic and Hungary) confirm the results of visual inspection. No data supports the TDH for the three post-transition countries. A simple explanation for these results might be a lack of any short-run *and* long-run savings-investment equilibrium. However, the evaluation of the effects of the fiscal balance on the trade balance might have been influenced by exports, which partly follow other determinants (world demand) in contrast to imports (domestic demand).

4. The propensity to import

This section tests a model of import propensity with four variables, fiscal balance, exports, import intensity of exports and net capital inflows, according to:

$$m_t^i = \beta_0^i + \beta_1 (BDEF_t^i) + \beta_2 x_t^i - \beta_3 \left(\frac{X}{M}\right)_t^i \beta_4 CA + \mu_t^i \qquad (9)$$

which is a partly re-arranged and augmented version of equation (5). Compared with equation (5), the export-gdp ratio is moved to the right of equation (6). This variable is now treated as independent variable from the fiscal balance and the import-gdp ratio. Since exports improve the economy's capacity to import, *x* may be interpreted as a trade balancing variable, and in regressions, β_2 should be positive and close to 1. The model has been augmented by two

[4] Granger causality tests for the Czech Republic and with levels confirm the nonsignificant correlation depicted in Figure 3.

additional variables: First, $\left(\frac{X}{M}\right)$ is a structural variable measuring the import intensity of exports. In contrast to the export-gdp ratio *x*, this variable is a trade de-balancing variable where a higher import intensity of exports leads to a smaller variable value but contributes to a higher propensity to import for the economy, and β_3 should receive a negative sign. The design of this variable is directly linked to re-exports, outsourcing, fragmentation trade, production sharing and foreign direct investment, which integrate the emerging markets, among them transition countries into a worldwide production area, and which is widely documented in the trade literature. The specific role of less-emerging market economies in this structure of labour division is the lower end in vertical intra-industry trade (Gabrisch, 2009) and assembling in manufacturing (Ando and Kimura, 2000). Relying on data from the central statistical office in Poland, Łaski et al. (2010) calculated the size of the fiscal multiplier for the Polish economy with an import share in Polish export value of 60 % in 2008.

Second, net capital inflows are proxied by the current account deficit (CA) when changes in foreign reserves are disregarded. β_4 captures the impact of net capital inflows on the import-gdp ratio through the exchange rate effect. Net capital inflows contribute to a higher propensity to import through an appreciation of the national currency.

Equation (9) is subject to a co-integration test. Again, we may exclude the Czech Republic and Hungary from testing because their budget balance data are stationary (see Annex Table A1). With a lag length of two, three co-integrating relationships could be identified at least at the 10% significance level (Table A3). The co-integration equation (t-statistics in brackets) reads

$$m_t^{PL} = \underset{(0.366)}{0.037}(BDEF_t^{PL}) - \underset{(-18.781}{1.202}(x_t^{PL}) + \underset{(19.577)}{0.509}(\frac{X}{M})_t^{PL} - \underset{(-11.677)}{0.105}(CA_t^{PL}) + \underset{(0.280)}{0.007}(Trend) \qquad (10)$$

The budget deficit and most other variables are not significantly different from zero, and the trade-balancing and de-balancing variables are highly significant but have the 'wrong' sign. Since the results are inconclusive, I turn to a more pragmatic approach in modelling: the use of a first-difference equation model for the import propensity according to

$$\Delta m_t^i = \delta_0^i + \delta_1 \Delta(BDEF_t^i) + \delta_2 \Delta x_t^i + \delta_3 \frac{X}{M} + \delta_4 \Delta CA_t^i + \bar{\zeta}_t^i \qquad (11)$$

The regression results are reported in Table 2. The OLS estimation in Model 1 reveals that a change in the budget deficit does not significantly affect the import-gdp ratio, though in two cases the nonsignificant impact is negative. The other variables obtain the predicted signs and are highly significant. The coefficient to the export-gdp ratio takes the expected value of around 1. The import-intensity of exports contributes to an increasing import-propensity of the entire economy. An increase of this intensity by 1 percent increases the import-gdp ratio between 0.3 and 0.5 percent. Increased net capital inflows – a higher current account deficit – explains for the increase of the import propensity in Hungary and Poland but not in the Czech Republic. The impact of net capital inflows on the import-gdp ratio is higher in Hungary than in Poland. The OLS model might suffer from two sources of inconsistency: omitted variables and endogeneity. Therefore, we estimated a second model with GMM. Because there is no obvious choice of instrument other than lagged variables, conclusions about causality are necessarily tentative.

Table 2: Regression results for changes in the import-gdp ratio

Variables	**Model 1 (OLS)**			**Model 2 (GMM)**		
	Czech Republic	Hungary	Poland	Czech Republic	Hungary	Poland
Δ(BDEF)	0.007	-0.048	-0.013	-0.001	0.016	-0.001
Δx	1.032***	1.069***	1.093***	1.071***	1.071***	0.874
Δ((X/M)	-0.533***	-0.405***	-0.304***	-0.464***	-0.550	0.118
ΔCA	-0.025	-0.127**	-0.074***	-0.058*	0.004	0.041
Constant	-0.019	-0.047	-0.056	-0.068	-0.012	0.154
Diagnostic statistics						
Adjusted R-squared	0.99	0.94	0.94	0.99	0.92	-0.33
Durbin Watson	1.45	2.59	2.54	1.88	2.29	1.96
F-[a]/J-Statistic[b]	1650.59	239.19	229.20	1.454*	3.035	0.041*
AIC	0.066	1.86	0.83	---	---	---
observations	63	63	62	62	62	61

[a] for OLS estimates; [b] for GMM estimates. Instruments: one-lagged variables.

***, **, *: significances at the 1 %, 5 % and 10 % confidence levels. BDEF: Budget deficit; x: export-gdp ratio; (X/M) import intensity of exports; CA: net capital inflows (current account deficit).

GMM results deviate from OLS estimates with respect to all variables in the case of Poland and to the import intensity of exports and net capital inflows in the case of Hungary. In general, the results again reject TDH. One reason for the nonsignificance of the variables, which were significant in the OLS model, may be due to the poor quality of the instruments. The J-statistic of the instrument orthogonality C-test indicates that for Poland and the Czech Republic: the instruments used are not correlated with the error term, while in the case of

Hungary, the instruments are not valid. In Poland, the inclusion of one-lagged variables as instruments diminishes the validity of all the instruments.[5] For the Czech Republic, we at least obtain a reasonable estimation result, which confirms the results of Model 1 (OLS).

5. Conclusions

Each empirical specification and modelling approach rejects TDH. I agree with Szakolcsai (2006) who argues that each deficit, the fiscal as well as the external, has specific causes. With respect to the trade deficit, the results for all three countries suggest increased import intensity of exports as the main driver as well as net capital inflows in Hungary and Poland. The political conclusions seem to be clear: a reduction of the fiscal deficits in the post-transition countries would not contribute to a major decline of external imbalances. Rather, structural/industry policies should have a strong emphasis on the production structures in the economy and support the inclusion of domestic intermediary goods into export activities. Monetary policy should consider the real exchange rate. Further research should use more firm-level data in demonstrating the import intensity of exports.

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[5] Tested instruments included the money market spread to Germany, international credit.

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Annex

Table A1: ADF-test results

All in % of GDP and seasonally adjusted	Level	1stdifference
Poland		
BDEF (fiscal balance)	-2.402	-14.146***
CA (current account balance)	-3.116**	-9.934***
TB (trade balance)	-1.550	-8.748***
m (imports)	-1.925	-6.939***
x (exports)	-0.505	-6.715***
Czech Republic		
BDEF	-6.650***	-8.916***
CA	-3.671***	-10.339***
TB	-1.564	-3.025**
m	-1.175	-6.662***
x	-0.113	-4.921***
Hungary		
BDEF	-6.834***	-9.984***
CA	-1.866	-9.744***
TB	-0.651	-8.289***
m	-2.165	-5.308***
x	-1.546	-5.160***

***, **, *: significances at the 1 %, 5 % and 10 % confidence levels.

Table A2: Johansen co-integration test for Poland (trade and fiscal balance)

		Trace				λ max		
Eigenvalue	H_0	Trace	5 % Critical Value	10 % Critical Value	H_0	λ max	5 % Critical Value	10 % Critical Value
0.257	r = 0	24.872*	25.872	23.342	r = 0	18.129*	19.387	17.234

Notes: A lag length of one is used on the VAR (p =1). The estimations were obtained assuming a linear trend in the levels of the data, and only an intercept in the co-integration equation. * denotes rejection of the hypothesis at the 0.05 level. Critical values: MacKinnon-Haug-Michelis (1999). *: significances at the 10 % confidence level.

Table A3: Johansen co-integration test for Poland (import-gdp ratio)

		Trace				λ max		
Eigenvalue	H_0	Trace	5 % Critical Value	10 % Critical Value	H_0	λ max	5 % Critical Value	10 % Critical Value
0.714	r = 0	138.796	88.804	84.378	r = 0	75.210*	38.331	35.581
0.320	r ≤ 1	63.386**	63.586	60.086	r ≤ 1	23.149	32.118	29.540
0.309	r ≤ 2	40.436*	42.915	39.755	r ≤ 2	22.202	25.823	23.441

Notes: A lag length of two is used on the VAR (p =1). The estimations were obtained assuming a linear trend in the levels of the data, and only an intercept in the co-integration equation. * denotes rejection of the hypothesis at the 0.05 level and ** at the 0.01 level. Critical values: MacKinnon-Haug-Michelis (1999).

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