Received: 17 April 2020 | Revised: 15 December 2020 | Accepted: 20 December 2020

DOI: 10.1002/ijfe.2458

RESEARCH ARTICLE

WILEY

Has the current account broken up with its fundamentals in Central and Eastern Europe?

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Abstract

Substantial capital outflows across Europe following the 2007/8 Global Financial Crisis and 2010 European Sovereign Debt crisis raise concerns regarding potential capital outflows from the economies of Central and Eastern European countries. To shed light on country-level factors that can mitigate crisis and potential capital outflows across these countries, this article investigates which factors have influenced the evolution of their current accounts. Our analyses, using dynamic ordinary least squares, suggest that the long-run determinants of the current account have indeed changed over time, and threshold cointegrated estimates also confirm that, for each country, the parameters are dependent on thresholds for certain variables and there is significant heterogeneity across the countries. Our overall results are robust to complementary analyses, such as threshold estimation approach. We comment on some possible implications of these differences.

KEYWORDS

capital flows, Central and Eastern Europe, current account, European integration, structural breaks

JEL CLASSIFICATION

F15; F32; F41

1 | INTRODUCTION

Periods of significant capital outflows from many European countries in recent years, particularly following the global financial crisis (GFC) of 2007/8 and the European sovereign debt crisis of 2010, have underscored the need for better understanding of the factors that determine a country's current account (hereafter *CA*) position. This importance is highlighted from several perspectives relating to various aspects of the real economy including income distribution (Behringer & van Treek, 2018), the housing cycles (Arestis & Gonzalez-Martinez, 2016; Maas, Mayer, & Rüth, 2018) and *CA* reversals (see, for example, Edwards, 2004 and Pancaro & Saborowski, 2015) to mention a few. For countries with large *CA* deficits, heavy reliance on capital inflows and/or huge foreign-currency-denominated debt translates to increased exposure and vulnerability to sudden shifts in investor sentiments. Further, sustained and/or prolonged *CA* deficits are likely to be detrimental, particularly for the future generations as they are likely to be saddled with unsustainable debts

and high-interest payments. A situation more likely when one considers the likely scenario of lower than optimal levels of return on investments (see, for example, Milesi-Ferretti & Razin, 1996).[1]

Due to the practical effects of the *CA* in a country's international credit positioning, much attention has been paid in the extant literature to *sustainability* of countries' external balances. However, going back to the basics, macroeconomic theory predicts a link between net exports, savings and investment, and on the basis that some variables are key fundamentals of supply-side shocks on income, critical analysis of the determinants of the *CA* become paramount. Given the well-documented problems faced by some EU countries, including Greece, Portugal and Spain, in the aftermath of the recent crises, in spite of the Eurosystem's TARGET2 system (i.e., the real-time gross settlement [RTGS] system owned and operated by the Eurosystem), it is important for countries seeking full integration into the EU to better understand the factors that impact their country's *CA* position. The mechanics of the Eurosystem's TARGET2 system prevent a sudden stop for euro area countries as foreign private debt is substituted by foreign public debt in the event of a crisis, so to that extent, being inside the euro is likely to be a structural break in terms of foreign funding which further underscores the relevance of considering structural breaks in empirical work. This study highlights this as a gap in the literature and contributes to this discussion by assessing the significance of the factors that determine the current account in the Central and Eastern European Countries (CEECs). Our focus on the CEECs is, in part, motivated by the fact that most of these countries have undergone a significant structural shift from being largely command economies to becoming market economies. Moreover, in moving to join the European Union (EU), these countries have become more open, in line with other EU countries while aiming to adhere to the requirements of the Maastricht Treaty, particularly the fiscal criterion restricting current account deficits. With the current account being an abstruse economic concept in international economics and having been further highlighted by recent tensions between the United States and China, the factors driving the current account deficits for these transitioning economies is instructive and worthy of economic analyses.

According to the World Bank, in its June 2019 *Global Economic Prospects*: *Heightened Tensions*, *Subdued Investment* report, economic growth in the CEECs is expected to slow to 3.3% in 2020 from 3.7% in 2019, as growth slows in its main trading partners, particularly in the Eurozone and Russia. Such forecasts further underscore the importance of studying the significance of the determinants and the evolution of the *CA* in these countries, for better economic planning in these transition countries. The main aim of this cross-country study is to examine the empirical linkages between the *CA* for the CEEC countries (i.e., Bulgaria, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia) and a broad set of economic variables proposed by the theoretical and empirical literature. This cross-country approach is relevant because the fundamentals that may lead to policy shifts are likely to be different across countries and represent different degrees of vulnerability to external shocks, or differences in the ability to undertake policy adjustments. In this study, though, instead of focusing on the concept of *sustainability*, we approach the relevance of the *CA* from a different perspective and seek to identify which fundamentals are significant for each of these countries' CA. Despite the importance of capital mobility in developing and transition economies, we note that there is a lack of cross-country empirical studies that analyse the effect of macroeconomic variables on the CA. To empirically analyse the relationships between the countries and the current account determinants, we employ the dynamic ordinary least squares (DOLS) and threshold estimation methods so as to better understand and examine the relationship between the *CA* and its main fundamentals (i.e., the real exchange rate, terms of trade, gross fixed capital formation as a proxy for investment, government consumption as a proxy for fiscal deficit and real income). We also test the hypothesis that an a priori assumption that the relationship between the *CA* and its fundamentals is stable and linear is restrictive. If this is so, then in empirical work, the models need to be allowed to be time-varying and/or nonlinear. Further, as the CEECs have gone through significant structural changes in their transition towards market economies, coupled with some moving towards EU membership, we allow for potential structural breaks in the analyses. It is worth noting that these countries left the Soviet economy system with the collapse of the USSR which was an important shock to their economies. Moreover, the countries have since then prepared for EU membership, and some of them for *euro* accession. We conclude that, first, for the CEECs, there are significant heterogeneities in their responses to the fundamentals; hence, cross-country empirical analysis is instructive. Second, we argue that, in analysing the *CA*, assuming linearity a priori in models and/or not considering structural breaks may be misleading. Third, our analyses, using the threshold models, suggest that the threshold variables depend on the country under analysis and share commonalities with the time-varying models. These results have policy implications since policymakers and monetary authorities can better predict the likely

evolution of the *CA*, and act upon the macroeconomic fundamentals to reduce *CA* deficits if so required.

The rest of this article is organized as follows. Section 2 provides a general background and brief literature review as related to our analyses. Section 3 describes the empirical methods employed, whiles Section 4 summarizes the results after presenting the data. Finally, Section 5 presents some conclusions.

2 | BACKGROUND AND LITERATURE REVIEW

2.1 | A brief background on CEECs

For several years, state control of investment, public ownership of industrial assets coupled with the ownership of huge supplies of oil and gas, which became much more valuable as exports after the world oil price hikes in the 1970s, ensured that the current account in the Soviet Union and the Eastern bloc countries as a whole remained essentially balanced, with small deficits and surpluses very rarely above 1% of the overall GDP. However, since the collapse of the Union, stark differences have emerged across the former members, which raises the question of how their current accounts are evolving. Becker et al. (2010) note that the CEECs experienced a prolonged period of foreign direct investments, mainly from the developed EU15 countries, which happened in tandem with substantial increases in private sector credit in the years preceding the GFC. Darvas and Szapáry (2008) posit that these fuelled a credit boom in the Baltic countries of Bulgaria and Romania. By the end of 2011, however, huge investment outflows started to show, reflecting a massive withdrawal of banking funds from the region. The CEECs became a net exporter of funds by 2013*q*1, a trend which still ongoing today. In recent years, although these countries' *CA* balances have typically been in deficit, the extent of these deficits is substantially lower in some, including Czechia (the Czech Republic), Estonia, Hungary and Poland. As the CEECs have moved towards the market economy and joined the EU, arguments of over- or under-adjustment to integration have been put posited (see Blanchard, 2006; Blanchard & Giavazzi 2002) as likely explanations for their observed *CA* movements.

Some studies in the extant literature posit that these transition and developing economies tend to experience significant appreciations in their real exchange rates, which destabilize their current accounts (see, for example, Roubini & Wachtel, 1999 and Cuestas, 2013). Moreover, for countries with fixed exchange rates or currency boards, the potential effects are likely to be exacerbated since the pressure of the real appreciation directly affects the competitiveness of the country's exports. This may also have a direct effect on economic growth (see Bajo-Rubio & Díaz-Roldán, 2009). In fact, the importance of *CA* imbalances is also underscored through some widely acknowledged institutional legislative measures, for example, the "macroeconomic imbalance procedure" (MIP) legal framework which consists of two pieces of legislation that were introduced as part of the of the "six-pack" (the EU Economic Governance Reforms of 2011), which monitors the evolution of *CA* deficits of member states (see Gabrisch & Staehr, 2015). Therefore, for developing and transition economies, a clearer understanding of the *CA* is necessary for their economic stability, planning and development. Noteworthy is the fact that these CEEC's monetary policies differ considerably, from completely fixed exchange rate arrangements and euro members to pure floaters. At the beginning of their transition process, to gain credibility and aiming to reduce inflation from high levels, most of these countries (i.e., Bulgaria, Estonia, Latvia and Lithuania) pegged their exchange rates to highly stable currencies, for example, the U.S. dollar or the Deutsche Mark. Over the 1990s, some of them gradually moved on from the pegs towards greater monetary policy autonomy and, in some cases, adopted inflation targeting as their monetary policy framework (e.g., the Czech Republic, Hungary, Poland, Romania and Slovakia).

2.2 | Theoretical motivation

Although a *CA* deficit is not necessarily bad, the longer such deficits remain, the worse off future generations are likely to be as they are likely to be burdened with excessive debts and interest payments. While not discounting the role of foreign net income in driving the *CA*, this article's main interest is in the domestic determinants of *CA* fluctuations in the CEECs. For this purpose, we in part, make use of the widely used intertemporal current account (ICA) model. ICA models, by extending the permanent income model of consumption to small open economies, consider countries' current account as an instrument to smooth consumption over time. The approach views a *CA* deficit as the outcome of forward-looking dynamic saving and investment decisions driven by expectations of productivity growth, government spending, interest rates and several other factors. Since first introduced by Sachs (1981), the approach has been extensively used in the literature to study the evolution of current account balances for different countries and time periods, and has been extended along several dimensions, including fiscal policy (Frenkel, Razin, & Yuen, 1996),

real exchange rate (Stockman, 1987), terms of trade fluctuations (Mendoza, 1995; Tornell & Lane, 1998), capital controls (Mendoza, 1991), global productivity shocks (Glick & Rogoff, 1995) and interest rate and exchange rates (Bergin & Sheffrin, 2000).[2]

In this article, a brief description of Bergin and Sheffrin's (2000) version (hereafter, BS) of the ICA model will suffice. BS considers a small open economy that can borrow and lend with the rest of the world at a time-varying real interest rate and considers two goods: *traded* and *non-traded*. The representative household makes consumption and borrowing decisions so that it maximizes its discounted lifetime utility, and therefore, it solves the following maximization problem:

$$\max E_0 \sum_{t=0}^{\infty} \theta^t U_{(C_{T,t},C_{NT,t})} \tag{1a}$$

and for all t, $FA_t - FA_{t-1} = Y_t - I_t - G_t - (C_{T,t} + P_T C_{NT,t}) + r_t FA_{t-1}$, where $C_{T,t}$ and $C_{NT,t}$ represent consumption by the representative household in traded and non-traded goods, P_T being the price of non-traded goods in terms of traded goods, Y_t denoting the value of current output, I_t is investment expenditure, G_t denoting the government expenditure, FA_t representing the stock of foreign assets at the beginning of the period, and r_t being the net world real interest rate the country faces in terms of traded goods and $U_{(C_{T,t},C_{NT,t})}$ is the households utility function, per-period, which is assumed to follow the following Cobb–Douglas form $\frac{1}{1-\sigma}\left(C_{T,t}^{a}, C_{NT,t}^{1-a}\right)^{1-a}$, where, in equilibrium, a∈(0,1) is the share of consumption of traded goods in total consumption, and $\sigma > 0$ is the inverse of the intertemporal elasticity of substitution, γ. In their ICA model, the authors assume output, investment and government expenditure to be exogenous and infer that expected changes in consumption are a function of the expected consumption-based real interest rate. In doing so, BS highlights the role of the interest rate and the exchange rate on the household's optimal consumption profile. Following BS and Rogoff (1992), this study uses the *real exchange rate* as a proxy for P_T. According to the model, when there is a change in the exchange rate this induces an intra-temporal substitution effect on the household's consumption. On the one hand, when traded goods prices are temporarily low, households will substitute traded goods for non-traded goods in consumption and with the intra-temporal rate of substitution being 1 (from the Cobb–Douglas form), current consumption expenditure increases by (1 – a). Hence, the intertemporal effect is driven by the relative price of future and current consumption, in terms of the traded goods price. On the other hand, when traded goods prices are temporarily high and expected to decrease, the future payment of loans in terms of traded goods is high, but it is expected that the future repayment will have a lower cost in terms of the full consumption bundle than in terms of traded goods alone. Concerning *net output*, BS goes on to derive a model in the form that demonstrates the *CA*'s consumption smoothing feature:

$$-E_t \sum_{j=1}^{\infty} \theta^j \left[\Delta no_{t+j} - \gamma r^*_{t+j}\right] = \mathrm{CA}^*_t = no_t - c_t \tag{1b}$$

where $\Delta no_t = logNO_{t+1} - logNO_t$, and $NO_t = Y_t - I_t - G_t$, $c_t = logC_t$ and γ being the intertemporal elasticity of substitution, from the Codd–Douglas function, as earlier defined. Based on these, BS also conclude that, all things being equal, higher expected future net output will imply smaller *CA* balance today. Further, the smaller the consumption-based real interest rate expected in the future the smaller the *CA* balance, because the representative household substitutes away future consumption for current consumption.

Next, the well-known Feldstein–Horioka (FH) approach suggests that the investment-savings correlation is very high, at least for the developed countries (see Coakley, Kulasi, & Smith, 1998). Further, even across 30 OECD countries, Katsimi and Zoega (2016) also highlight this correlation under certain conditions such as institutions, exchange rate risk and credit risk. Given that the FH approach considers capital mobility to be less than perfect, its appropriateness for developing and transition economies seems justifiable and the authors, reporting cross-sectional regressions of the investment ratio on the savings ratio, argue that, given limited capital mobility, any changes in savings is fully reflected in the investment. For transition and developing countries, with limited access to world capital markets as well as relatively higher (even if only perceived) risks of investing in these countries, the correlation between investment and savings, can be expected to be very high (near unity), a priori. The potential impact of *investment* to the *CA* is worthy of investigation.

The Mundell–Fleming (Mundell, 1968) model posits that an increase in *government expenditure* tends to cause domestic interest rates to rise, which, in turn, leads to an increase in capital inflows and domestic currency appreciation. In theory, the ensuing domestic currency appreciation, by making exports less competitive, will then lead to an increase in the *CA* deficit. Further, the Keynesian absorption theory also suggests that if a country has a deficit in its balance of payments, it means that people are "absorbing" more than they produce. In other words, domestic expenditure on consumption and investment is greater than national income and hence an increase in imports which

then worsens the *CA* deficit. Arguably, the fiscal challenges faced by developing and transition countries imply that they often run fiscal deficits, and hence have a higher proclivity for running *CA* deficits, particularly as they move towards free capital movement. Furthermore, Lee and Chinn (1998), in their analyses of the current account and estimating a sticky-price model for seven industrialized countries, also conclude that consideration of shocks matters when considering the drivers of the CA.

2.3 | Current account fundamentals

Despite the relatively extensive body of theoretical literature on the subject, there are only a few comprehensive cross-country studies that empirically analyse the effect of macroeconomic variables on the current account deficit. Although the above theories motivate the *CA* fundamentals considered in this study, we also consider other control variables which have been suggested in the extant literature.

Before any estimations, we determine the order of stationarity of the variables since for situations where the variable is non-stationary, that is, *I*(1), shocks to the variable will have permanent effects. In such cases, empirical analyses of the determinants should rely on, say, cointegration techniques, which would imply finding other *I*(1) processes whose stochastic trends cancel out with that of the current account. To buttress the point, Cuestas (2013) finds, by applying unit-root tests, that for the CEECs, the *CA*s of these countries are nonstationary processes, underscoring the importance of establishing the order of stationarity of the variable for appropriate modelling. Another study, Cuestas and Regis (2016), also proposes a simple framework for small open economies, where the *CA* is a means for intertemporal consumption and the real exchange rate (*RER*) is the price for this consumption. Since the *CA* is a record of a nation's transactions with the rest of the world, for the CEECs, interest rates are aligned with that of the EU and it is expected that *RER* will be a key determinant in the evolution of the CA.[3] Under different settings, Harkmann and

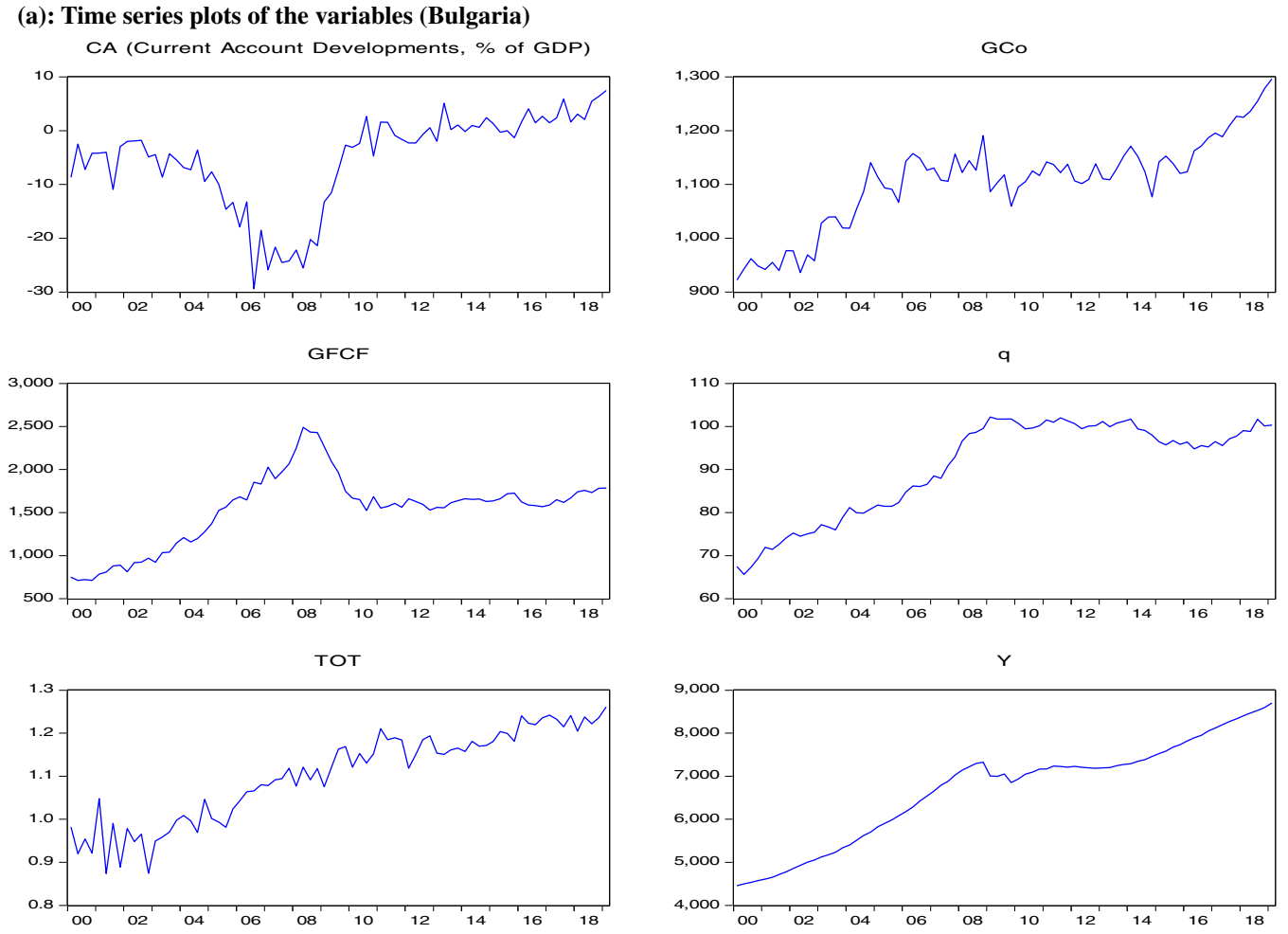

FIGURE 1 Time series plots of the variables (Bulgaria) [Colour figure can be viewed at wileyonlinelibrary.com]

Staehr (2021) study the *CA*'s main fundamentals for a group of CEECs in a panel set-up. Although the authors treat all the variables as stationary, including the *CA*, they still find that the *RER* is one of the key determinants. A priori, there is a temptation to assume that the expected relationship between the *RER* and the *CA* should be negative since an appreciation of the currency should make national products more expensive and hence have a detrimental effect on the competitiveness of the country's exports. However, in practice, capital inflows into a country depend on the *expectations* of a depreciation of the currency over the maturity of investments, that is, an expected appreciation should decrease the *CA* and vice versa. However, *realized* movements in *RER* do not always mimic the *expected* changes in the *RER* in the next period; hence, we consider the sign of the relationship to be ambiguous.

Another variable, *Government consumption*, can serve as a proxy of the size and impact of the public sector in economies where public spending is a key in the catching-up process. For the CEECs and many other developing economies, many products/services consumed by the public sector are imported, which then have implications for the CA. We note, however, that in practice, the sign of its relationship with the *CA* will depend on the proportion of *tradeables* and *non-tradeables* in government expenditure.

Next, the relationship between the *CA* and the terms of trade (*TOT*) has been discussed in the extant literature (see Bouakez & Kano, 2008, amongst others). Intuitively, the *TOT* proxies the relative price of exports versus imports from the main trade partners, and changes in the *TOT* will affect import demand and exports (see, for example, Cashin & McDermott, 1998). For developing countries, this relative price of imports and exports can be highly important for their *CA* (see Coleman, 2008). Typically, the effects of the *TOT* on the *CA* may be disaggregated into the *income* and *substitution* effects. For completeness, therefore, it is instructive for *TOT* to be incorporated in empirical modelling of the CA. Since the sizes of the income and substitution effects are not

(b): Time series plots of the variables (Czechia (The Czech Republic))

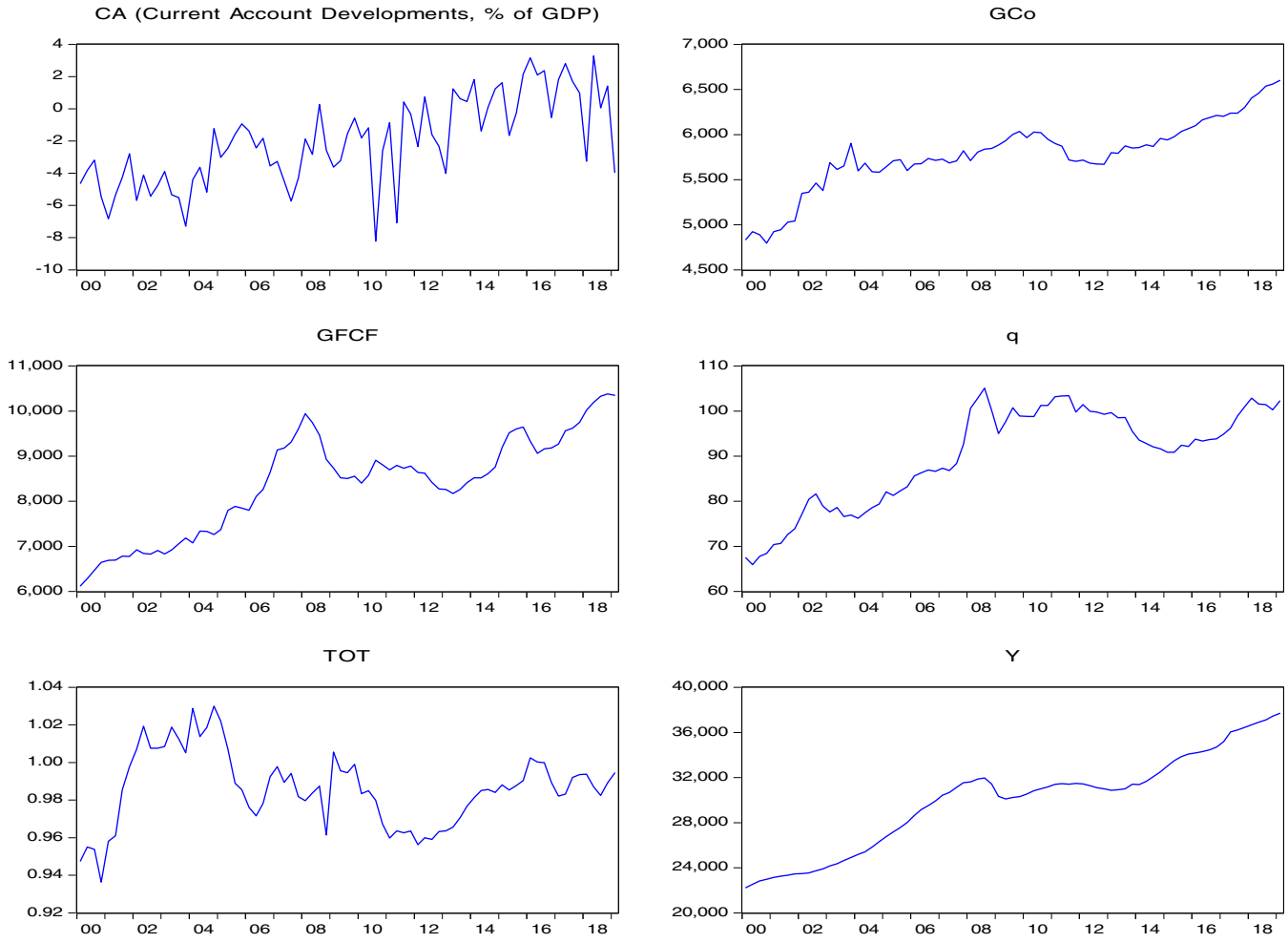

FIGURE 2 Time series plots of the variables (Czechia [The Czech Republic]) [Colour figure can be viewed at wileyonlinelibrary.com]

known a priori, that is, it depends on whether the income effect dominates the substitution effect. Hence, the expected effects and direction of the relationship between the *CA* and *TOT* are also ambiguous.

For completeness, following on from the ICA and FH approaches discussed above, we also include *investment* (proxied by the *gross fixed capital formation*, *GFCF*) and *real income* (*Y*) in our model to control for their potential effects in the evolution of the CA. The expected signs of the relationship between the *CA* and these two variables depend on whether *GFCF* and *Y* have dominant demand or supply effects on the given economy.

3 | DATA, EMPIRICAL METHODS AND MODEL SPECIFICATION

3.1 | Data

We focus on the following 10 CEECs: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. Our data are sourced and compiled from *Eurostat* and consist of quarterly observations spanning 2000*q*1–2019*q*1, except for Poland, Lithuania and Slovenia, where the series starts in 2004*q*1.[4] We then construct the following key variables that we analyse in this study: The current account as proportion of the GDP (*CA*); the log of the real effective exchange rate (*q*) (constructed with consumer price index as deflator, for 37 trading partners - industrial countries, with an increase indicating an appreciation of the currency); the log of real government consumption (*GCo*); the log of real gross fixed capital formation (*GFCF*); the log of the terms of trade measured as the ratio between export prices and import prices (*TOT*), and the log of the real GDP (*Y*). For consistency, we seasonally adjust Slovakia's data using the *Census X13* procedure, since all the other variables we compile have already been seasonally adjusted in *Eurostat*. Figures 1 to 10 present an illustration of the *CA* (as a percentage of GDP) and the other variables (before any log transformations). A few observations are worth highlighting. First, across all the countries, the periods preceding the GFC, is characterized by current account deficits, most likely due to high consumption of imported goods financed by foreign capital. Second, in the periods immediate after 2010, these

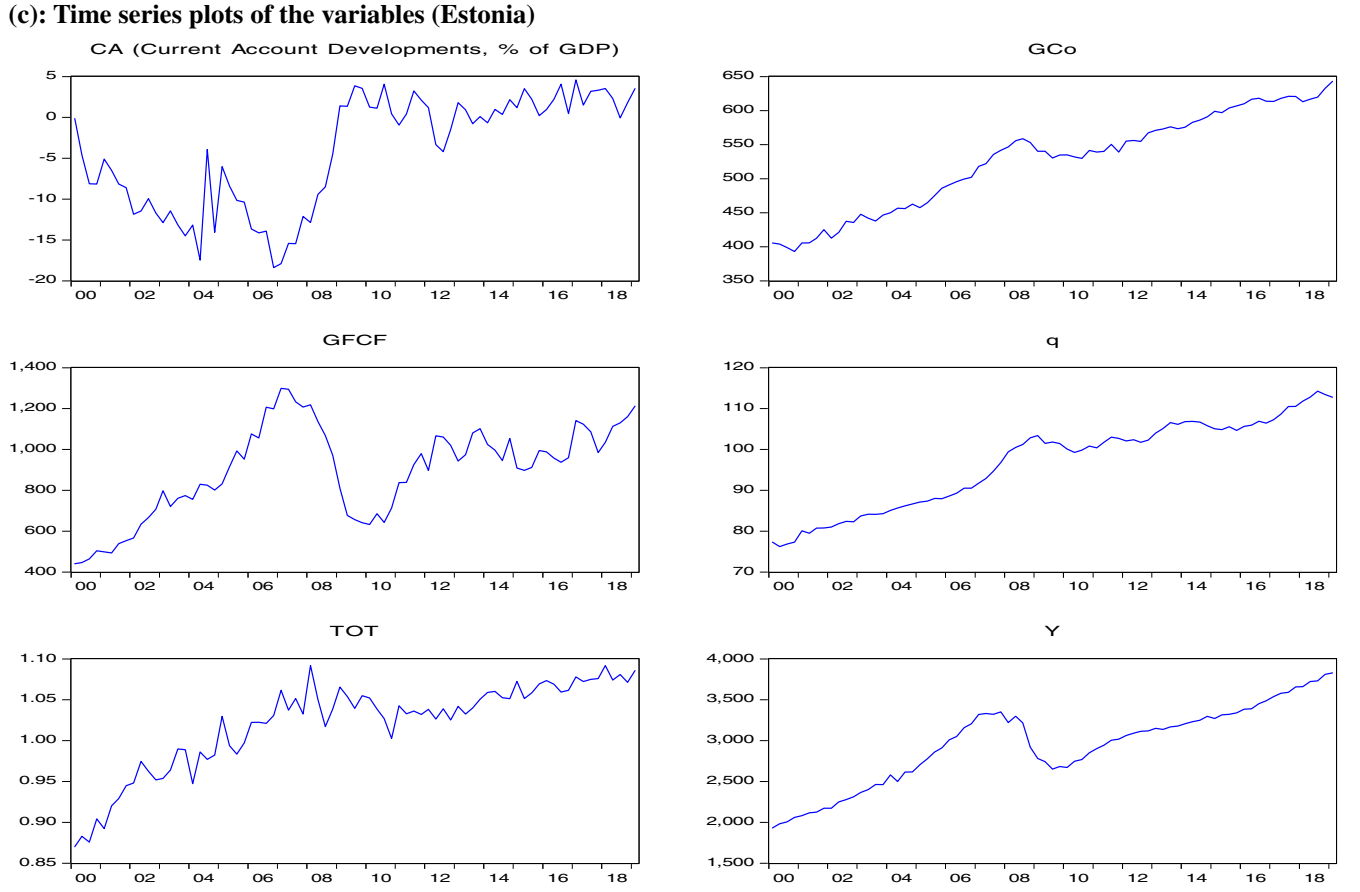

FIGURE 3 Time series plots of the variables (Estonia) [Colour figure can be viewed at wileyonlinelibrary.com]

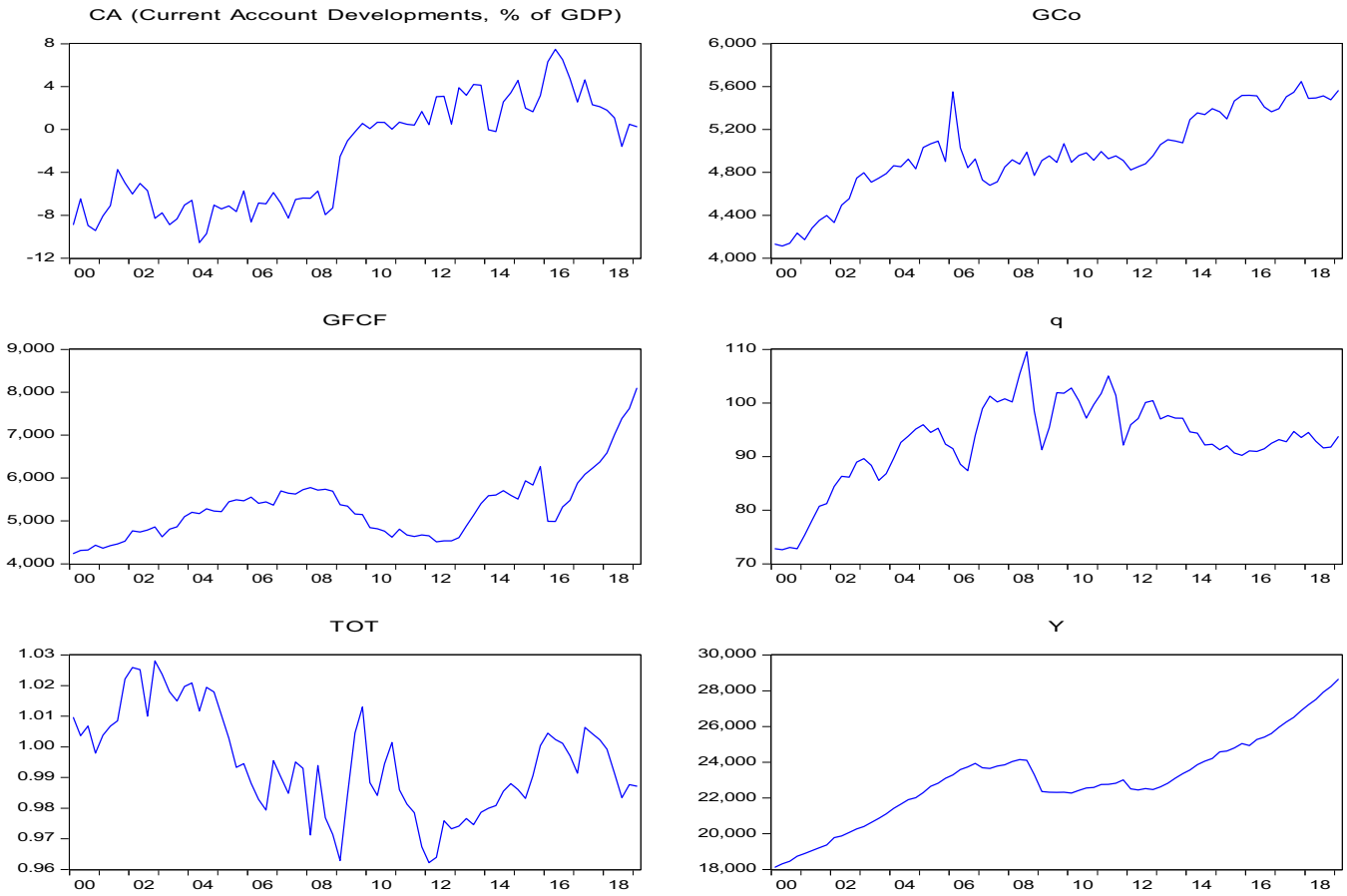

FIGURE 4 Time series plots of the variables (Hungary) [Colour figure can be viewed at wileyonlinelibrary.com]

deficits decrease or even get into surpluses. Again, this may be due to sudden declines in foreign capital inflows and lower consumption of imports due to the GFC.

3.2 | Empirical methods and model specification

First, to avoid spurious regressions, as a preliminary step, we assess the order of integration of the variables. Our tests for the presence of unit roots in the variables find that all the variables are non-stationary in levels and we also find that the series share common stochastic trends, implying that they are cointegrated.[5] We note that, in the extant literature, Cuestas and Regis (2016) also employ nonlinear cointegration techniques to model the relationship between the *CA* and its fundamentals and use the Hansen and Seo (2002) method to estimate a threshold error correction model. With this method, the authors obtain different coefficients for the dynamics and the speed of adjustment for different deviations from the long-run equilibrium. However, in this article, our main interest is in uncovering the important fundamentals and determining how these countries' long-run equilibrium relationships have changed over time or according to the thresholds of some variables.

Since the series are $I(1)$ and cointegrated, we estimated the long-run relationships using DOLS, which controls for potential endogeneity of the regressors by including leads and lags of the first differences of the right-hand side variables.[6] Also, to limit the possibility that the standard errors will be biased, we employ the Newey–West heteroscedastic and autocorrelation correction (HAC) method. Specifically, to estimate the long-run relationships between the *CA* and its fundamentals, we apply the dynamic ordinary least squares (DOLS) method proposed by Stock and Watson (1993) and incorporate structural breaks in the parameters of the long-run equations as suggested by Bai and Perron (1998, 2003a, 2003b). Our estimated model is as follows:

$$CA_t = \sum_{p=1}^{m+1}\left(c_p + \sum\nolimits_{i=1}^{k}\beta_{p,i}X_{i,t\in p}\right) + \sum\nolimits_{i=1}^{k}\sum\nolimits_{j=-h}^{z}\delta_{i,j}\Delta X_{i,t+h} + \varepsilon_t \quad (2)$$

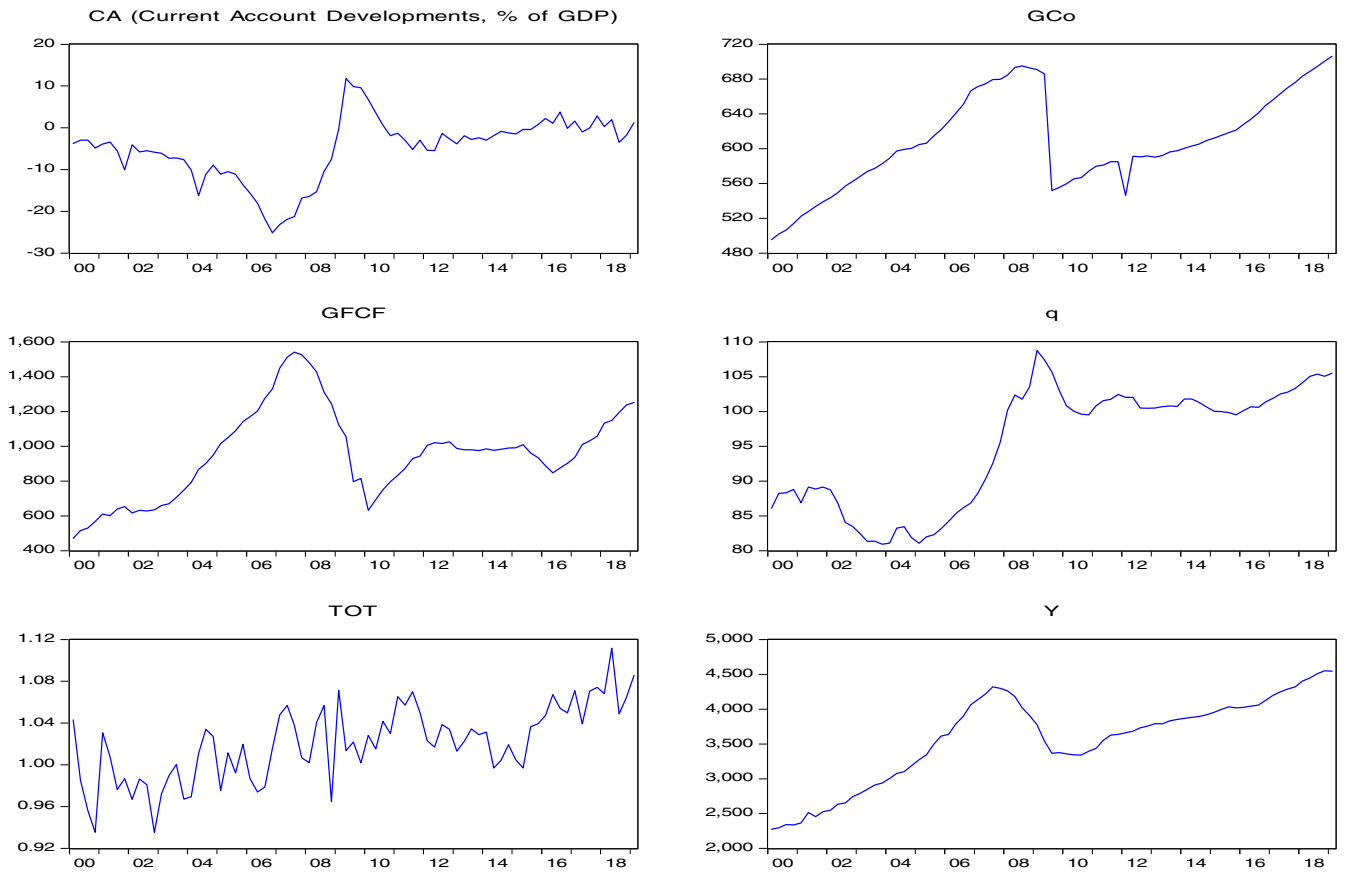

FIGURE 5 Time series plots of the variables (Latvia) [Colour figure can be viewed at wileyonlinelibrary.com]

where *CA* represents the current account balance as proportion of the GDP, *X* represents the other *k* explanatory variables including the main fundamentals, and *m* is the number of breaks, *h* and *z* represent the lead and lag lengths, respectively, and are included in DOLS regression have the purpose of making its stochastic error term independent of all past innovations in stochastic regressors. In line with the extant literature, and data considerations, we allow for one lead and one lag length. The model allows us to estimate the coefficients for (*p*) different subperiods, with *m* breaks, which is determined by employing the sequential method developed by Bai and Perron (1998, 2003a, 2003b). In estimating Equation (2), only the long-run parameters (β) and the constant are allowed to be time-dependent, whereas the coefficients of the variables in first differences do not change. Hence, our estimation relies on the following long-run equation:

$$CA_t = c + \beta_1 q_t + \beta_2 GCo_t + \beta_3 GFCF_t + \beta_4 TOT_t + \beta_5 Y_t + \varepsilon_t \quad (3)$$

Further, to identify which variable(s) are driving the breaks in Equation (2), we estimate a *threshold model*. With threshold estimation models, we estimate different coefficients for the long-run parameter depending on given thresholds for a threshold variable. The number of breaks conditional to the threshold variable is determined using the sequential method developed by Bai and Perron (1998, 2003a, 2003b). The estimated equation is:

$$CA_t = \sum_{p=1}^{m+1}\left(c_p + \sum_{i=1}^{k}\beta_{p,i}x_{i,t}|tr_t \in \left(\lambda_p^-, \lambda_p^+\right)\right) + \sum_{i=1}^{k}\sum_{j=-h}^{z}\delta_{i,j}\Delta x_{i,t+h} + \varepsilon_t \quad (4)$$

where *tr* is the threshold variable and $\left(\lambda_p^-, \lambda_p^+\right)$ are the lower and higher values of the threshold for the threshold variable for that particular regime, *p* and other variables as previously defined. To choose the right model, we incorporated as potential threshold variables all the variables in levels with one lag, and the leads and lags of the first differences of the regressors. We then chose for each case the model which minimizes the sum of squared residuals (SSR).

(f): Time series plots of the variables (Lithuania)

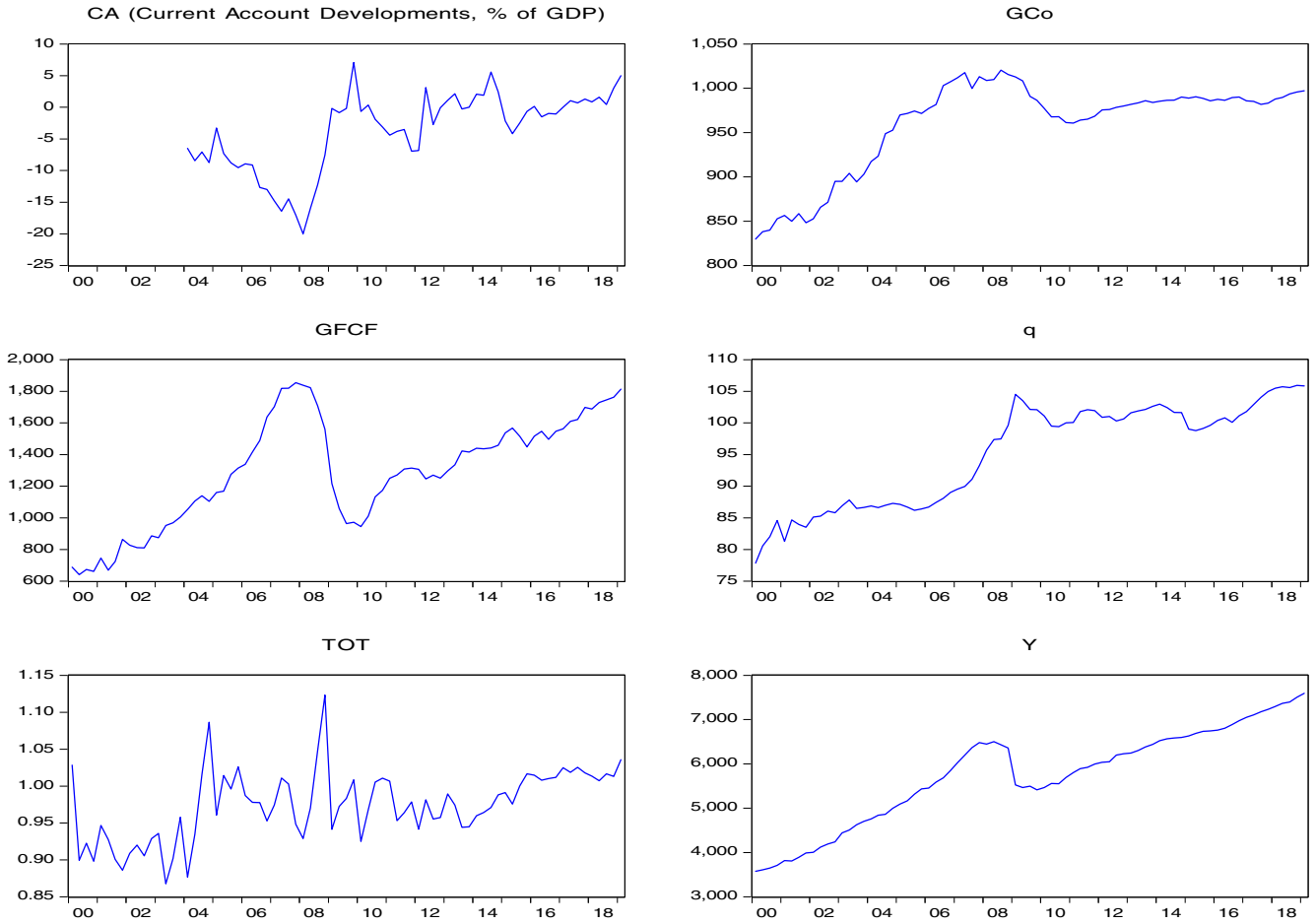

FIGURE 6 Time series plots of the variables (Lithuania) [Colour figure can be viewed at wileyonlinelibrary.com]

4 | DISCUSSION OF RESULTS

Our dependent variable is the current account balance as a ratio to the GDP and the set of core explanatory variables is chosen based on their relevance in the literature and as suggested by theory. They are the *investment* (*GFCF*), real income (*Y*), real exchange rate (*RER*), government consumption (*GCo*) and terms of trade (*TOT*). Leads and lags are also included, as described in the previous section.

Table 1 reports the results of our DOLS estimation after including one lead and one lag for the full period, and below we discuss the effects of each of the *core* explanatory variable on the current account (Tables 1 and 2). First, Table 1 shows *investment* (*GFCF*) to be the most relevant determinant, as it is negative and statistically significant across all the countries, except for Slovakia where the effect, though negative, is statistically insignificant. This result suggests that, over the full period, higher investment has been an attractor or *pull*-factor for foreign capital and thus increased the *CA* deficits. A plausible reason for this effect of investments on the current account deficit is that, typically, the CEECs have been characterized by relatively low household saving rates (see Rocher & Stierle, 2015); and the current account can also be expressed as the difference between national (both public and private) savings and investment. It is also worth noting that there is also significant heterogeneity in savings across the countries. Similarly, our panel estimates in both the *pre*- and *post*-2008 samples report same. We note, however, that the effect of *investment* on the CEEC current accounts in the *post*-2008 sample (Table 2) is bigger than in the *pre*-2008 sample. As these countries sought to generate economic growth through investment, it has been achieved with higher indebtedness and hence worsening *CA* balances. This may relate to the latter recovery period after the financial crisis, when higher investments in these countries and economic recovery acted as magnets of foreign capital.[7] If these countries aim to reduce their *CA* deficits, an effective policy route may be to, instead of increasing indebtedness, put in measures to increase private and

(g): Time series plots of the variables (Poland)

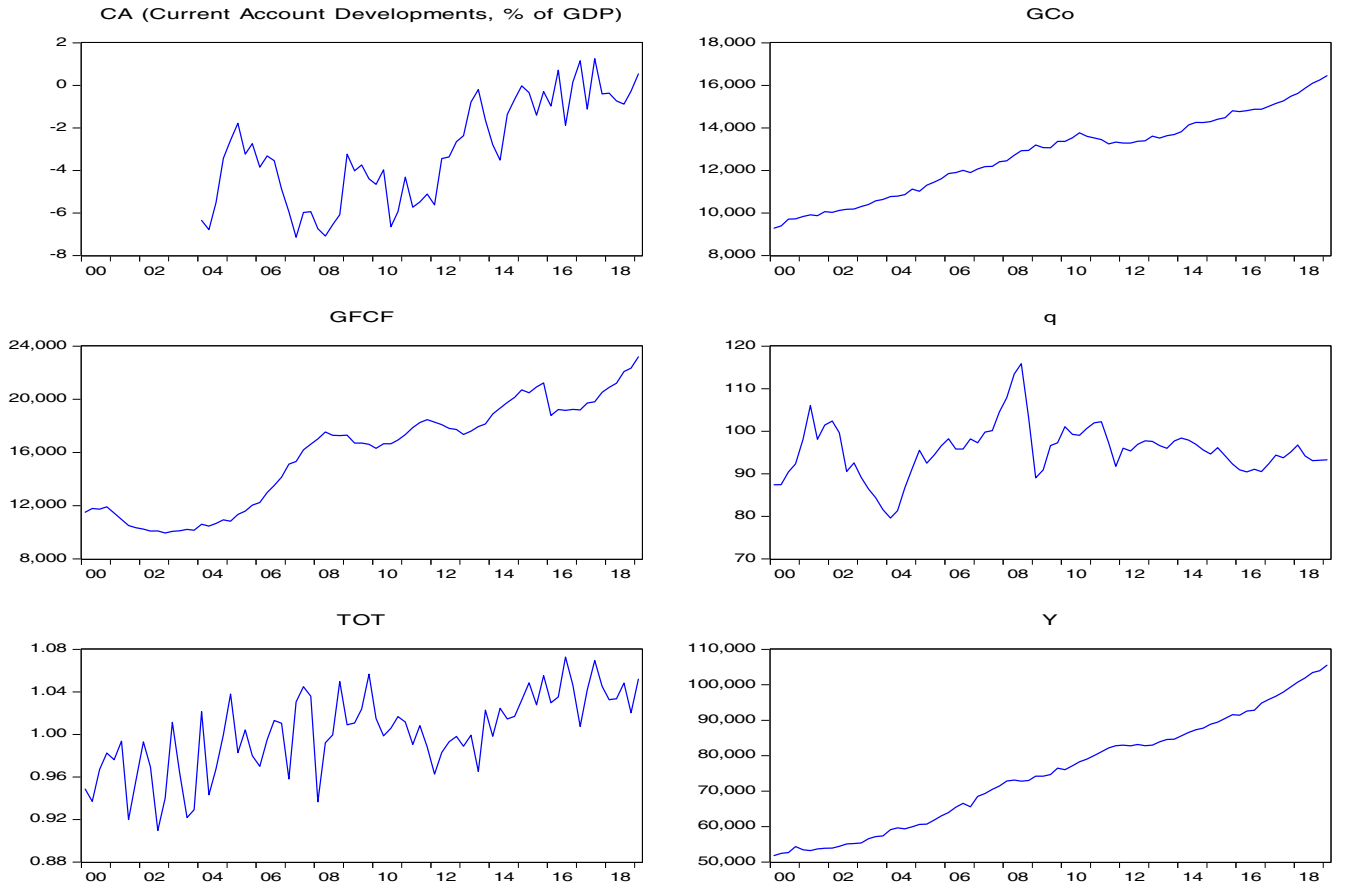

FIGURE 7 Time series plots of the variables (Poland) [Colour figure can be viewed at wileyonlinelibrary.com]

public savings (see Calderón, Chong, & Loayza, 2002). From our results, increase in *real income (Y)* has a statistically significant and positive effect on the *CA* for 7 out of the 10 countries assessed, but is not statistically significant in Estonia, Romania and Slovakia. A plausible explanation of this positive sign is that an increase in the *Y* is associated with extra savings, which is then exported abroad. This result corroborates the findings of Glick and Rogoff (1995) who posit that if an increase in *real incomes* is solely the result of a temporary productivity surge, then it would be expected to move the *CA* towards a surplus. This appears to be the case for the CEECs.

For the CEECs, just prior to the GFC, growth was been dominated by remarkable increases in total factor productivity (TFP) which was almost double that in other emerging market country groups (see Schadler, Mody, Abiad, & Leigh, 2006). This is not surprising in view of the inefficiencies inherited from central planning, which left much scope for managerial improvements, labour shedding and gains from interindustry resource reallocation. Although the growth rates have seen some marginal decreases from the period immediately following the GFC, the growth rates are still encouraging across these countries, albeit with some heterogeneity. Relatively, Estonia has experienced some GDP declines in recent times, yet with a high degree of budgetary discipline kept the deficit low. While Romania and Slovakia have both experienced relatively higher income growth, Romania has managed to lower real expenditures whereas Slovakia appears to have been aided by the EMU membership in spite of its expansionary expenditure policies. For the *real exchange rate*, we find evidence consistent with the Mundell–Fleming model for only 2 out of the 6 countries for which there is statistical significance. Specifically, for Hungary and Poland, an appreciation in their local currency has the effect of worsening the *CA* deficit. On the other hand, for Bulgaria, Estonia, Slovakia and Slovenia, one plausible explanation for the statistically positive estimates is that their currencies are undervalued, which make imports more expensive and hence less attractive. Another plausible explanation could be inelasticity in demand for their exports. This positive relation between the *RER* and the *CA*, similar to the findings of Lee and Chinn (2006), does not align with predictions of single-sector models where current account improvement is associated with *RER* depreciation, that

(h): Time series plots of the variables (Romania)

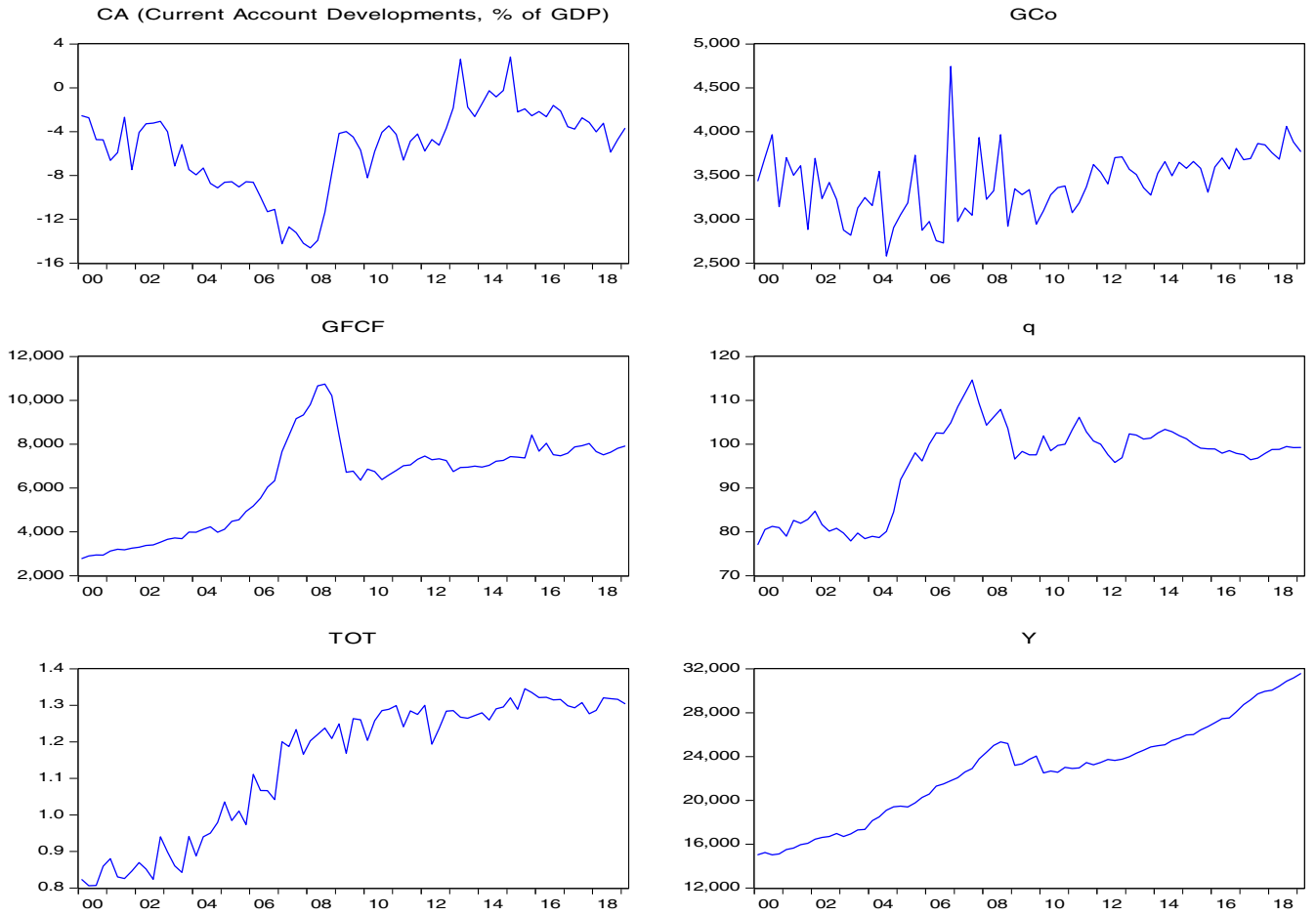

FIGURE 8 Time series plots of the variables (Romania) [Colour figure can be viewed at wileyonlinelibrary.com]

is, the latter part of the *J*-Curve. Although outside the remit of this article, we point out that Lee and Chinn (2006) suggest that models that distinguish between *tradeables* and *non-tradeables* would better explain the puzzle. We also find that changes in the *terms of trade* are significant in 6 out of the 10 countries analysed. Of these 6, we observe the expected negative relation between the *TOT* and the *CA* position, consistent with the Harberger–Laursen–Metzler effect (Mendoza, 1995; Obstfeld & Rogoff, 1982; Svensson & Razin, 1983) in Bulgaria, Estonia and Slovakia.[8] Of these three, Slovakia appears to be the most affected by *TOT* shocks. On the other hand, for Czechia, Romania and Slovenia, the positive signs of the estimates suggest inelasticity in their exports, particularly as majority of their exports are refined oil products, wooden products, electrical equipment. We do not find evidence of statistical significance of the *TOT* for Hungary, Latvia, Lithuania and Poland, which may be because the changes in *TOT* are affecting inter-temporal allocation of savings and investments in these countries. Another plausible explanation, which can be inferred from the country-level representations in Figure 1, is that the quarterly variations in these countries are low relative to annual variations. *Government consumption* is a significant factor in 6 out of the 10 countries. In Czechia, Slovakia and Slovenia, our results are consistent with the expected effect where increases in *GCo* worsen the *CA* balance. In these countries, their deficits are largely the results of relatively expansionary expenditure policies. However, for Slovakia and Slovenia, their membership of the EMU has arguably helped reduce their exchange rate exposures and increase investor confidence. Overlapping generations models suggest that government budget deficits tend to induce current account deficits by redistributing income from future to present generations (see Chinn & Ito, 2007; Obstfeld & Rogoff, 1994). On the other hand, in Estonia, Hungary and Romania, *GCo* has a positive effect on the *CA*, which suggests a more inward-looking approach to consumption rather than increasing imports. A plausible explanation for the statistical insignificance we find for Bulgaria, Latvia, Lithuania and Poland may be that, in the

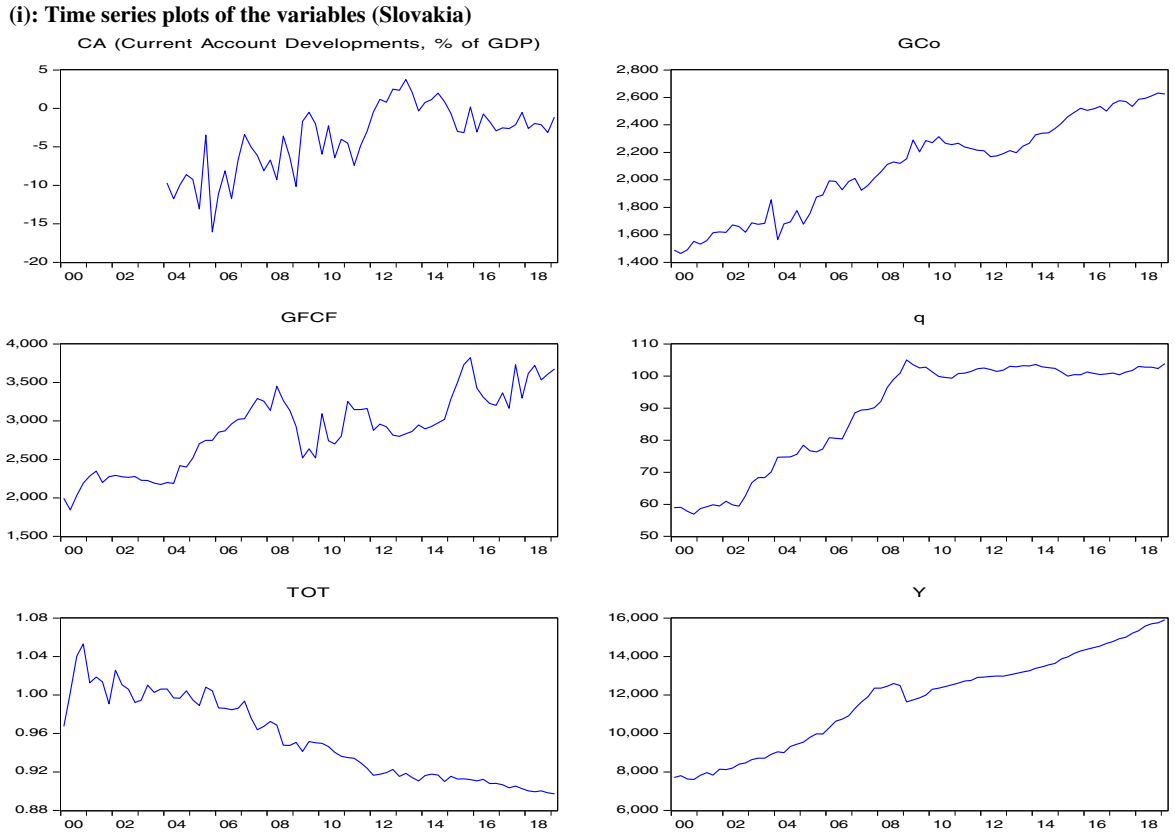

FIGURE 9 Time series plots of the variables (Slovakia) [Colour figure can be viewed at wileyonlinelibrary.com]

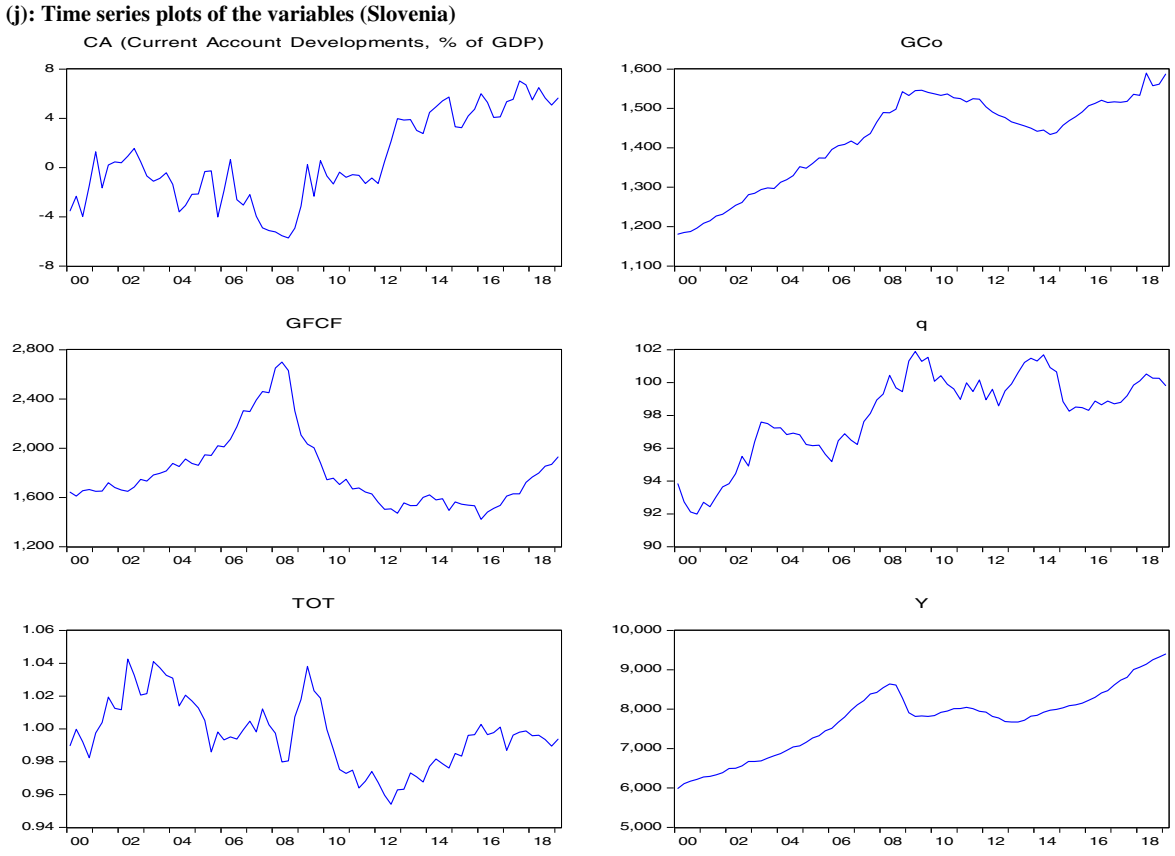

FIGURE 10 Time series plots of the variables (Slovenia) [Colour figure can be viewed at wileyonlinelibrary.com]

TABLE 1 DOLS long-run estimates (full sample)

Country	q	GCo	GFCF	TOT	Y	c
Bulgaria	0.55**	0.41	−0.55**	−0.50	0.56**	−6.33**
Czechia	−0.01	−0.25*	−0.26**	0.25	0.49**	−0.47
Estonia	0.70**	0.25	−0.17**	−0.67**	−0.00	−3.66**
Hungary	−0.20**	0.44**	−0.45**	−0.48	0.54**	−4.48**
Latvia	0.19	0.08	−0.33**	0.52	0.25**	−1.30
Lithuania	−0.08	−0.28	−0.42**	0.16	0.75**	−1.21
Poland	0.02	−0.20	−0.16*	0.52**	0.37**	−0.80
Romania	−0.02	0.12**	−0.21**	0.45**	0.00	0.85
Slovakia	0.25**	−0.29**	−0.10	−1.03*	0.12	0.57
Slovenia	0.26	−0.50**	−0.21**	0.31**	0.49**	−0.21

Note: ***** indicate significance at the 5%, 10% level respectively. Estimations obtained with one lead and one lag. The estimated coefficients for leads and lags of the first differences have not been included in this table. The standard errors have been obtained by HAC. Full sample: 80 observations, except in Poland, Lithuania and Slovenia, where sample is 68 observations. Full estimation results and diagnostics available upon request.

TABLE 2 DOLS long-run estimates, as a panel (sub-samples: 2000–2008 and 2009–2019)

Variable	(2000–2008) Coefficient	(2009–2019) Coefficient
q	0.13*** (0.04)	0.02 (0.06)
GCo	−0.03 (0.05)	0.02 (0.07)
GFCF	−0.20*** (0.03)	−0.14*** (0.02)
TOT	0.04 (0.07)	0.11 (0.11)
Y	0.15*** (0.06)	0.21*** (0.05)

Notes: *** indicate significance at the 1% level. Estimations obtained with one lead and one lag. The estimated coefficients for leads and lags of the first differences are not included here. The standard errors, shown in parenthesis, have been obtained by HAC. Full estimation results and diagnostics available upon request.

case of full Ricardian equivalence, where private saving fully offsets changes in public saving, there is no link between government budget balances and current account balances. As is evidenced from our discussion above, the variables in the model do not seem to follow a homogenous pattern in terms of sign and significance across the countries, but rather depend on the country analysed. This underscores the importance of cross-country analyses rather than panel studies.

Next, we test for the stability of the model by applying separately the CUSUM test and Chow test, and the results suggest that the models estimated are not stable when we consider the full sample period.[9] As a next step, we also estimate DOLS model for the period *before* and *after* the beginning of the 2007/8 GFC. The DOLS is estimated as a panel using pooled weights and HAC errors. Hence, we estimate the equations over two sample periods in separate regressions—the first ending in 2008*q*4 and the second from 2009*q*1 onwards. Our results, from both the DOLS in panel, reported in Table 2 show some differences in the parameters and the effects of shocks over the two sample period, which underscores the importance of controlling for the possibility of structural breaks in empirical analyses of the *CA* for the CEECs. Here, after incorporating the possibility of breaks in the parameters in our analyses, we employed the Bai and Perron (1998, 2003a, 2003b) approach and allowed for a maximum of two breaks. In most cases, we find the two breaks to be optimal, except for Poland, where only one break is optimal and Czechia where no breaks are found (see Table 3). This is not surprising since Poland appears to have been the least affected country in the sample by the GFC in the evolution of their GDP. We find that, for all the countries considered, there is always one break occurring between 2008 and 2010, reflecting the GFC. Further, we find the second breaks to be either before 2008, which is likely to be related to EU membership or after 2010, which is likely to be because of the European sovereign debt crisis and the sudden stops in international capital flows. Overall, this exercise also supports the earlier finding of noticeable heterogeneity across the CEECs. Some common responses have been highlighted, however an attempt to infer common response for all CEECs will be misplaced.

The estimates from the *threshold regressions* identify three regimes for the relationships: one for low values of the threshold variable, one for medium-range values and one for higher values. The only exception is again Poland,

TABLE 3 DOLS long-run estimates with breaks

Country	Bulgaria	Czechia	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Slovakia	Slovenia
Variable/ period	2000q3-2006q2	No break model	2000q3-2003q1	2000q3-2003q2	2000q3-2003q2	2004q1-2007q4	2004q1-2012q1	2000q3-2003q4	2004q1-2006q1	2000q3-2011q4
q	1.02**		0.08	1.60**	0.55	0.87**	0.24**	−0.09	0.96	−1.07*
GCo	0.50*		0.69	−0.17	−3.70**	0.39	0.06	0.21**	−0.63**	0.31
GFCF	−0.44**		−0.67**	0.20	0.02	0.11	−0.25**	−0.24**	−0.49**	−0.12**
TOT	−0.12		−1.30**	−2.92**	−0.58	0.40	0.50**	0.14	2.89**	0.64*
Y	−0.04		2.12	−2.51**	1.98**	−0.93**	0.17	0.65**	1.63**	0.04
c	−4.53		−16.8**	17.5**	5.07	0.51	−0.25	−5.69**	−10.6**	3.14**
Variable/ period	2006q3-2009q3		2003q2-2005q4	2003q3-2012q4	2003q3-2008q4	2008q1-2014q2	2012q2-2018q4	2004q1-2013q1	2006q2-2012q1	2012q1-2015q1
q	1.37**		1.93**	0.40**	1.32**	0.90**	0.17	0.00	0.67**	−2.41**
GCo	0.46		−0.61	0.11**	−2.53**	0.03	−0.04	0.20**	−0.18**	−2.47**
GFCF	−0.33*		−0.16	−0.23**	0.20**	−0.46**	−0.05	−0.17**	−0.10**	0.05
TOT	0.52		−1.06**	−1.19*	−0.36	0.93**	0.39**	0.32**	−0.49**	0.75
Y	−0.61		−0.55*	−0.37	−0.03	1.19**	0.49	0.02	−0.27*	−0.26**
c	−1.84		−8.33**	1.26	9.11**	−11.4**	−1.46	−0.53	1.60**	31.09**
Variable/ period	2009q4-2018q4		2006q1-2018q4	2013q1-2018q4	2009q1-2018q4	2014q3-2018q4		2013q2-2018q4	2012q2-2018q4	2015q2-2018q4
q	−0.21		0.58**	−0.18	0.24	1.40**		0.07	0.36**	1.91
GCo	1.05**		0.53**	−0.60*	0.59**	0.65		0.26**	−0.17**	−0.68**
GFCF	−0.20*		−0.19**	−0.13	−0.12*	−0.73**		0.00	−0.11**	−0.14
TOT	−0.24		−1.27	1.36*	−0.05	−0.41*		0.30	0.90**	0.30
Y	−0.15		−0.02	0.18	−0.20	0.59*		−0.32**	0.07	0.25
c	2.53**		−1.31**	5.36*	2.43	−10.8		0.58	0.01	−4.90**

Note: Model estimates with non-breaking one lead and lag of the regressors in first differences. **·* indicate significance at the 5%, 10% level respectively. Estimations obtained with one lead and one lag. The estimated coefficients for leads and lags of the first differences have not been included in this table. The standard errors have been obtained by HAC. Full estimation results and diagnostics available upon request.

TABLE 4 DOLS long run threshold estimates

Country	Bulgaria	Czechia	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Slovakia	Slovenia
Variable/ threshold	$TOT_{t-1}<0.06$	$\Delta CA_{t-1}<-0.01$	$GCo_{t-1}<6.12$	$GCo_{t-1}<8.50$	$q_{t-1}<4.48$	$Y_{t-1}<8.70$	$GCo_{t-1}<9.51$	$GFCF_{t-1}<8.28$	$\Delta CA_{t-1}<-0.02$	$Y_{t-1}<8.87$
q	1.02**	−0.02	0.52	0.50**	−0.48**	1.13**	0.32**	−0.34**	0.06	−0.37*
GCo	0.49**	−0.07	0.55	0.08	−2.66**	0.24**	0.13	0.14**	−0.33**	−1.20**
GFCF	−0.47*	−0.13**	−0.10	−0.26**	−0.03	0.30**	−0.36**	−0.48**	−0.33**	−0.18**
TOT	−0.11	0.33**	−0.41**	−1.05**	0.26	0.54**	0.25	0.19*	−1.53**	1.01**
Y	0.02	0.24**	−0.46**	−0.39*	0.78**	−1.21**	0.37**	0.95**	0.15	1.10**
c	−4.82**	−0.55	−1.58*	3.18**	12.90**	1.43*	−3.40**	−4.95**	3.34**	1.95**
	$0.06<TOT_{t-1}<0.14$	$-0.01<\Delta CA_{t-1}<0.02$	$6.12<GCo_{t-1}<6.35$	$8.50<GCo_{t-1}<8.53$	$4.48<q_{t-1}<4.63$	$8.70<Y_{t-1}<8.79$	$9.51<GCo_{t-1}$	$8.28<GFCF_{t-1}<8.90$	$-0.02<\Delta CA_{t-1}<0.01$	$8.87<Y_{t-1}<8.98$
q	1.46**	0.01	1.62**	0.71**	0.43**	1.07**	−0.02	−0.11	0.42**	0.56**
GCo	0.49**	−0.21*	−0.46	0.46**	−0.12	−1.70	−0.71**	0.15**	−0.24**	−0.70**
GFCF	−0.39**	−0.42**	0.04	−0.08	−0.33**	−0.10	0.05	−0.20**	−0.01	−0.18**
TOT	0.42	0.53**	−0.86**	−2.18**	−0.31*	1.13**	0.10	0.23**	−1.50**	0.28**
Y	−0.54**	0.60**	−0.63**	−0.68**	0.38**	0.59**	0.60**	0.41**	−0.17	0.48**
c	−2.51	−0.65	0.20	0.24	−2.11**	2.38	−0.40	−3.23**	1.57**	−0.38
	$0.14<TOT_{t-1}$	$0.02 < \Delta CA_{t-1}$	$6.35<GCo_{t-1}$	$8.53<GCo_{t-1}$	$4.63<q_{t-1}$	$8.79<Y_{t-1}$		$8.90<GFCF_{t-1}$	$0.01<\Delta CA_{t-1}$	$8.98<Y_{t-1}$
q	−0.17	−0.39**	−0.85**	0.26**	−1.58**	0.80**		−0.47**	−0.20*	0.15
GCo	1.01**	−0.61**	−0.48*	0.02	−0.47**	0.31		0.08	−0.07	−0.63**
GFCF	−0.21**	−0.03	0.05*	−0.29**	0.44**	−0.22*		−0.11**	−0.21**	−0.26**
TOT	−0.27	−0.61**	−0.27	−0.16	0.99**	1.09**		0.55**	−0.90**	−0.00
Y	−0.13	0.63**	0.63**	0.38**	−0.77**	0.07		−0.13**	0.27**	0.83**
c	−3.50**	0.69	1.59	−2.72	13.76**	−4.93*		3.74**	0.52	−1.63**

Note: Model estimates with non-breaking one lead and lag of the regressors in first differences. **·* indicate significance at the 5%, 10% level respectively. Estimations obtained with one lead and one lag. The estimated coefficients for leads and lags of the first differences have not been included in this table. The standard errors have been obtained by HAC. Full estimation results and diagnostics available upon request.

with only two regimes. Our results of the *threshold regressions* reported in Table 4 find that lagged *GCo* is the key variable driving the relationship between the *CA* and its fundamentals in Estonia, Hungary and Poland. Lagged *CA* changes drive the relationships in Czechia and Slovakia, lagged *Y* is found to be the driver in Lithuania and Slovenia, whereas lagged *TOT*, *RER* and *GFCF* are identified as the main drivers in Bulgaria, Latvia and Romania, respectively. To put the results in perspective, there is evidence of heterogeneity in the impacts of the fundamentals and the structural breaks, across the CEECs, which underscores the importance of individual country level studies for the CEECs. Similar evidence of heterogeneity is found by Staehr (2010), who suggests four "clusters" of countries—*the casualties*, *the activists*, *the hardliners*, and *the outlier* based on their policy response to the GFC.

5 | CONCLUSIONS

Although the strength of the growth record in the CEECs since the end of central planning is open to interpretation, there is significant agreement by international institutions, such as the World Bank and IMF that over the past two decades growth in most of the CEECs has been above the average of emerging market countries with the three Baltic countries (Estonia, Latvia and Lithuania) among the top five emerging market performers. As these countries integrate into the EU, better understanding of the drivers of capital flows to or from these countries make the study of the determinants and evolution of the current account topical and instructive. This study analyses how the current accounts for a group of CEECs have evolved and, in particular, the relationship between the *CA* and its main fundamentals (the real exchange rate, terms of trade, investment, government consumption and income). Analysing a cointegrating relationship, which we estimate employing a DOLS model and allow for time-varying parameters and dependent threshold variables, our results highlight the importance of employing models that allow for structural breaks and employing the use of threshold models when analysing the CA. We show this using data for the CEECs, that these are necessary when analysing the long-run relationship between the *CA* and its fundamentals. Although the results and inferences thereof are not the same for all the CEECs in our sample and are country-dependent, we can make policy recommendations from the estimated results. Policymakers should know that "emulate-thy-neighbour" policies across the CEECs are likely to be sub-optimal since there are marked differences in the fundamentals driving the *CA* across the countries. Each country's policymakers will do well to establish their national targets for the *CA*, and forecast the evolution appropriately, by employing empirical models such as the ones presented here. Nevertheless, we have also highlighted that *investment* and *TOT* appear to be most important across most of the CEECs. Finally, we have also shown that structural breaks in these countries should not be ignored since they affect the relationships between the current accounts and their fundamentals.

DATA AVAILABILITY STATEMENT

The data (Main Balance of Payments and International Investment Position items as share of GDP [BPM6]) that support the findings of this study are openly available in (Eurostat database) at both https://ec.europa.eu/eurostat/web/products-datasets/-/bop_gdp6_q and https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=bop_gdp6_q&lang=en, reference number bop_gdp6_q.

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ENDNOTES

[1] For a detailed discussion on the relevance of the current account for national accounts, we refer the interested reader to Obstfeld (2012).

[2] Others are Bussiere, Fratzscher, and Muller (2004), Ghosh (1995), Işcan (2002), Nason and Rogers (2006) and Otto (1992). It is plausible that other variables including measures relating to demography (e.g., population growth and dependency ratios) and resource dependency can also be considered.

[3] The current account is being defined, here, as a country's net trade in goods and services, its net earnings on cross-border investments, and its net transfer payments over a defined period.

[4] Such delimitation resulted from the classification provided by the Organization for Economic Co-operation and Development (OECD). OECD also includes Albania in the group of CEECs, but *Eurostat* data were not available for Albania and, therefore, it is not included in our analysis. It should be added that Central and Eastern Europe, depending on the adopted criteria, can also include Belarus, the Ukraine, Bosnia and Herzegovina, Serbia, Montenegro, Macedonia, or Kosovo (unrecognized by some countries in the world).

[5] Results available upon request.

[6] See Stock and Watson (1993) for detailed support. We thank an anonymous referee for the suggestion to provide the citation.

[7] During the GFC, several of these countries faced tightening of credit conditions. However, foreign ownership of major banks provided a safety net which would otherwise would have been unavailable (see Staehr, 2010).

[8] The Harberger–Laursen–Metzler effect posits that adverse transitory terms of trade shocks lead to reduction in current incomes

that is greater than that in permanent income, which then leads to a decline in savings and, thus, a deterioration in the *CA* position.

[9] For brevity, these test results are not reported here but are available on request.

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How to cite this article: Coleman S, Cuestas JC. Has the current account broken up with its fundamentals in Central and Eastern Europe? *Int J Fin Econ*. 2021;1–19. https://doi.org/10.1002/ijfe.2458