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How interdependent are Eastern European economies and the Euro area?

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ABSTRACT

This article investigates the interrelations between the Euro area and five Central and Eastern European economies. Using an open economy framework, we derive theoretical restrictions to be imposed on the cointegration space of a structural vector error correction model. We employ generalized impulse response analysis to assess the effects of shocks to output, interest rates, the exchange rate, and relative prices on both areas. The results show strong inter-regional spillovers of output shocks with the magnitude being similarly strong in both areas. Furthermore, we find multiplier effects in Central and Eastern Europe and some evidence for the European Central Bank's desire for price stability.

1. Introduction

Since the fall of the Iron Curtain, integration between Western Europe and Eastern Europe proceeded at a remarkable pace. While there were doubtlessly also backlashes, the overly successful process culminated in the accession of the Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia to the European Union (EU) on May 1, 2004. Bulgaria and Romania followed suit on January 1, 2007 and Croatia on July 1, 2013. Since then, seven of these countries even managed to adopt the Euro as their single currency.

The process of economic integration unfolded in several areas: While the Central and Eastern European (CEE) countries predominantly benefited from being net beneficiaries of the European Cohesion Policy and the Common Agricultural Policy as well as from high Western FDI inflows, old EU-15 member states gained by having access to new unsaturated markets (see for example Bevan & Estrin, 2004; Breuss, 2001; Carstensen & Toubal, 2004; Matkowski & Próchniak, 2007). Barriers to labor mobility between the EU-15 and the CEE countries were continuously removed (European Commission, 2008) and several agreements have achieved the elimination of trade barriers with a positive impact on economic growth and welfare in both regions (Egger & Larch, 2011). Furthermore, increased international fragmentation of production due to outsourcing and off-shoring of firms located in old EU member countries to low-wage new member states enhanced the international competitiveness of EU-based firms (Guerrieri & Caffarelli, 2012).

The global economic and financial crisis has demonstrated that the increased interconnectedness of European economies, besides all advantages, also bears risks – especially the risk of contagion during recessions. While the presence of foreign-owned banks is often seen to have mitigated the adverse impact of the crisis in Eastern Europe (see Berglöf, Korniyenko, Plekhanov, & Zettelmeyer, 2010), a high degree of trade openness passed on the drop in industry production from the old EU member states to the CEE countries (Keppel & Wörz, 2010).

Despite all these strong ties, the macroeconomic interdependencies between the EU-15 and the new CEE member states have only most recently attracted the attention of the empirical literature. This is mainly due to a lack of sufficiently accurate data

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and the unsatisfactorily short coverage of time series (Benkovskis, Bessonovs, Feldkircher, & Wörz, 2011). It is, however, of utmost importance to have accurate tools at hand to assess the economic implications of inter-regional shocks in an increasingly interdependent Europe (see also EBRD, 2012; IMF, 2012, for a discussion). We attempt to contribute by outlining an appropriate framework for investigating the interrelations between the 12 initial member countries of the Euro area and the five Eastern European countries Czech Republic, Hungary, Poland, Slovakia, and Slovenia (henceforth CEE-5). In so doing we make use of aggregate Euro area data for GDP, interest rates, and prices and construct a corresponding data file for the CEE-5 that additionally contains a price differential variable and an exchange rate between the Euro and the artificially calculated aggregate currency of the CEE-5.[1] We use this dataset to analyze the effects of shocks to output and to interest rates on the corresponding other region as well as the effects of shocks to the exchange rate and to relative prices on both regions. As a robustness check, we repeat our analysis for the largest economies of our CEE-5 aggregate – the Czech Republic, Hungary, and Poland – separately.

The methodology we rely on is based upon a series of papers (Garratt, Lee, Pesaran, & Shin, 1999, 2003, 2006; Pesaran & Shin, 1998), in which the authors argue in favor of using a structural vector error correction model (SVECM) combined with generalized impulse response analysis to assess the effects of exogenous shocks on macroeconomic variables. The advantages of this model class over other approaches like vector autoregressive models (VARs), structural vector autoregressive models (SVARs) and standard vector error correction models (VECs) are that theoretically derived long-run relationships – which are deemed to be more credible than theoretically derived short-run relationships – are used to identify cointegrating relations, and that the ordering of endogenous variables neither matters for the cointegration space nor for the impulse response analysis. Altogether this minimizes the investigator's need for arbitrary assumptions and modeling choices.

The following studies are related to our analysis: Jiménez-Rodriguez, Morales-Zumaquero, and Égert (2010) assess the preconditions for the well-functioning of an enlarged monetary union. In investigating this issue, the Euro area and the United States are considered as the foreign economy in a near VAR model. The CEE countries show a high degree of homogeneity in response to exogenous shocks, indicating a good pre-condition for joining the monetary union. Benkovskis et al. (2011) analyze the transmission of monetary policy shocks from the Euro area to Poland, Hungary, and the Czech Republic. They employ a factor augmented VAR (FAVAR) model and show that there are substantial effects of Euro area monetary policy on economic activity in the considered CEE countries, which mainly operate through the interest rate channel and through changes in foreign demand. Crespo-Cuaresma, Eller, and Mehrotra (2011) explore the transmission of fiscal shocks from Germany to the CEE-5 countries. They use a structural VAR model and show that a fiscal expansion in Germany triggers expansionary fiscal policy measures in all five CEE countries.[2] After we embarked on our project, Backé, Feldkircher, and Slačík (2013) and Feldkircher (2013) have also contributed to the understanding of the spillover effects of output and interest rate shocks to the CEE countries. Their global VAR (GVAR) model is not based on theoretical restrictions of the cointegration space and they do not provide confidence intervals for the impulse response functions. However, the point estimates of their impulse response functions hint toward positive output spillover effects and negative interest rate effects from Western Europe to the CEE countries, which is consistent with our findings. We see their approach and ours as complementing strategies to uncover the dynamic interrelations between Western Europe and the CEE countries. Implementing a theory-driven GVAR framework as a natural next step is left as a promising task for future research on this topic.

This short overview indicates that the existing empirical work is either based on time-series applications without theoretical foundations or otherwise shocks are identified via theoretical *short*-run restrictions. To the best of our knowledge, there exists no paper that applies a similar modeling strategy like Garratt et al. (2006) to the CEE region. The contribution of our paper is therefore twofold: First, we construct a dataset for the CEE-5 that is suited to study the interrelations between these economies and the Euro area and second, we use state-of-the-art econometric techniques to minimize the effects of arbitrary assumptions and modeling choices.

Our paper proceeds as follows: Section 2 is devoted to a description of the underlying theoretical framework, Section 3 describes and assesses our econometric specification, in Section 4 we present the results and our robustness checks, and Section 5 concludes.

2. The theoretical model

In this section we derive restrictions on the cointegration space of the SVECM. In so doing we generalize the model used by Prettner and Kunst (2012) to allow for two different currencies in the two economic areas under investigation.

2.1. Consumption side

Assume that there are two economies, each of which is populated by a representative household who chooses sequences of consumption goods produced at home and abroad to maximize its discounted stream of lifetime utility

$$\max_{\{C_t\}_0^\infty,\{C_t^*\}_0^\infty} \sum_{t=0}^{\infty} \beta^t \left(C_t^\alpha C_t^{*1-\alpha}\right). \tag{1}$$

In this expression $\beta = 1/(1+\rho)$ is the subjective discount factor with $\rho > 0$ being the discount rate, t is the time index with $t = 0$ referring to the present year, C_t denotes consumption of the domestically produced aggregate (which we take as the numéraire good), and an asterisk refers to the foreign economy such that C_t^* describes consumption of the aggregate produced abroad. The utility function has a Cobb–Douglas representation with $0 < \alpha < 1$ being the share of the consumption aggregate produced at home. The household has to fulfill a budget constraint ensuring that its expenditures and savings in period t do not exceed its income. Furthermore, households are subject to a cash-in-advance constraint in the spirit of Clower (1967) such that individuals are only allowed to buy consumption goods with money and not with wealth that is invested in capital or bonds. The two constraints of the household can be written as

$$C_t + \frac{P_t^*}{e_t}C_t^* + K_t + B_t + \frac{B_t^*}{e_t} + M_t = (1+r_t)K_{t-1} + w_t L_t + \frac{1+i_t}{1+\pi_t}B_{t-1} + \frac{1+i_t^*}{1+\pi_t^*}\frac{B_{t-1}^*}{e_t} + \frac{M_{t-1}}{1+\pi_t}, \tag{2}$$

$$C_t + \frac{P_t^*}{e_t}C_t^* \leq \frac{M_{t-1}}{1+\pi_t}, \tag{3}$$

[1] See Appendix B for details on the construction of the dataset.

[2] See also Fidrmuc and Korhonen (2006), Égert, Crespo-Cuaresma, and Reininger (2007), and Égert and MacDonald (2009) for surveys regarding the business-cycle correlation, the interest rate pass-through, and the monetary transmission mechanism in CEE, respectively.