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# Real and Financial Sector Studies in Central and Eastern Europe: A Review\*

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## *Abstract*

*This survey focuses broadly on real and financial sector studies in former transition economies of Central and Eastern Europe. The survey shows that in the real sector there has been considerable trade and global integration in the post-transition period. Moreover, there is no uniform evidence regarding convergence or divergence from the surveyed empirical studies regarding business cycles in Central and Eastern Europe. Financial sector studies show that foreign bank ownership is associated with higher banking efficiency than in the case of domestic bank ownership and significant return and volatility transmission also from core European financial markets. However, the recent global financial crisis significantly affected these patterns. Finally, central bank communication seems to have significant wealth effects in financial markets and tends to reduce financial market uncertainty.*

## **1. Introduction**

Even though there is an abundance of research focusing on different aspects the economies of Central and Eastern Europe (CEE) in the post-transition period, inadequate attention has been paid in the literature to reviewing existing research on business cycle synchronization, convergence, global integration, foreign direct investment and financial markets in the CEE region.<sup>1</sup> This issue is germane since the recent Greek crisis has shown that in the absence of proper business cycle synchronization, premature adoption of a common currency can leave policymakers with few options in dealing with adverse economic shocks.

After the collapse of communism, the CEE countries began a rapid transition that led to a significant increase in trade both in goods and services and in financial assets with the rest of Europe. It is known that trade intensity accelerates the cross-country synchronization of business cycles. Trade intensity is associated with highly correlated business cycles in a wide range of theoretical models, ranging from multi-sector international models with intermediate-good trade to one-sector versions with

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<sup>1</sup> Fidrmuc and Korhonen (2006) provided a meta-analysis of business cycle correlation between the euro area and the Central and Eastern European countries. Babecký and Campos (2011) reviewed evidence of the effects of structural reforms on economic growth, with emphasis on the experience of the transition economies. Hanousek *et al.* (2011) presented a survey and meta-analysis on foreign direct investment in emerging European markets. Cuaresma *et al.* (2014) conducted a meta-analysis of studies of foreign currency loans in CEE countries.

technology or monetary shocks. Accordingly, Classic Ricardian or Heckscher-Ohlin specialization may mitigate the direct effect of openness to goods trade, whereas financial integration may decrease (or increase) synchronization, but will also unambiguously induce specialization (Imbs, 2004).

Have business cycles within CEE and within the euro area become more similar over time due to trade integration and financial linkages so that “one size fits all” is an optimal policy? There are two opposing views on this issue. One view, dubbed the “optimistic view” by de Haan *et al.* (2008) and shared by European policymakers, argues that further economic and monetary integration will lead to less divergence. This is the original argument put forward by Frankel and Rose (1998), which is that international trade patterns and international business cycle correlations are endogenous, hence countries are more likely to satisfy the criteria for entry into a currency union after taking steps toward economic integration. This view is in contrast to Krugman (1991), who argues that due to economies of scale and scope, industry concentration patterns may mimic those of the US and therefore sector specific shocks become region-specific shocks, leading to asynchronous business cycles. Despite the body of research conducted to date, there is no consensus in the literature on the relationship between integration and business cycle synchronization. Moreover, Weyerstrass *et al.* (2011) find no “euro effect”: the introduction of the euro in 1999 does not seem to have generated a very strong impact on synchronization.

This paper surveys the empirical literature dealing with the real and financial sectors, focusing on former transition economies of Central and Eastern Europe. More specifically, we focus on the new eurozone countries, eurozone candidate countries and countries that are candidates for accession to the European Union. Regarding real sector studies, we survey productivity and trade, economic growth, FDI, the Balassa-Samuelson effect and business cycle convergence. In doing so, we are also able to examine whether the Central and East European experience supports Krugman’s (1991) argument that integration leads to more specialization and less business cycle synchronization.<sup>2</sup> A review of financial sector studies includes banking sector efficiency, return and volatility transmission in the CEE region, central bank communication and interactions between fiscal and monetary policy.

The remainder of the paper is organized as follows: Section 2 reviews trade and FDI studies. Section 3 surveys studies on productivity and the Balassa-Samuelson effect. Section 4 discusses the literature on financial markets, banking sector efficiency and monetary and fiscal policy. Section 5 reviews business cycle synchronization studies. Section 6 offers some concluding comments.

## **2. Trade Liberalization and FDI**

### **2.1 Trade Liberalization**

Petreski (2013) analyzed the impact of CEFTA-2006 on trade and provided a quantitative comparison with the original CEFTA and with trade liberalization under the EU integration process. Annual data sets comprising thirty-six countries over the period 1993–2010 were used in this paper. Estimates are obtained with the generalized method of moments (GMM) estimator by using heteroskedasticity

<sup>2</sup> Fidrmuc *et al.* (2014) test a similar hypothesis for Krugman’s (1991) argument for China.

and autocorrelation-corrected standard errors. The empirical evidence suggests that CEFTA-2006 exerted a positive, significant and large effect on trade in Southeastern Europe. The effect of CEFTA-2006 has been estimated to be larger than the effect of the stabilization and association agreements (SAA). Increasing cooperation, reduction of nontariff barriers to trade, coordination of the process of attracting foreign direct investment, harmonization of public-procurement rules, and other factors will likely bring significant benefits to the region.

Ekmen-Özçelik and Erlat (2014) tested the static and dynamic comparative advantages of Turkish exports in the EU15 market in relation to the exports of the non-EU15 countries for the period 1996–2010. They used export data measured in US dollars at the three-digit sector level. Dividing their sample into two periods (1996–2003) and (2004–2010) and based on the revealed comparative advantage (RCA) index, they showed that in most RCA sectors there is successful restructuring of Turkey's exports from the first to the second sub-period. Their analysis showed that the countries are heterogeneous in terms of the variety of products in which they have comparative advantages, whereas they are relatively more homogeneous in terms of the contribution of RCA exports to their total export earnings.

Hanousek and Kočenda (2014) investigated determinants of bilateral trade among European countries for the period 1992–2008. They considered the effects of several factors such as geography, culture, institutions, infrastructure and trade direction on four types of goods: primary goods, parts and components, capital goods and consumer goods. By using a standard gravity model, they showed that geographical, cultural and institutional factors were significant with respect to trade but individual effects varied across the types of goods and measures of trade.

By means of panel data analysis, Maurel (2004) aimed to analyze the paradox with a decrease in credit market imperfections in a country entering a currency union for European countries. Her sample consisted of 15 EU countries (Austria, Belgium, Luxembourg, Denmark, France, Germany, Greece, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom) plus the CEE countries (the Czech Republic, Hungary, Poland, Slovenia, Slovakia, Romania and Bulgaria), the three Baltic States (Estonia, Lithuania and Latvia) and Russia for the period 1990–2000.<sup>3</sup> Empirical findings suggest that fixing the currency would not increase trade in the EU countries because Austria, Sweden and Finland did not have any trade-creation effects after joining the EU. Hence the study concluded that the trade-creation effect within a currency union is derived only partially from the mere reduction in transaction costs through the elimination of exchange rate volatility. Finally, this study concludes that external constraints matter and the process of trade integration is accompanied by monetary and fiscal policy coordination both within a currency union and within any exchange rate regime.

## 2.2 Foreign Direct Investment

There is also extensive literature that investigates the relationship between economic growth, FDI, financial development and capital mobility. For example,

<sup>3</sup> As our focus is on Central and Eastern European countries, we do not review studies that cover Russia as a separate country. We consider studies that include Russia more as a reference or take Russia as an additional sample country.

Buch and Piazzolo (2001) examined the effect of trade and capital flows on the process of EU enlargement for the Central and Eastern European countries (Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia) by using cross-country OLS regressions. Using a cross-section data set to determine the determinants of cross-border trade and capital flows, they calculated the degree of integration of the CEE countries. Unlike previous studies that used country level data, Buch and Piazzolo considered regionally disaggregated data and showed that international bank claims, portfolio investments, trade and FDI flows were the most important determinants of EU accession and that joining the EU led to an increase in capital flows from EU member countries. Moreover, EU accession led to more goods being imported from other EU countries than non-member countries. Finally, most EU candidate countries were far below the expected levels in terms of the effects of EU membership on asset holdings and trade flows.

Altomonte and Guagliano (2003) looked at the determinants of FDI flows in the countries from two regions (CEE and South Mediterranean) because specific agreements that had been signed by the ten CEE countries in the early 1990s for accession to the EU and the historic partnership that had been developed since 1995 with all the South Mediterranean countries (the so-called Barcelona process) led to the creation of a free trade area. The study uses micro-level cross-sectional and time series data covering 48 industries over eight years (1990–1997) in eleven Mediterranean countries (Algeria, Cyprus, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, Syria, Tunisia and Turkey) and ten Central and Eastern European countries (Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia) and a panel probit model in the empirical analysis. While the dependent variable was the number of investments undertaken by European multinational enterprises, three general FDI determinants such as demand-related variables, comparative advantages and institutional variables were considered as independent variables. Empirical findings suggested that the CEE countries have greater potential than Mediterranean countries to attract FDI flows.

Carstensen and Toubal (2004) examined the determinants of foreign direct investment in CEE countries by using yearly data for the period 1993–1999. Their sample consisted of ten OECD countries, Austria, Belgium, Denmark, France, Italy, Germany, Portugal, Spain, the UK and the US, and seven CEE destination countries, namely Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia. Using dynamic panel data methods, they considered several explanatory variables that may affect foreign direct investment. They classified explanatory variables as traditional and transitional variables. The traditional variables were the market potential of the host country, tariffs, unit labor costs, the fraction of skilled labor to total labor, the relative labor-capital endowment and the corporate tax rate. The transitional variables comprised private market share, a political risk index and a measure of the method of privatization. Empirical results showed that the estimated parameters of the variables were consistent with theoretical expectations and the effect of market potential on FDI was robust and positive among the traditional variables. On the other hand, transitional variables were significant and consistent with *a priori* expectations and hence they concluded that traditional variables alone were not sufficient to explain FDI. They also separated countries into two broad groups and found that the CEE countries were the most successful in attracting FDI.

Bevan and Estrin (2004) inspected the determinants of FDI from Western countries to transition economies by using panel data analysis for the period 1994–2000. Western countries consisted of the EU15, Korea, Japan, Switzerland and the US; the transition countries were Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia Republic, Slovenia and Ukraine. They considered GDP for home and host countries, unit labor costs, interest rate differentials, openness to trade, and institutional, legal and political factors as potential determinants of FDI in the study. A panel data model with random effects suggested that FDI was related positively to both source- and host-country GDP and inversely related to the distance between the countries and unit labor costs. Hence, investment to the CEE region has been both market seeking and efficiency seeking. Finally, they found that the EU enlargement process for transition economies is important in terms of FDI because the EU enlargement announcement led to increased FDI flows into the CEE countries.

Demekas *et al.* (2007) investigated the determinants of FDI inflows in European transition countries for the period 1995–2003. The sample was based on bilateral data and consisted of FDI flows and stocks between 16 host and 24 source countries. The host countries are Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, the Former Yugoslav Republic of Macedonia, Hungary, Moldova, Poland, Romania, Slovakia, Slovenia, Serbia and Montenegro, Estonia, Latvia and Lithuania. The source countries were the EU15 plus Croatia, Cyprus, the Czech Republic, Hungary, Poland, Russia, Slovenia, Switzerland and the US. The study distinguishes between privatization-related FDI, namely foreign investments to acquire a controlling stake in state-owned companies under privatization, and no privatization-related or “underlying” FDI. They formally tested the hypothesis that the importance of individual policy changes is sensitive to reaching a certain level of income. Finally, the paper also focused on the impact of policies that influence FDI flows. They focused on two types of variables: gravity variables measuring market size and the proximity between the source and host countries and policy variables that the government can influence in the short or medium term. Empirical results showed that gravity factors (such as the size of the host market and the geographical and cultural proximity between source and host country) were significant in explaining FDI levels in Central and Southeastern Europe and the Baltic countries. Moreover, the existence of a certain threshold level for GDP accelerated FDI inflows.

Mehic *et al.* (2013) explored the impact of foreign direct investment (FDI) on economic growth for seven Southeastern European countries (SEE) covering the period 1998–2007 by using the panel data estimation methodology. The principal variable of interest in their analysis, the FDI variable, was measured as FDI stock rather than FDI flows. In addition, they incorporated into the model a domestic investment variable and a set of control variables: trade openness, government balance and the inflation rate. The results provide evidence that FDI has a positive and statistically significant effect on economic growth in transition economies. The results further suggest that there seems to be a strong tendency for convergence in these economies. Trade openness and macroeconomic stability, represented by the inflation rate, are also key determinants of economic growth. They found no evidence of inverse causality. Including more control variables to better capture host-

country characteristics and giving the panel a larger timeframe would certainly contribute to more reliable estimates of the effects of FDI on economic growth.

Silajdzic and Mehic (2015) studied the impact of FDI on economic growth. The study covers ten CCE countries, namely Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia, and the sample period is from 2000 to 2011. Their analysis incorporated variables measuring the absorptive capabilities of host countries, such as research and development indicators, as well as variables on domestic and foreign capital accumulation. Silajdzic and Mehic (2015) found that FDI has an exogenous positive impact on economic growth. However, the impact of FDI on growth gets larger when the given host country has more absorptive capacity and a higher level of technological development.

To examine the degree of capital mobility, Taslaman and Kayikci (2013) analyzed the saving and investment relationship of twenty-eight EU member countries for the period 1980–2012 using panel cointegration and other methods. Empirical results showed that saving and investment were correlated in the long run. There was also a moderate level of capital mobility in the short run, suggesting that the Feldstein-Horioka puzzle is not valid for these countries. The level of capital mobility is also higher in the fifteen members of the European Union which joined before 2004 than in the other members of the European Union.

### **2.3 FDI and Growth**

There are also extensive studies that focus on economic growth with respect to production similarity for emerging and candidate European Union countries. Using a standard neoclassical growth model, Krkoska (1999) simulated the transition experiences of five Central European countries, namely the Czech Republic, Hungary, Poland, Slovakia and Slovenia. To compare the data with the model of a transition economy, the study used a Monte Carlo simulation for 1989–1997 using annual macroeconomic indicators. The empirical results showed that macroeconomic fluctuations in transition economies are consistent with the properties of the unconditional second moments both predicted by the theoretical model and estimated for a control group of Western European economies.

Rusinova (2007) emphasized the importance of input factors in determining long-run growth for transition countries by using annual data for the period 1990–2002. Using cross-sectional growth equations with spatial econometric models, population growth, investment, schooling and initial income as factor inputs and data on macroeconomic stabilization, economic reforms, initial conditions and institutional variables as independent variables, the empirical results suggested that the factor inputs had a significant effect on growth in transition countries. The study emphasized that factor inputs should be considered in the empirical analysis of growth determinants for the transition countries. Moreover, considering the spatial effect in the estimation process increases the significance of the explanatory variables.

Horvath (2012) focused on confidence spillover effects between the Czech Republic and Germany in terms of economic growth. For this purpose, the study examined whether confidence indicators improve the forecasts of future economic activity in the Czech Republic for the 1999Q1–2001Q1 period by means of a vector

autoregression (VAR) model. Estimating a VAR model with real GDP growth and consumer prices, the interest rate and the exchange rate, the empirical results suggested that even though confidence indicators are contemporaneously well correlated with GDP, they do not help improve the GDP forecasts *vis-à-vis* the base-line macro-economic model. In addition, German confidence indicators are relevant for forecasting Czech Republic economic activity, which is related to business cycles transmission from Germany to the Czech Republic.

Gurgul and Lach (2012) evaluated the presence of a causal link between financial development and economic growth in Poland for the period from January 2000 to April 2001. The empirical research was performed in two variants: bank and stock market approaches. The paper used several econometric techniques to test for both linear and nonlinear Granger causality between GDP and financial development in the Polish economy. Using bank and stock market data, the results indicated the presence of causal link running from stock market development to economic growth and from economic growth to banking sector development prior to the crisis. The results of the causality analysis performed for the pre-crisis subsample indicated the existence of significant unidirectional short-run and long-run impacts of real *per capita* GDP on both bank-related proxies for financial development in Poland. Causality running from economic growth to the banking sector may indicate that a more developed economy has a more developed banking system. Moreover, it was concluded that a more developed stock market leads to higher economic growth. In order to examine the impact of the 2008 financial crisis on financial sector-GDP causal links in Poland, they compared the results of the research performed for the full sample and the pre-crisis subsample. This comparison provided a basis for claiming that during the 2008 financial crisis the banking sector had a much more significant impact on economic growth than before the crisis.

Cojocaru *et al.* (2016) explored the impact of financial development and economic growth using a broad set of 25 transition economies. They used several measures of the financial system, including indicators of financial efficiency and financial depth. For measures of financial development, they utilized the characteristics of the banking system. The dataset includes fifteen CEE countries (Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Montenegro, Poland, Romania, Serbia, Slovakia and Slovenia) and ten CIS countries (Armenia, Belarus, Georgia, Kazakhstan, the Kyrgyz Republic, Moldova, the Russian Federation, Tajikistan, Turkmenistan and Ukraine) for the period 1990–2008. Their results, based on GMM estimations, indicated that interest rate spreads and bank overhead costs in particular have played an important role on economic growth in the transition economies. In addition, financial system efficiency, competitiveness and the amount of private sector credit provided by the banking system are also important.

### **3. Productivity and Balassa-Samuelson Effects**

#### **3.1 Productivity Growth**

When we look at the studies that focus on the relationship between productivity and globalization for emerging European countries, the main finding of the literature is that globalization provides a positive impact on productivity for

the countries in question. In this sense, Kutan and Yigit (2009) examined the implications of integration and globalization on labor productivity at the industry level in eight Central and Eastern European countries that joined the EU in 2004, namely the Czech Republic, Estonia, Hungary, Poland, Latvia, Lithuania, Slovakia and Slovenia. They used a fixed effects panel estimation over the period 1995–2006, correcting for potential heteroscedasticity in the cross sectional dimension. In this study, individual effects of exports and imports on labor productivity were tested separately and obtained country-level evidence. The indicators were divided between domestic (R&D expenditure, investment and secondary education) and international (productivity gap, imports, exports and FDI) variables. They found that all international innovation factors play a significant role in explaining labor productivity. Regarding domestic variables, they found that human capital is the most important source of labor productivity growth in the new member states. FDI and exports improve productivity, but imports hurt it.

Parteka and Wolszczak-Derlacz (2013) explored the relationship between labor productivity growth and trade integration with the European Union from the perspective of the post-transition economy of Poland. Their empirical analysis is based on bilateral data concerning manufacturing sectors in Poland (as the home country) and statistics referring to sectors in single-partner countries in the EU. They focused on twelve manufacturing activities during the period 1995–2006. They used an error correction model to estimate both short-term and long-term effects of explanatory variables on productivity. Sector-level data show that relative productivity levels in manufacturing in Poland remain lower than the European standard. Their results indicate that trade integration, influencing the degree of openness of single sectors, can be considered among the strong positive determinants of relative labor productivity growth in Polish manufacturing. Their main results suggest that change in openness is not only important for domestic productivity developments, but also for the relative trade position *vis-à-vis* the partner country.

Masso and Vahter (2014) examined how changes in the export product portfolio are related to the aggregate export growth and productivity differences among Estonia's exporters. They used firm- and export-product-level data from the full population of exporters from Estonia for the period before and after Estonia's accession to the European Union, covering the period 1995–2009. Their empirical analysis is based on various decomposition methods and regression analysis. They estimated fixed effects regression models to describe the association between product churning, concentration on core competence products and firm-level productivity. They showed that the importance of product-level dynamics within firms for aggregate trade growth in Estonia. They found that both the relative importance of firms' entry into the export market and the role of product-level entry significantly increase in the total export volume for Estonia after EU accession in 2004. They also showed that concentration on core competence products within a firm has a rather different association with productivity in different firm size groups in Estonia.

To compare the determinants of firms' export performance in two groups of new EU member states, Cieřlik *et al.* (2015) studied three Baltic states (Estonia, Latvia and Lithuania) and four Central European countries (the Czech Republic, Hungary, Poland and Slovakia) in three separate years: 2002, 2005 and 2009. They argued a new strand in the new trade theory stressing the link between export



performance and firm heterogeneity expressed in terms of productivity. They estimated probit regressions using pooled data sets separately for the two country groups. Analyzing multi-country firm-level export determinants in each group, they formally tested for differences between the two country groups. Therefore, they used the standard probit procedure on the pooled cross-section dataset without controlling for individual firm effects, though they controlled for time-specific and industry-specific effects. They found that firms' export performance was positively related to the level of productivity, firm size, the share of university graduates in productive employment, spending on R&D activities and the internalization of firms measured by foreign ownership. They showed that despite some differences in the estimated parameters between the Baltic states and the Central European countries, the formal tests indicated that the results obtained for these two groups of countries were not statistically different.

Majcen *et al.* (2009) used survey data in considering the factors that induce productivity changes in foreign subsidiaries in the manufacturing sectors of five CEE economies (Estonia, Hungary, Poland, Slovakia and Slovenia). According to the ordered probit model results, corporate governance, production capability and market orientation were significant variables for productivity. In addition, having a foreign parent company was a key determinant of productivity in which majority foreign equity shareholding is significantly and positively related to productivity growth. They also concluded that regional characteristics have a strong effect on productivity changes.

Hanousek *et al.* (2015) researched factors that affect the corporate technical efficiency of firms in 22 European countries by using a stochastic frontier model. They considered firm-level unbalanced panel data of 337,5595 firm/year observations for the period of 2001–2011 and divided their sample into two sub-samples comprising the old and new EU countries and according to sectors to determine the presence of (or lack of) differences between the old and new EU countries. In this context, they considered data for Austria, Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Portugal, Spain, Sweden and the United Kingdom as the old EU countries and for Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Poland, Romania, Slovenia and Slovakia as the new EU countries. They also divided their sample according to firms' operating sectors such as the manufacturing and services sectors. Their results suggested that there was a significant relationship between firm size, firm leverage and efficiency, where smaller firms are more efficient than larger firms and greater leverage leads to increased efficiency. Furthermore, a relationship between capital structure and concentrated ownership and efficiency was detected. Finally, efficiency levels were different during the pre-crisis period (2001–2008) and the post-crisis period (2009–2011).

### **3.2 Balassa-Samuelson Effects**

Overvalued real exchange rate and high inflation were endemic features in the CEE countries during the EU accession period and this phenomenon had attracted considerable attention in the literature because real exchange rate appreciation and high inflation rates have cast doubts on whether these countries could satisfy the Maastricht criteria. Therefore, a large number of studies have examined real exchange rate appreciation and inflation dynamics in the CEE countries in terms of the so-called Balassa-Samuelson effects.

For instance, Egert (2002) analyzed the presence of the Balassa-Samuelson effect in the five Central European transition countries, namely the Czech Republic, Hungary, Poland, Slovakia and Slovenia, in terms of three aspects. First, the study examined the link between the productivity growth differentials of the traded goods and non-traded goods sectors for the countries in question. Second, when Germany and the US were considered as benchmarks for price and productivity developments, the relationships between relative prices and the real exchange rate were examined. Finally, the author investigated whether inflation differentials were behind real exchange rate appreciation during the transition. The change in labor productivity in the industrial sector, the relative prices of non-traded goods relative to traded goods, and the real exchange rate were compared in the period from January 1991 to December 2000 for the Czech Republic, Hungary and Poland and from January 1993 to December 2000 for Slovakia and Slovenia. By using Johansen VAR-based cointegration analysis, the study validated the Balassa-Samuelson effects in these countries, where these effects on inflation and the real exchange rate varied across the countries. Accordingly, the Maastricht inflation criteria may not be a problem with respect to these countries' accession to the Economic and Monetary Union (EMU).

Egert *et al.* (2003) tested the presence of the Balassa-Samuelson effects in nine transition countries, namely Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia for the period 1995–2000 by using panel unit root and panel cointegration tests. The quarterly data set consisted of labor productivity, the relative price of non-traded goods and real exchange rates for the open and the sheltered sectors. Their empirical results showed that productivity growth in the traded goods sector Granger caused non-tradable inflation. On the other hand, this finding did not imply that productivity gains will be reflected automatically in overall inflation and thus in an appreciation of the real exchange rate.

Lommatzsch and Tober (2004) calculated real equilibrium exchange rates for the Czech Republic, Hungary and Poland by using macroeconomic balance models to better understand actual exchange rate movements for the period 1994–2003. In this case, macroeconomic balance considers variables based on national accounts and the balance-of-payments framework for calculating deviations from purchasing power parity. They considered the real exchange rate based on the producer price index in the study because they wanted to abstract from increases in the relative price of non-tradable goods. They found considerable appreciation in the transition countries' currencies but that appreciation was not as high as the inflation differentials that the nominal appreciation and the current account deficits would suggest. The main result of the study is that increases in productivity cause appreciation in the real exchange rate, as increases in productivity are associated with increases in export revenues in the transition countries.

Kemme and Roy (2006) developed a model for the long-term equilibrium real exchange rate by using macroeconomic fundamentals to calculate real exchange rate misalignments in Poland and Russia for the period 1995–2001. They employed unit root and cointegration tests to determine the relationship between variables. The Beveridge and Nelson decomposition method was also used to determine the effects of transitory and permanent shocks. They found that different nominal exchange rate regimes of the two countries produce different levels of misalignments

and different responses to exogenous shocks. They also found that misalignments in Russia were higher than those in Poland.

Candelon *et al.* (2007) considered the fundamentals behind the real exchange rate for eight new member states, namely Estonia, the Czech Republic, Hungary, Latvia, Lithuania, Poland, Slovenia and Slovakia, by means of a panel cointegration test. Using quarterly data, they examined the presence of a long-run relationship between the real exchange rate and consumption (government, private and total), openness and productivity both in the CEE countries and the Baltic states for the period 1993–2003. They found evidence in favor of Balassa-Samuelson effects, where an increase in productivity in the tradable sector of the new member states relative to the euro area does indeed lead to an appreciation of the new member states' real exchange rate. In addition, they found a negative and statistically significant relationship between openness and the real exchange rate.

Garcia-Solanes (2008) focused on the Balassa-Samuelson effect and other factors affecting the appreciation trend in the real exchange rate for six new member states of the EU and six existing members by means of panel unit root and panel cointegration tests. Quarterly data on labor productivity, prices and the real exchange rate were used for the period 1995–2004 for the six new member states (the Czech Republic, Estonia, Latvia, Lithuania, Poland and Slovakia) and the six existing members (Finland, France, Italy, Netherlands, Spain and Sweden). Germany was considered as a benchmark reference country, while the six existing members were included for the purpose of comparison in the empirical analysis. The empirical analysis was carried out in two steps and the presence of Balassa-Samuelson effects were estimated in two phases. Accordingly, the link between productivity and internal relative prices in the first phase suggested the presence of Balassa-Samuelson effects in both groups of countries. In the second phase, the relationship between inter-country productivities and the real exchange rate was analyzed and no effect was found in either group of countries. In the second step, the study investigated the effects of quality improvements and demand pressures in the tradable sector of the CEE economies and found that improvements in quality and increasing demand for tradable goods caused an appreciation in the real exchange rate for the CEE countries.

Egert (2011) examined differentials in inflation rates among 23 European Union countries in terms of the Balassa-Samuelson effect for the period 1998–2007. Using linear and nonlinear panel data models, he showed that the Balassa-Samuelson effect is not important for inflation rate differentials. On the other hand, quality, composition and demand-side effects are important factors for inflation. Specifically, economic catching-up causes a shift in consumption patterns of households and richer households tend to consume higher-quality goods, less energy and foodstuffs, and more services.

Staehr (2008) considered the importance of the fiscal policy structure for the EMU countries and analyzed whether the cyclical properties of fiscal policies in the candidate countries differ from those in the eurozone countries. Using panel data and a sample period from 1995 to 2005, the average fiscal policy reaction of the ten Central and Eastern European countries is markedly different from the fiscal reaction in the 12 Eurozone countries. Moreover, differences in the formulation of fiscal

policy between current and candidate eurozone countries decrease over time. Similarly, Golem and Perović (2014) aimed to investigate the long-run relationship between fiscal decentralization and the size of government. They analyzed a set of annual data for 23 OECD countries over the period 1970–2008 using a pooled mean group estimation technique. They employed an improved measure of fiscal decentralization. Using the size of the government sector in the economy (the share of government expenditure in total expenditures) as a dependent variable, the results suggested that fiscal decentralization decreases the size of government in the long run.

## **4. Financial Markets, Banking Sector Efficiency, Monetary and Fiscal Policy**

### **4.1 Contagion and Financial Market Linkages**

The global financial crisis of 2007–2009 highlighted the contagion effects among financial markets, which led to a proliferation of research on contagion and financial market linkages. Egert and Kočenda (2007) analyzed causal links between Eastern and Western European stock markets in terms of returns and volatility by using intraday data for the period 2003–2005. They considered three stock markets in Central and Eastern Europe (the Czech Republic, Hungary and Poland) and three Western European stock markets (Germany, France and the UK). By using several econometric techniques such as unit root tests, cointegration tests, GARCH models and Granger causality tests, they did not find any robust long-run relationship for any of the stock index pairs. On the other hand, they found short-term spillover effects in terms of both returns and volatility between stock markets. For example, there was a spillover effect in returns among the CEE markets, among the Western markets and from Western Europe to CEE but there was no spillover effect running from east to west. Moreover, there were volatility spillover effects within the CEE markets and within the Western markets, as well as from the Western markets to the CEE markets.

Egert and Kočenda (2011) investigated intraday co-movements among three developed (France, Germany and the UK) and three emerging (the Czech Republic, Hungary and Poland) European stock markets by means of a multivariate GARCH model. They found strong correlations among the German, French and UK stock markets. Even though there was little evidence of positive correlation between Western and CEE stock markets, there was synchronization among CEE markets in terms of return co-movements. Moreover, volatility in the CEE stock markets was driven by local innovation; hence, volatility spillover effects in the CEE markets were limited. Caporale and Spanolo (2011) found that there are significant co-movements between the financial markets in Czech Republic, Hungary and Poland and both the Russian and the UK markets. They also found that EU accession has resulted in an increase in volatility spillovers between the three CEE countries and the UK.

Barunik and Vacha (2013) investigated international stock market co-movements and contagion using five-minute, high-frequency financial market data on the Czech (PX), Hungarian (BUX) and Polish (WIG) stock indices, with the German stock index (DAX) used as a benchmark. Data were collected over a period of two years beginning on January 2, 2008 and ending on November 30, 2009. Using the wavelet technique, which enables understanding of the relationship between stock markets in the time-frequency domain, they showed how the cor-

relations change continuously over time and across frequencies. Their results indicate that the connection of the CEE markets to the region's leading market is significantly lower at higher frequencies than at lower frequencies. This showed that the CEE markets were still not tightly connected to the leading market in the region.

Hanousek *et al.* (2014) looked at the dynamics of price jumps on European stock markets (Germany, the UK, the Czech Republic, Poland, Hungary, Romania, Croatia, Slovenia and Turkey) specifically during the European debt crisis. By using high-frequency data (five-minute interval) for the 2008–2012 period, they found that the results depend on the test methods. Mature and emerging markets experienced volatility increases during the period of financial distress according to the method that maximizes the probability of a successful jump detection method. Minimization of the probability of a false jump detection method suggested that differences in price intensity were less pronounced.

Using multivariate GARCH models, Horvath and Petrovski (2013) evaluated the presence of stock market co-movements between Western Europe and two groups of emerging European economies in Central Europe (the Czech Republic, Hungary and Poland) and Southeastern Europe (Croatia, Macedonia and Serbia) during the period 2006–2011. The findings indicated that the Central European markets are more integrated with Western Europe than are those of Southeastern Europe. They also showed that the global financial crisis negatively affected all stock market returns, but it did not affect the degree of stock market integration between these groups of countries. Recent evidence uncovered by Stoica *et al.* (2015) support this conclusion in that they find increasing international interdependencies in stock markets in all Central and Eastern European countries except Bulgaria.

Koseoglu and Cevik (2013) examined the existence of causal links between the stock markets and foreign exchange markets in the Czech Republic, Hungary, Poland and Turkey by means of causality in mean and variance tests. In this study, they employed daily data for all countries covering the period from July 30, 2002 to July 28, 2011 for a total of 2,348 observations. They first analyzed whether structural breaks appear in the variance of stock and foreign exchange rate returns series. Then they employed the causality-in mean/variance test proposed by Cheng and Ng (1996) and Hong (2001). Their results generally suggested that stock markets play a more dominant role in the price discovery process in all of the countries.

Bubák *et al.* (2011) analyzed the nature and dynamics of volatility transmission between Central European currencies (the Czech koruna, the Hungarian forint and the Polish zloty) and the EUR/USD foreign exchange rate by using a multivariate GARCH model, Granger causality test and spillover index for the period 2003–2009. They found volatility spillover effects between the Central European foreign exchange markets on an intraday basis. Moreover, volatility transmission displayed different patterns in the periods before and after the global financial crisis.

Babecky *et al.* (2013) addressed the relationship between financial integration and financial instability, emphasizing the priority role of financial innovation. They investigated whether individual segments of the financial markets (the foreign exchange, money, government bond and equity markets) of the Czech Republic and selected inflation-targeting countries of the Central European region (Hungary and Poland) and advanced Western European economies (Sweden and the UK) are integrating with the euro area. They used two methods to measure financial integra-

tion: price-based measures used beta-convergence and sigma-convergence, while news-based measures used gamma convergence. The calculations for all measures of financial integration were carried out using weekly data from January 1999–July 2010. In order to analyze the impact of financial stability on financial integration, the sample was divided into the pre-crisis period (January 1999–July 2007) and the crisis period (August 2007–July 2010). The empirical analysis revealed that the financial crisis caused a temporary price divergence of the Czech financial market from the markets of the euro area (in the cases of the equity, money and foreign exchange markets) and Germany (in the case of the government bond market) and the overall impact of the financial crisis on financial stability was not significant for the Czech Republic.

## 4.2 Financial Sector and Banking Efficiency

Financial systems in the CEE countries experienced significant changes during to transition period. An efficient financial system is important in fostering sustainable economic growth, particularly in a market economy. Hanousek *et al.* (2007) examined the development of the financial systems in Hungary, the Czech Republic, Poland and Slovakia in the period 1993–2005. They found that households were the largest creditors of commercial banks in terms of credit for the countries in question. Non-financial companies were the largest borrowers uniformly across the four countries according to their debt. Financial flows between banks and other sectors were higher in Hungary and Poland than in the Czech Republic and Slovakia. Furthermore, the empirical findings showed that the performance of banks significantly improved after privatization in all countries.

By using both linear and threshold models, Ivanov *et al.* (2011) inspected the long-run and short-run behavior of deposit euroization (DE) and credit euroization (CE). Data for the DE model were available at monthly frequency from January 1997 to May 2010. As a proxy for DE, the authors used the share of foreign currency deposits in total deposits. Data for the CE model were available at quarterly frequency from the third quarter of 1999 to the second quarter of 2010. As a proxy for CE, the authors used the share of foreign currency loans and loans indexed to a foreign currency in total loans. The Johansen cointegration test results suggested that the exchange rate (nominal or REER), exchange rate volatility, the minimum variance portfolio, monetary aggregate M1 and inflation were cointegrated with DE. The long-run model of CE included the exchange rate (nominal or REER), exchange rate volatility, the minimum variance portfolio, bank foreign debt, deposit euroization, the share of M4 in M1 and average past inflation. The results of the empirical analysis presented in this paper suggested that financial euroization (FE) is an equilibrium outcome of several factors. Models nested in a linear framework suggested that the exchange rate, exchange rate volatility, inflation and the tradeoff between inflation and real depreciation (suggested by the portfolio view of FE) were important for explaining the long-run behavior of both DE and CE.

Fidrmuc and Hainz (2010) studied the default risks of 700 loans made to small and medium-sized enterprises (SMEs) in Slovakia between 2000 and 2005. Various probit and panel probit models show that liquidity and profitability factors are important determinants of SME defaults. While indebtedness significantly increases

the probability of default, liability has important incentive effects. Finally, the authors found that default rates differ between sectors and factors converged to the values found in developed financial markets.

Jiang *et al.* (2013) used non-linear unit root tests and tested the uncovered interest parity (UIP) and risk premium convergence hypothesis in ten Central and Eastern European countries. They found evidence of long-run UIP, suggesting that interest and exchange rate adjustments are mean reverting in Hungary, Poland, Romania, Russia, Croatia, Bulgaria and the Czech Republic.

Andries and Căpraru (2014) tested the presence of convergence between the CEE countries during the period 2004–2010 in terms of banking sector efficiency. They used data for 190 active commercial banks from ten CEE countries that are new members of the European Union (Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia). They estimated banking efficiency using the stochastic frontier analysis to obtain an unbiased systematic measure of cost efficiency across countries. To analyze the convergence of banking-efficiency levels, they used the concepts of beta and sigma convergence proposed by Barro and Sala-i-Martin (1991). The results of this study showed that there are large differences in the levels of cost efficiency among national banking systems. They noticed an increase in banking efficiency for all banking systems until 2008. All tests employed in this study validated the main conclusion concerning beta convergence and sigma convergence in banking efficiency across the new EU member states in Central and Eastern Europe.

Cuaresma *et al.* (2014) conducted a meta-analysis of the determinants of foreign currency loans in Central and Eastern Europe. They examined 21 studies that provide around 800 estimated coefficients for seven determinants of foreign currency loan demand. They found that supply factors (foreign currency deposits and the minimum variance portfolio ratio) play a more significant role than demand factors (interest rate differentials) of foreign currency loans.

There is also increasing literature focused on banking sector efficiency in emerging European countries in terms of productivity. Kutsomanoli-Filippaki *et al.* (2009) emphasized that the efficiency of the banking sector is of vital importance from both the microeconomic and macroeconomic perspectives. The efficiency of the banking sector is crucial in terms of competition during the transition to a market economy because the number of foreign banks significantly increased in the CEE region as some improvements in terms of the institutional, regulatory and supervisory framework took place. The efficiency of the banking industry influences the cost of financial intermediation and the overall stability of the financial system, as banks constitute the backbone of financial markets in the CEE economies. Hence, an improvement of banking performance indicates a better allocation of financial resources and thus an increase in investment that favors growth.

Hasan and Marton (2003) focused on banking sector efficiency during transition periods in Hungary with respect to profit and cost efficiency. They specifically focused on the Hungarian banking sector because the Hungarian case may also be relevant for transition countries that are yet to experience similar stages of banking and financial sector developments. They employed stochastic frontier analysis to determine the efficiency of the sector and considered financial statements

of all commercial banks during the period 1993–1998. Their results showed that foreign banks and foreign bank ownership involvement were significantly less inefficient than their domestic counterparts. In addition, they found that institutions that took advantage of acquisition of local banks were associated with lower inefficiency in Hungary.

Kutsomanoli-Filippaki *et al.* (2009) evaluated the impact of the financial regulations on the efficiency and productivity performance of the banking sector in ten CEE countries, namely Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia, over the period 1998–2003. Using the stochastic directional technology distance function approach, which models multiple output technologies, and the Luenberger productivity indicator, they examined 186 banks with an unbalanced panel dataset of 871 observations to determine the efficiency of the banking sector within the CEE countries. Their finding implied a lack of efficiency for all of the CEE countries. Although the CEE countries, with the exception of Estonia, did not provide significant efficiency gains, the results suggested evidence in favor of productivity gains. Furthermore, they confirmed the relationship between ownership and bank performance, in which foreign bank ownership provided the highest productivity gains.

Akin *et al.* (2013) addressed the efficiency differentials of foreign and domestic deposit banks in Turkey. They used pooled data sets of twenty-eight domestic private and foreign deposit banks from the Turkish banking sector from the period the 2007–2010. Their data set also enables consideration of the performance of domestic and foreign banks during the 2008 global financial crisis. They applied an input-oriented data envelopment analysis (DEA) as modified by Brockett and Golany (1996) to measure the relative performances of banks and detected the effect of foreign ownership on the inefficiencies of banks after eliminating their managerial inefficiencies. This methodology allows comparison of banks by using a common frontier and enables differentiation of the managerial inefficiencies and group-specific inefficiencies. The results of their study showed that banking efficiency is strongly affected by association with banking groups. Before and after managerial inefficiencies are eliminated, foreign banks are more efficient than domestic banks. The authors' evidence supported the fact that foreign banks were highly or fully efficient during the global financial crisis once the managerial inefficiencies were removed. The relatively higher technical inefficiencies of domestic banks were partly due to larger numbers of employees than those used by foreign-owned institutions that perform similar banking functions. Turkish domestic banks need to rationalize the number of employees they use in their operations in order to improve performance efficiency.

Ozkan-Gunay *et al.* (2013) tried to assess the impact of regulatory policies on the efficiency of commercial banks of various sizes in the Turkish banking sector. They implemented a new approach to data envelopment analysis including lending quality and risk taking. They used annual unbalanced panel data covering twenty-nine banks during the period 2002–2010. This study provides evidence that regulatory policies have a positive impact on the efficiency of banks. The findings suggest that managerial efficiency improved in the Turkish banking sector over the course of the regulatory period. However, significant differences exist for different sizes of banks. Risk-taking and the lending-quality factor appear to be very important in efficiency and scale estimations.



Ozkan *et al.* (2014) inspected the role of three banking reform regulations following the 2000 crisis in banking sector performance in Turkey. They analyzed annual bank-level data for all deposit banks in the Turkish banking system for the period 1998–2009 using three different bank performance measures: profitability, support for the contribution of the banking sector in financing economic activities, and asset quality. They used an unbalanced panel data set consisting of 382 bank-year observations for empirical analysis. The dependent variable of the panel regression model is bank performance and the explanatory variables are divided into four groups: banking reform indicators, bank-specific control variables, industry-specific control variables and macroeconomic control variables. The results showed that these three reform measures had a significant effect on bank lending and the asset quality of banks improved after the first two reforms. Results also showed that the banking sector regulation relating to corporate governance positively affected asset quality. The authors' findings supported the view that the sequence and timing of regulatory measures shielded Turkey from the recent global crisis.

Nitoi and Spullbar (2015) analyzed the cost efficiency of commercial banks in six CEE countries, namely Bulgaria, the Czech Republic, Poland, Russia, Romania and Hungary, for the period 2005–2011 by means of heteroscedastic stochastic frontier analysis. Their sample covered an unbalanced panel dataset of 735 observations. Empirical analysis showed that macroeconomic stability caused the efficiency of commercial banks to rise and there was a positive and significant relationship between risk-taking and inefficiency. Furthermore, the authors showed that banks achieved significant improvement in terms of efficiency until 2008.

### **4.3 Central Banks and Monetary and Fiscal Policy**

There are several studies examining how central bank communication affects CEE financial markets. Horvath and Karas (2013) investigated the effect of written and oral central bank communications on the level and volatility of interest rates in Czech Republic. Their sample included daily observations of the Czech National Bank's communication and interest rates from January 2007 to December 2012. To evaluate the effect of central bank communication on interest rate volatility, they estimated the GARCH, TGARCH and EGARCH models. The result of the econometric estimation was that financial markets respond to central bank communication. They found that more positive statements about economic conditions were followed by an increase in short-term interest rates. Central bank communication matters for interest rate volatility as well. Written communication, as captured by the monetary policy minutes and inflation reports, exerts a calming effect on the financial markets. The findings of the analysis showed that the timing of central bank communication played an important role.

Using a high-frequency GARCH model, Égert and Kočenda (2014) explored the impact of macroeconomic news and central bank communication on the exchange rates of three Central and Eastern European currencies against the euro and their volatility. Besides employing news and communication variables to explain exchange rate variations, they also included a measure of exchange rate misalignment based on a monetary model. They conducted their analysis during the pre-crisis (2004–2007) and crisis (2008–2009) periods. The results indicated that macroeconomic news

affected CEE exchange rates during both periods. However, CEE exchange rates reacted to central bank communication only during the crisis period.

Brzeszczyński and Kutan (2105) investigated the impact of monetary policy announcements by the National Bank of Poland (NBP) on the zloty/dollar exchange rate and on the zloty/dollar volume of trade. They used data on the foreign exchange trading volume obtained directly from the Reuters electronic brokerage platform for currency trading. The sample period covers the years 2000–2003, during which the NBP gained independence. Brzeszczyński and Kutan (2015) found that the NBP's communication helped reduce foreign exchange market uncertainty, as measured by the conditional variance of foreign exchange returns, and stimulated market activity by increasing trading volume.

A recent study by Frömmel *et al.* (2015) focused on the foreign exchange market in Hungary and examined how scheduled and unscheduled public news announcements affected the intraday jumps (i.e. significant price discontinuities) in the Hungarian foreign exchange interdealer market over the period 2003–2004. Their findings indicated large jumps in the market. In addition, they found that both scheduled and unscheduled news is related to jumps and scheduled US news had a large effect on the market. However, public news announcements can explain about half of the jumps, suggesting that jumps in foreign exchange markets may be driven by the arrival of private information.

Some studies in the literature focus on the interaction between monetary and fiscal policy in European countries. In this regard, Hallett *et al.* (2014) examined strategic fiscal-monetary interactions in a novel game theory framework that allows policies to be committed for different periods of time. They used variables such as inflation, output and debt that are affected by both policies. They showed that concerns about long-term excessive spillover effects between fiscal policy and monetary policy might be justified. They found that the non-Ricardian (active fiscal, passive monetary) regime can occur in equilibrium and that this is more likely in a monetary union due to free-rider problems. Their investigation showed that the effect of monetary policy commitment on economic outcomes of the policy interaction depends highly on its explicitness (whether it is legislated as a numerical target) relative to the degree of fiscal policy rigidity, the size of the fiscal gap and other policy parameters.

Similarly, Cevik *et al.* (2014) examined the interactions between the fiscal and monetary policies for some former European transition economies (the Czech Republic, Estonia, Hungary, Poland, Slovenia and Slovakia) over the 1995Q1–2010Q4 periods by using a Markov regime-switching model. They considered the monetary policy rule proposed by Taylor (1993) and the fiscal policy rule suggested by Davig and Leeper (2007) in accounting for monetary and fiscal policy interactions. Their empirical results suggest that the central banks of all the countries followed both active and passive monetary policy rules in the sample, in which passive monetary policy regimes are more persistent and have longer duration than active monetary regimes for all countries except for Poland. As for fiscal policy, the Czech Republic, Estonia, Hungary and Slovenia seem to have alternated between active and passive fiscal regimes while the fiscal policies of Slovakia and Poland can be characterized by a single (active) fiscal regime. The global financial crisis seems

to have forced fiscal policy to be active in all the countries. Finally, monetary policy was generally passive in all the countries after 2000.

With respect to fiscal policy, Hanousek and Kočenda (2011) considered the dynamics of public investment and public finance in the new members of the European Union, specifically examining the effects of economic freedom and corruption for the period 1995Q1–2008Q4. The empirical results showed that improvements in economic freedom were associated with increases in public investment. Moreover, there was an inverse relationship between debt accumulation and economic regulation, and less corruption is associated with decreases in the deficit and debt. As such, steps aimed at reducing corruption and the degree of economic regulation could improve the fiscal position of most of the new EU countries.

Kočenda *et al.* (2008) tested the degree of fiscal convergence among the CEE8 (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia), Cyprus and Malta and mature European countries in the context of EU enlargement. They employed unit root tests with structural breaks for two fiscal variables (debt to GDP ratio and budget deficit to GDP ratio) using quarterly data from the period January 1995 to April 2005. Fiscal convergence was compared to developed EU countries (Austria, Belgium, France, Germany and the Netherlands) and emerging EU countries (Greece, Portugal and Spain). They found substantial heterogeneity with regard to fiscal convergence in the EU in general.

Other studies have focused on monetary independence issues. Cuaresma and Wójcik (2006) investigated the monetary independence hypothesis for three new EU member states, namely the Czech Republic, Hungary and Poland. They employed a dynamic conditional correlation (DCC) multivariate GARCH model suggested by Engle (2002), which allowed the authors to trace the change of the degree of monetary independence over time and across countries using high-frequency data. The CEE countries considered are the Czech Republic, Hungary and Poland, while Germany and the US serve as the foreign countries. The data frequency is daily but the length of the time series differs across countries. The longest time series spans the period from January 1994 to February 2003. When looking at the correlation dynamics of an individual country over time, the results were mixed. Although the dynamic behavior of the correlations in interest rate shocks in the Czech Republic appear to be consistent with the theory, the authors found no evidence to support the validity of the monetary hypothesis in Hungary and Poland.

Akcelik *et al.* (2014) studied the trilemma configuration of the Turkish economy by calculating the trilemma indices for the period 2002–2011. They constructed indices for each of the three policy objectives of the trilemma: monetary independence, exchange rate stability and capital openness. They extended the Aizenman, Chinn and Ito (2008) approach by applying a Kalman filter to the classical linear regression to capture the time-varying aspect of policy decisions. They revealed the role of central bank foreign reserves and required reserves in mitigating trilemma tradeoffs through their relationship to trilemma residuals in a vector auto regression framework. They showed that foreign reserves and required reserves had a role in mitigating the trilemma tradeoffs in Turkey. In this study, relationships between the residuals obtained from the trilemma regression, the foreign reserve to GDP ratio,

and the reserve requirement ratio are analyzed. The authors concluded that the foreign reserve to GDP ratio and the required reserve ratio augment trilemma residuals and thus mitigate the policy tradeoffs.

## 5. Business Cycles Synchronization

The optimum currency area (OCA) theory as proposed by Mundell (1961) postulated that in order to procure maximum benefits, potential members of a monetary union should display some common characteristics such as business cycle synchronization and production structure similarity. Otherwise, common monetary policy is costly in the absence of business cycle synchronization because asymmetric shocks require each country to devise its own policies. Hence, a common monetary policy may lead to conflicts across countries in conducting common monetary and fiscal policy. In addition, production structure similarity is also important, as different production structures result in asymmetric responses to common shocks, which may lead to divergent business cycles in the future.

### 5.1 Convergence and Integration Studies

Kočenda (2001) examined the degree of convergence for the CEE countries, namely the Czech Republic, Slovakia, Hungary, Poland, Slovenia, Romania, Bulgaria, Albania, Estonia, Latvia and Lithuania. The study employed a panel unit root test to examine real convergence in terms of real industrial output, money aggregate (M1), producer and consumer prices, and nominal and real interest rate spreads by using monthly data for the period from January 1991 to December 1998. The study found evidence of convergence in macroeconomic fundamentals among the CEE countries in general, but the degree of convergence differs for particular variables as well as for groups of countries. While the greatest degree of convergence occurred in the growth rates of real output across all groups of economies, the Baltic countries showed the highest degree of convergence in basic macroeconomic fundamentals.

Kutan and Yigit (2005) considered both nominal and real convergence to EU standards for the ten members that joined the EU in May 2004. They used monthly data for the period from 1993 to 2004 to test for convergence in the annual growth rates of monthly industrial production, prices and nominal interest rate spreads. Using panel unit root techniques, they found strong evidence of real stochastic convergence for all new members; however, their empirical results suggested that the degree of nominal convergence is idiosyncratic. On the other hand, Jagric (2003) found that internationalization of enterprises and greater product and financial market linkages to EU markets were major factors in business cycle synchronization at the beginning of transition.

Kočenda *et al.* (2006) evaluated nominal and real convergence of the CEE8 (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia) by using country specific regression analysis. Diverging from the existing literature, they considered the presence of structural breaks in their estimation. They used real GDP, inflation and interest rates for testing real and nominal convergence. For this purpose, the authors considered quarterly GDP for the period 1995–2005 and monthly inflation and interest rates for the period 1996–2005. The real convergence test results implied that convergence for the Baltic countries seems to be faster than

for the other candidate countries. On the other hand, the nominal convergence test results indicated that new EU members showed significant nominal convergence.

In a meta-analysis of 35 studies in the literature on convergence, Fidrmuc and Korhonen (2006) examined business cycle correlation between the euro area and CEE economies. Their results suggest that some CEE countries already have comparably high correlations with the euro area business cycle. As expected, they find that estimation methodologies have a significant effect on business cycle correlations. They conclude that in the CEE countries, there is no evidence of a geographical bias in the studies.

Skořepa (2013) suggested improving the construction of the OCA index in several ways, primarily by making it sensitive to real income convergence. The sample covered 31 late-stage transition economies in the pre-crisis period (1999–2008). They calculated specific values of the index for individual economies in the sample *vis-à-vis* Germany as the anchor. The OCA index methodology was based on the following two steps: the dependent variable in the cross-section regression was the exchange rate variability over a certain time period, while the explanatory variables were OCA-relevant indicators, thus the resulting statistical relationship was used to predict exchange rate variability. In this regression, each pair of economies in the sample was one observation. The main econometric result was that when explaining the evolution of real exchange rate pressure in a group of 31 advanced and late-stage transition economies, real convergence turns out to be a statistically significant factor. This finding suggests that the OCA index should be constructed so that it is sensitive to real convergence.

Jiménez-Rodríguez *et al.* (2013) examined the degree of co-movements in some macroeconomic aggregates in the CEE area using a multi-factor model. In the CEE area, the largest fraction of real output variability is due to idiosyncratic factors. Overall, the authors find that for both euro-area and CEE countries, the global European and country-specific factors play different roles during different periods in different countries, even though there is more homogeneity in the euro area than in the CEE countries.

Veličkovski and Stojkov (2014) studied the factors that determine the synchronization of shocks in the Central and Southeastern European countries *vis-à-vis* the euro area. They find that an increase in trade intensity, intra-industry trade and financial integration leads to more convergence while divergent fiscal policies increase the shock divergence process, but not to a substantial enough degree to counteract the positive effects associated with trade and financial integration. This is in line with Artis *et al.* (2008), who find that extensive trade and financial linkages are likely to result in further increases in business cycle correlation in CEE, while an increase in labor market regulation and the pursuit of national fiscal policies may result in a counteracting effect.

## 5.2 Business Cycle Synchronization Studies

There are numerous studies in the literature that focus on business cycle synchronization and production structure similarity in the eurozone, emerging European Union members and candidate countries. The advocates of euro accession emphasize that business cycles have become more correlated across the euro area and candidate countries. On the other hand, some empirical results show that the euro-

zone countries have themselves experienced different degrees of synchronization over their business cycles. This phenomenon became more acute specifically after the 2007–2009 global financial crisis and its aftermath, as Greece, Italy, Ireland, Portugal and Spain showed signs of excessive duress compared to other eurozone countries due to their structural fiscal problems and debt levels. This led to conflicts in the conduct of common monetary policy and the viability of the euro has been increasingly questioned since then.

It has been recognized that several factors affect business cycle synchronization: trade, capital flows, financial integration and production structure similarity all play some key roles. Baxter and Kouparitsas (2004) found that capital flows, specialization and financial integration are the most important factors for business cycle synchronization among developed and developing countries. Similarly, de Haan *et al.* (2008) find that trade is the main source of business cycle transmission among the EMU countries. After the 2007–2009 global financial crisis, the number of empirical studies focused on the EMU and emerging European economies has significantly increased because of the doubts about eurozone enlargement.<sup>4</sup>

The issue of business cycle synchronization has been widely examined across countries and over different time periods by means of different econometric methodologies; empirical results tend to vary across countries and over time. Some studies have examined business cycle synchronization between the EMU and emerging European countries in terms of nominal and real convergence. For instance, Brada and Kutun (2001) investigated the convergence of monetary policy between the candidate countries and the EU. Their sample included Hungary, the Czech Republic, Poland, Slovakia, Slovenia, Estonia and Latvia, and two Balkan countries, Bulgaria and Romania. They also included Cyprus, Malta and Turkey, market economies that were seeking entry into the EU at the time, as well as Austria, Finland and Sweden. Using cointegration tests for convergence, they showed that the German Bundesbank dominates the behavior of monetary policy in the most recent members of the EU at the time, i.e. Austria, Finland and Sweden. They also found a strong connection between the Bundesbank's policies and those of Cyprus and Malta, two of the candidates for EU membership.

Eickmeier and Breitung (2006) tested the degree of business cycle synchronization between the EMU countries and new EU member states by using dynamic correlation analysis for the period from 1993Q1 to 2003Q4. Their empirical results showed that business cycle correlations are lower on average for the new member states than for the EMU countries. Furthermore, structural dynamic factor model results indicated that the transmission of common euro-area shocks to the new member states does not seem to differ significantly from the propagation to the EMU countries in most cases. Similarly, Bobeica and Manu (2013) analyzed the degree of business cycle synchronization and the similarity of production structures between Romania and the eurozone countries. They also considered seven other CEE countries, namely Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania and

<sup>4</sup> For recent studies examining the impact of the recent global financial and European debt crises, see, among others, Črnigoj and Verbič (2014), Dungey and Gajurel (2014), Ajmi and Apergis (2015), Balcilar and Demirer (2015), Bayraci and Demiralay (2015), Črnigoj (2015) and Liao (2015). Some other related studies are also reviewed later in this paper.

Poland for comparison. They employed several detrending techniques (such as the Hodrick-Prescott filter, the band-pass Christiano-Fitzgerald filter, a quadratic filter and an unobserved components model estimated through the Kalman filter) to assess the sensitivity to the chosen detrending method. The authors found strong evidence in favor of structural dissimilarity between Romania and the eurozone. Therefore, they concluded that adopting the euro by Romania was not advisable.

Another avenue of research is to look at the correlations of business cycle shocks based on a structural VAR model and there are extensive studies in the literature that examine the correlation between demand and supply shocks with respect to business cycles synchronization. For example, Fidrmuc and Korhonen (2003) examined the correlation between supply and demand shocks in the Euro area and CEE countries by using a structural vector autoregressive (SVAR) model. The empirical results showed that the correlation of supply shocks varies across the countries and correlation of demand shocks was lower than for supply shocks. In addition, some candidate countries were well correlated in comparison with some members of the EMU. The size of the shocks was relatively low for all accession countries, with the exception of Poland and Slovenia. For example, the size of the shocks in the Czech Republic and Estonia was smaller than in the core EMU countries.

Babetskii *et al.* (2004) investigated the time-varying correlation of demand and supply shocks in Ireland, Portugal, Spain and nine CEE countries, namely the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia, by using a VAR model and Kalman filter to calculate time-varying correlation coefficients. They considered real GDP and GDP deflator data for the period 1990–2002 for the CEE countries and their empirical results suggested an ongoing process of convergence of demand shocks, but divergence of supply shocks.

Horvarth and Ratfai (2004) examined demand and supply shocks correlations between EMU countries (Germany, France and Italy) and EMU accession countries (the Czech Republic, Poland, Hungary, Slovakia, Slovenia, Estonia, Latvia and Lithuania) by means of a bivariate SVAR model. Using quarterly data from the period 1993–2000 they found that demand and supply shocks among EMU accession and incumbent countries, especially Germany, tend to be uncorrelated. On the other hand, they found a high degree of correlation in supply and demand shocks among EMU accession countries.

Hegerty (2010) studied the cross-correlations of real gross domestic product and its components for six euro candidate countries in the period from 1993 to 2008. None of the countries showed consistent co-movements with Germany as compared to world economic indicators. The Baltic states showed strong linkages with each other and much stronger linkages with the world than with Germany, suggesting that this part of Europe may not benefit from joining the euro.

Slanicay (2013) explored business cycle synchronization between the Czech Republic and the 12 eurozone countries for the period 2000Q1–2011Q3 by focusing on the main macroeconomic variables: consumption, investment, output, inflation and the interest rate. The results are similar to those in Bobeica and Manu (2013) for Romania in that shocks were asymmetric in the case of consumption, moderately symmetric in the case of inflation, and highly symmetric in the case of investment,

output and the interest rates. The results also suggest that the monetary policy of the European Central Bank (ECB) is more discretionary than the monetary policy of the Czech National Bank (CNB); monetary policy shocks play a much larger role in explaining the main macroeconomic variables in the euro area than in the Czech economy.

Apostoaie *et al.* (2014) tested the business cycle synchronization with a focus on ten economies in Central, Eastern and Southeastern Europe (CESEE). First, they analyzed the short-term dynamics of the relationships between credit expansion and economic growth and then they investigated certain features of the two main variables with respect to their volatility, amplitude, persistence and cross correlations. They employed Hodrick and Prescott-Baxter and King filters to calculate business and credit cycles for the period 2000Q1–2012Q4 and analyzed the co-movements between credit expansion and real GDP growth using simple correlation analysis. Their results suggest higher interdependence between credit expansion and real GDP growth in the developing countries (e.g. Hungary, Poland and Romania) and lower interdependence in the developed economies. In addition, Granger causality test results provide evidence for a lead-lag relationship between real GDP and credit expansions in the short term for almost all the CESEE countries and the Granger causality tended to be bidirectional. Moreover, credit is, on average, twice as volatile as output in these countries. The overall results show that the credit cycle and the business cycle start to move much closer together, synchronize to a greater extent and become more interconnected, revealing an increasingly tighter link between bank-credit expansion and economic growth.

Akkoyun *et al.* (2014) investigated the business cycle synchronization of the Turkish economy with the eurozone countries and the United States. The data for Turkey and the United States covers the period 1987Q1–2011Q3; data for the eurozone area for a shorter period, 1995Q1–2011Q3. The authors separated their sample into two parts due to the 2001 Turkish financial crisis, as major structural reforms were initiated in the Turkish economy after 2001. The study used the wavelet method to get cycles at different frequencies for trend/cycle decomposition. The authors also employed dynamic correlations to measure common movements between a pair of series distributed over different frequencies. Whereas most previous papers on the Turkish economy used either GDP or industrial production for analyzing co-movement, they extended the variable set to include cycles of private consumption, private investment, exports and imports. They found that the correlation of Turkish cycles with the cycles of the eurozone and the United States increased substantially after 2001 and the correlations with the United States tended to be higher than those with the eurozone. They also emphasized that capital flows and financial conditions were important for business cycle synchronization and hence these variables should be considered in addition to the trade channel for examining co-movement of cycles.

## **6. Conclusions and Suggestions for Future Research**

This survey reviewed empirical studies on real and financial sectors related to the former transition economies of Central and Eastern Europe. These include the new eurozone countries, eurozone candidate countries and EU accession candidate countries. With respect to the real sector, we have covered studies on productivity and trade, growth and FDI, the Balassa-Samuelson effect and convergence. For



financial sector studies, we have reviewed papers on financial markets and banking, as well as monetary and fiscal policy. Based on the surveyed studies, we can summarize our findings as follows:

First, there has been considerable trade and productivity integration in the post-transition period. However, there is no uniform evidence regarding convergence or divergence from the surveyed empirical studies regarding business cycles in Central and Eastern Europe. There is some evidence that factors such as extensive trade, financial linkages and FDI flows lead to more convergence.

Second, available empirical evidence for business cycle synchronization and convergence is sensitive to the individual countries studied. Hence, it is difficult to reach generalized conclusions about the optimal timing of euro adoption by the Central and Eastern European new EU members. However, the evidence reviewed in this paper suggests that the completion of the euro-adoption process may take a long time.

Third, banking sector efficiency studies show that foreign bank ownership is associated with higher banking efficiency than in the case of domestic banks. Moreover, there is significant return and volatility transmission not only within CEE financial markets but also between CEE and core European financial markets. Central bank communication seems to have significant wealth effects and tends to reduce market uncertainty as well. However, the recent global financial crisis significantly affected these patterns.

Finally, there is limited evidence of business cycle convergence despite the presences of productivity and income convergence, which improved trade and FDI flows in the region. This is in line with Krugman (1991) in that integration may lead to more specialization but less business cycle synchronization. Given that the EU members in Central and Eastern Europe are bound to adopt the euro eventually, the current evidence suggests that their business cycles are not adequately in sync with the core eurozone, so adopting the euro soon would pose significant costs. Moreover, the burdens of the sovereign debt crisis in Greece show that premature adoption deprives policymakers of an important tool in dealing with economic crises.

Our survey reveals that the methods employed and the data make it hard to reach definite conclusions regarding business cycle synchronization, growth, financial market linkages and banking sector efficiency. An interesting idea for future research is to conduct a meta-analysis. Another way to improve the precision of the results is to compare the results to highly integrated areas such as US regions or to the core areas of the European Union. Using US regions or core EU should provide a benchmark against which the results from Central and Eastern Europe can be compared. Future research may also be expanded with respect to the growing but limited number of studies on central bank communication and interaction between monetary and fiscal policy. In addition, studies using more microstructure financial data would be welcome.

## REFERENCES

- Ajmi A, Apergis N (2015): Systemic Sovereign Risk and Asset Prices: Evidence from the CDS Market, Stressed European Economies and Nonlinear Causality Tests. *Finance a úvěr-Czech Journal of Economics and Finance*, 65(2):127–143.
- Akcelik Y, Cortuk O, Turhan I (2014): Mitigating Turkey's Trilemma Tradeoffs. *Emerging Markets Finance and Trade*, 50(6):102–118.
- Akin A, Bayyurt N, Zaim S (2013): Managerial and Technical Inefficiencies of Foreign and Domestic Banks in Turkey during the 2008 Global Crisis. *Emerging Markets Finance and Trade*, 49(3):48–63.
- Akkoyun HC, Şen-Doğan B, Gunay M (2014): Business Cycle Synchronization of Turkey with the Eurozone and the United States: What Has Changed Since 2001. *Emerging Markets Finance and Trade*, 50(4):26–41.
- Altomonte C, Guagliano C (2003): Comparative study of FDI in Central and Eastern Europe and the Mediterranean. *Economic Systems*, 27:223–246.
- Andries AM, Căpraru B (2014): Convergence of Bank Efficiency in Emerging Markets: The Experience of Central and Eastern European Countries. *Emerging Markets Finance and Trade*, 50(4):9–30.
- Apostoaie CM, Percic S, Cocriş V, Chirleşan D (2014): Research on the Credit Cycle and Business Cycle with a Focus on Ten States from Central, Eastern, and Southeastern Europe. *Emerging Markets Finance and Trade*, 50(4):63–77.
- Artis, MJ, Fidrmuc, J, Sharler, J. (2008): The transmission of business cycles Implications for EMU enlargement. *Economics of Transition*, 16(3):559–582.
- Babecký J, Campos N F(2011): Does Reform Work? An Econometric Survey of the Reform-growth Puzzle. *Journal of Comparative Economics*, 39(2):140–158.
- Babecky J, Komarek L, Komarkova Z (2013): Financial Integration at Times of Financial Instability. *Finance a úvěr-Czech Journal of Economics and Finance*, 63(2):180–196.
- Babetskii I, Boone L, Maurel M (2004): Exchange Rate Regimes and Shocks Asymmetry: The Case of the Accession Countries. *Journal of Comparative Economics*, 32:212–229.
- Balcilar M, Demirer, R (2015): Effect of Global Shocks and Volatility on Herd Behavior in an Emerging Market: Evidence from Borsa Istanbul. *Emerging Markets Finance and Trade*, 51:140–159.
- Barro RJ, Sala-i-Martin X (1991): Convergence across States and Regions. *Brookings Papers on Economic Activity*, 22(1):107–182.
- Barunik J, Vacha L (2013): Contagion among Central and Eastern European Stock Markets during the Financial Crisis. *Finance a úvěr-Czech Journal of Economics and Finance*, 63(5):443–453.
- Baxter M, Kouparitsas M (2004): Determinants of Business Cycle Comovement: A Robust Analysis. *NBER Working Paper*, no. 10725.
- Bayraci S, Demiralay S (2015): Central and Eastern European Stock Exchanges under Stress: A Range-Based Volatility Spillover Framework. *Finance a úvěr-Czech Journal of Economics and Finance*, 65(5):411–430.
- Bevan AA, Estrin S (2004): The Determinants of Foreign Direct Investment into European Transition Economies. *Journal of Comparative Economics*, 32:775–787.
- Bobeica EB, Manu AS (2013): Empirical Analysis of Business Cycle Synchronization and Shock Similarity between Romania and the Eurozone. *Emerging Markets Finance and Trade*, 49(4):74–97.
- Brada J, Kutan AM (2001): The convergence of monetary policy between candidate countries and the European Union. *Economic Systems*, 25(3):215–231.
- Brzeszczyński J, Kutan AM (2015): Public information arrival and investor reaction during a period of institutional change: An episode of early years of a newly independent central bank. *Journal of Comparative Economics*, 43(3):727–753.

- Bubák V, Kočenda E, Žikeš F (2011): Volatility Transmission in Emerging European Foreign Exchange Markets. *Journal of Banking and Finance*, 35(11):2829–2841.
- Buch CM, Piazzolo D (2001): Capital and Trade Flows in Europe and the Impact of Enlargement. *Economic Systems*, 25:183–214.
- Candelon B, Kool C, Raabe K, Veen T van (2007): Long-run Real Exchange Rate Determinants: Evidence from Eight New EU Member States, 1993–2003. *Journal of Comparative Economics*, 35:87–107.
- Caporale GM, Spagnolo N (2011): Stock Market Integration between Three CEECs, Russia, and the UK. *Review of International Economics*, 19(1):158–169.
- Carstensen K, Toubal F (2004): Foreign Direct Investment in Central and Eastern European Countries: A Dynamic Panel Analysis. *Journal of Comparative Economics*, 32:3–22.
- Cevik EI, Dibooglu S, Kutun AM (2014): Monetary and Fiscal Policy Interactions: Evidence from Emerging European Economies. *Journal of Comparative Economics*, 42:1079–1091.
- Ciešlik A, Michálek A, Michálek JJ, Mycielski J (2015): Determinants of Export Performance: Comparison of Central European and Baltic Firms. *Finance a úvěr-Czech Journal of Economics and Finance*, 65(3):211–229.
- Cojocaru L, Falaris EM, Hoffman SD, Miller JB (2016): Financial System Development and Economic Growth in Transition Economies: New Empirical Evidence from the CEE and CIS Countries. *Emerging Markets Finance and Trade*, 52(1):223–236.
- Črnigoj M (2015): The Responsiveness of Corporate Investments to Changes in Corporate Income Taxation during the Financial Crisis: Empirical Evidence from Slovenian Firms. *Emerging Markets Finance and Trade*. Published online: 01 Sep 2015:  
<http://www.tandfonline.com/doi/abs/10.1080/1540496X.2015.1068069?journalCode=mree20>
- Črnigoj M, Verbič, M (2014): Financial Constraints and Corporate Investments during the Current Financial and Economic Crisis: The Credit Crunch and Investment Decisions of Slovenian Firms. *Economic Systems*, 38(4):502–517.
- Cuaresma JC, Fidrmuc J, Hake M (2014): Demand and supply drivers of foreign currency loans in CEECs: A meta-analysis. *Economic Systems*, 38(1):26–42.
- Cuaresma JC, Wójcik C (2006): Measuring Monetary Independence: Evidence from a Group of New EU Member Countries. *Journal of Comparative Economics*, 34:24–43.
- Davig T, Leeper EM (2007): Fluctuating Macro Policies and the Fiscal Theory. *NBER Macroeconomics Annual 2007*, 21:247–298.
- Demekas DG, Horvarth B, Ribakova E, Wu Y (2007): Foreign Direct Investment in European Transition Economies—The Role of Policies. *Journal of Comparative Economics*, 35:369–386.
- Dungey M, Gajurel D (2014): Equity Market Contagion during the Global Financial Crisis: Evidence from the World's Eight Largest Economies. *Economic Systems*, 38(2):161–177.
- Egert B (2002): Estimating the Impact of the Balassa-Samuelson Effect on Inflation and the Real Exchange Rate during the Transition. *Economic Systems*, 26:1–16.
- Egert B (2011): Catching-up and Inflation in Europe: Balassa-Samuelson, Engel's Law and Other Culprits. *Economic Systems*, 35:208–229.
- Egert B, Drine I, Lommatzsch K, Rault C (2003): The Balassa-Samuelson Effect in Central and Eastern Europe: Myth or Reality? *Journal of Comparative Economics*, 31:552–572.
- Egert B, Kočenda E (2007): Interdependence between Eastern and Western European Stock Markets: Evidence from Intraday Data. *Economic Systems*, 31(2):184–203.
- Egert B, Kočenda E (2011): Time-Varying Synchronization of the European Stock Markets. *Empirical Economics*, 40(2):393–407.
- Égert B, Kočenda E (2014). The Impact of Macro News and Central Bank Communication on Emerging European Forex Markets. *Economic Systems*, 38(1):73–88.

- Eickmeier S, Breitung J (2006): How Synchronized are New EU Member States with the Euro Area? Evidence from a Structural Factor Model. *Journal of Comparative Economics*, 34:538–563.
- Ekmen-Özçelik S, Erlat G (2014): Turkey's Comparative Advantages and Dynamic Market Positioning in the EU Market. *Emerging Markets Finance and Trade*, 50(5):18–41.
- Fidrmuc G, Hainz C (2010): Default Rates in the Loan Market for SMEs: Evidence from Slovakia. *Economic Systems*, 34(2):133–147.
- Fidrmuc G, Korhonen I (2003): Similarity of Supply and Demand Shocks between the Euro Area and the CEECs. *Economic Systems*, 27:313–334.
- Fidrmuc G, Korhonen I (2006): Meta-analysis of the Business Cycle Correlation between the Euro Area and the CEECs. *Journal of Comparative Economics*, 34(3):518–537.
- Fidrmuc J, Korhonen I, Poměnková J (2014): Wavelet spectrum analysis of business cycles of China and G7 countries. *Applied Economics Letters*, 21(18):1309–1313.
- Frankel JA, Rose AK (1998): The Endogeneity of the Optimum Currency Area Criteria. *Economic Journal*, 108:1009–1025.
- Frömmel M, Han X, Gysegem FV (2015): Further evidence on foreign exchange jumps and news announcements. *Emerging Markets Finance and Trade*, 51(4):774–787.
- Garcia-Solanes J, Sancho-Portero FI, Torrejon-Flores F (2008): Beyond the Balasa-Samuelson Effect in Some New Member States of the European Union. *Economic Systems*, 32:17–32.
- Golem S, Perović LM (2014): An Empirical Analysis of the Relationship between Fiscal Decentralization and the Size of Government. *Finance a úvěr-Czech Journal of Economics and Finance*, 64(1):30–58.
- Gurgul H, Lach L (2012): Financial Development and Economic Growth in Poland in Transition: Causality Analysis. *Finance a úvěr-Czech Journal of Economics and Finance*, 62(4):347–367.
- Haan J de, Inklaar R, Jong-A-Pin R (2008): Will Business Cycles in the Euro Area Converge? A Critical Survey of Empirical Research. *Journal of Economic Surveys*, 22(2):234–273.
- Hallett AH, Libich J, Stehlik P (2014): Monetary and Fiscal Policy Interaction with Various Degrees of Commitment. *Finance a úvěr-Czech Journal of Economics and Finance*, 64(1):2–29.
- Hanousek J, Kočenda E (2011): Public Investments and Fiscal Performance in New EU Member States. *Fiscal Studies*, 32(1):43–72.
- Hanousek J, Kočenda E (2014): Factors of trade in Europe. *Economic Systems*, 38(4):518–535.
- Hanousek J, Kocenda E, Maurel M (2011): Direct and Indirect Effects of FDI in Emerging European Markets: A Survey and Meta-analysis. *Economic Systems*, 35(3):301–322.
- Hanousek J, Kočenda E, Novotný J (2014): Price Jumps on European Stock Markets. *Borsa Istanbul Review*, 14(1):10–22.
- Hanousek J, Kočenda E, Ondko P (2007): The Banking Sector in New EU Member Countries: A Sectoral Financial Flows Analysis. *Finance a úvěr-Czech Journal of Economics and Finance*, 57(5-6):200–224.
- Hanousek J, Kočenda E, Shamshur A (2015): Corporate efficiency in Europe. *Journal of Corporate Finance*, 32:24–40.
- Hasan I, Marton K (2003): Development and Efficiency of the Banking Sector in a Transitional Economy: Hungarian Experience. *Journal of Banking & Finance*, 27:2249–2271.
- Hegerty SW (2010): Central European Business Cycles. *Eastern European Economics*, 48(2):56–73.
- Horváth J, Ratfai A (2004): Supply and Demand Shocks in Accession Countries to the Economic and Monetary Union. *Journal of Comparative Economics*, 32:202–211.
- Horváth R (2012): Do Confidence Indicators Help Predict Economic Activity? The Case of the Czech Republic. *Finance a úvěr-Czech Journal of Economics and Finance*, 62(5):398–412.
- Horváth R, Karas P (2013): Central Bank Communication and Interest Rates: The Case of the Czech National Bank. *Finance a úvěr-Czech Journal of Economics and Finance*, 63(5):454–464.

- Horvath R, Petrovski D (2013): International Stock Market Integration: Central and South Eastern Europe Compared. *Economic Systems*, 37(1):81–91.
- Imbs J (2004): Trade, Finance, Specialization, and Synchronization. *Review of Economics and Statistics*, 86(3):723–734.
- Ivanov M, Tkalec M, Vizek M (2011): The Determinants of Financial Euroization in a Post-Transition Country Do Threshold Effects Matter? *Finance a úvěr-Czech Journal of Economics and Finance*, 61(3):230–251.
- Jagric T (2003): Business Cycles in Central and East European Countries. *Eastern European Economics*, 41(5):6–23.
- Jiang C, Li X-L, Chang H-L, Su C-W (2013): Uncovered interest parity and risk premium convergence in Central and Eastern European countries? *Economic Modelling*, 33(7):204–208.
- Jiménez-Rodríguez R, Morales-Zumaquero A, Égert B (2013): Business Cycle Synchronization between Euro Area and Central and Eastern European Countries. *Review of Development Economics*, 17(2):379–395.
- Kemme DM, Roy S (2006): Real Exchange Rate Misalignment: Prelude to Crisis? *Economic Systems*, 30:207–230.
- Kočenda E (2001): Macroeconomic Convergence in Transition Countries. *Journal of Comparative Economics*, 29(1):1–23.
- Kocenda E, Kutan AM, Yigit TM (2006): Pilgrims to Eurozone: How Far, How Fast? *Economic Systems*, 30:311–327.
- Kočenda E, Kutan AM, Yigit TM (2008): Fiscal Convergence in the European Union. *North-American Journal of Economics and Finance*, 19(3):319–330.
- Koseoglu SD, Cevik EI (2013): Testing for Causality in Mean and Variance between the Stock Market and the Foreign Exchange Market: An Application to the Major Central and Eastern European Countries. *Finance a úvěr-Czech Journal of Economics and Finance*, 63(1):65–86.
- Krkoska L (1999): A Neoclassical Growth Model Applied to Transition in Central Europe. *Journal of Comparative Economics*, 27:259–280.
- Krugman PR (1991): *Geography and Trade*. Cambridge (MA), MIT Press.
- Kutan AM, Yigit TM (2005): Real and Nominal Stochastic Convergence: Are the New EU Members Ready to Join the Euro Zone? *Journal of Comparative Economics*, 33:87–400.
- Kutan AM, Yigit TM (2009): European Integration, Productivity Growth and Real Convergence: Evidence from the New Member States. *Economic Systems*, 33:127–137.
- Kutsomanoli-Filippaki A, Margaritis D, Staikouras C (2009): Efficiency and Productivity Growth in the Banking Industry of Central and Eastern Europe. *Journal of Banking & Finance*, 33:557–567.
- Liau Y-S (2015): Beta Asymmetry in the Global Stock Markets Following the Subprime Mortgage Crisis. *Emerging Markets Finance and Trade*, Published online: 01 Sep 2015: <http://www.tandfonline.com/doi/abs/10.1080/1540496X.2015.1068613?journalCode=mree20>
- Lommatzsch K, Tober S (2004): What is Behind the Real Appreciation of the Accession Countries' Currencies? An Investigation of the PPI-Based Real Exchange Rate. *Economic Systems*, 28: 383–403.
- Majcen B, Radosevic S, Rojec M (2009): Nature and Determinants of Productivity Growth of Foreign Subsidiaries in Central and East European Countries. *Economic Systems*, 32:17–32.
- Masso J, Vahter P (2014): The Role of Product-Level Dynamics in Export Growth and Productivity: Evidence from Estonia. *Emerging Markets Finance and Trade*, 50(4):42–60.
- Maurel M (2004): Current Account Constraint as a Barrier to International Trade: The Evidence from the European Enlargement Process? *Economic Systems*, 28:301–317.
- Mehic E, Silajdzic S, Babic-Hodovic V (2013): The Impact of FDI on Economic Growth: Some Evidence from Southeast Europe. *Emerging Markets Finance and Trade*, 49(1):5–20.

- Mundell AR (1961): A Theory of Optimum Currency Areas. *American Economic Review*, 51(4): 657–665.
- Nitoi M, Spulbar C (2015): An Examination of Banks' Cost Efficiency in Central and Eastern Europe. *Procedia Economics and Finance*, 22:544–551.
- Ozkan S, Balsari CK, Varan S (2014): Effect of Banking Regulation on Performance: Evidence from Turkey. *Emerging Markets Finance and Trade*, 50(4):196–211.
- Ozkan-Gunay EN, Gunay ZN, Gunay G (2013): The Impact of Regulatory Policies on Risk Taking and Scale Efficiency of Commercial Banks in an Emerging Banking Sector. *Emerging Markets Finance and Trade*, 49(5):80–98.
- Parteka A, Wolszczak-Derlacz J (2013): The Impact of Trade Integration with the European Union on Productivity in a Posttransition Economy: The Case of Polish Manufacturing Sectors. *Emerging Markets Finance and Trade*, 49(2):84–104.
- Petreski M (2013): Southeastern European Trade Analysis: A Role for Endogenous CEFTA-2006? *Emerging Markets Finance and Trade*, 49(5):26–44.
- Rusinova D (2007): Growth in Transition: Reexamining the Roles of Factor Inputs and Geography. *Economic Systems*, 31:233–255.
- Silajdzic S, Mehic E (2015): Absorptive Capabilities, FDI, and Economic Growth in Transition Economies. *Emerging Markets Finance and Trade*. Published online: 23 Sep 2015: <http://www.tandfonline.com/doi/abs/10.1080/1540496X.2015.1056000?journalCode=mree20>
- Skorepa M (2013): Troubles in the Euro Area Periphery: The View through the Lens of a Simple Convergence Sensitive Optimum Currency Area Index. *Finance a úvěr-Czech Journal of Economics and Finance*, 63(2):129–151.
- Slanicay M (2013): Business Cycle Synchronization through the lens of a DSGE Model. *Finance a úvěr-Czech Journal of Economics and Finance*, 63(2):180–196.
- Staehr K (2008): Fiscal Policies and Business Cycles in an Enlarged Euro Area. *Economic Systems*, 32:46–69.
- Stoica O, Diaconasu D-E, Socoliuc OR (2015): Dilemma: Regional or International Interdependencies in Central and Eastern European Stock Markets. *Procedia Economics and Finance*, 20:601–609.
- Taslaman C, Kayikci F (2013): Capital Mobility in Emerging Europe. *Emerging Markets Finance and Trade*, 49(5):250–258.
- Taylor JB (1993): Discretion versus Policy Rules in Practice. *Carnegie-Rochester Conference Series on Public Policy*, 39:195–214.
- Veličkovski V, Stojkov A (2014): Is the European Integration Speeding up the Economic Convergence Process of the Central and South-Eastern European Countries? A Shock Perspective. *Empirica*, 41(2):287–321.
- Weyerstrass K, Aarle BV, Kappler M, Seymen A (2011): Business Cycle Synchronization with(in) the Euro Area: In Search of a 'euro effect'. *Open Economies Review*, 22(3):427–446.