

FOREIGN DIRECT INVESTMENT STOCK AND BUSINESS CYCLE SYNCHRONIZATION: THE CASE OF CENTRAL EUROPEAN ECONOMIES

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Abstract

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The business cycle synchronization was widely discussed before the last economic crisis and now the interest in this topic revives. The majority of literature about business cycle synchronization evaluates the role of mutual trade and similarities among the economies, while the investment links, mainly foreign direct investment flows and stocks are very often completely ignored or at least marginalized. The paper aims to discuss and then estimate the importance of continually increasing stock of foreign direct investment in synchronization of business cycles. It focuses to selected Central European economies after economic transition and their business cycle co-movements with their most important trade partners – France, Germany and Italy. The extent of trade flows, industrial structure similarity and selected trade environment variables are used to extend the standardly employed regression formula.

Keywords: business cycle synchronisation, foreign direct investment stock, foreign trade, product structure, transition countries, trade distance, panel data.

INTRODUCTION

Jeopardies and risks of the not sufficient nominal and real convergence and thus synchronization of national economies has been discussed since early 1960s. The works of McKinnon (1963), Kenen (1969), Mundel (1961) pioneered the research of economic shocks and their impacts to small countries under the full or partial loss of their economic policy autonomy. The following discussions resulted in the different sets of criteria guaranteeing the minimisation or full absence of dangerous asymmetry in economic shocks. At the same time, the minimization of their impact to economies was analysed and similar sets of criteria were suggested. The following 1970s concentrated evaluation of positive and negative aspects of currency areas followed by creating various list of requirements for optimal currency areas (Ishyama, 1975).

After the faint progress during 1980s the synchronization effort and mainly convergence criteria obtain a quite new assignment. From

a simple measure of current state of the convergence, they became the highly popular political indicators of willingness of states to deepen the unification of national economies; restraint in individual economic policy and finally to make the irreversible decision to fix and keep the common rules. Thus, the previously independent national monetary policy is transferred to common monetary authority by the plan. (Bayiomi and Eichengreen, 1996, De Grauwe, 2014).

The detailed and almost representative evaluation of business cycle synchronization of 1990s could be found in Boone and Maurel (1998) or European Commission (2001). The frequent discussion of that time between the European Commission and Krugman (1994) reflected the dispute about the final impact of deepening the integration. The European Commission supported the view of higher business cycle synchronization because of stronger integration (endogeneity hypothesis), while Krugman argued for drop in business cycles

synchronization due to deeper specialization of individual economies after their integration. It then should result in more dissimilar structure of economies and thus to more asymmetric reaction to potential external shock (Krugman, 1994).

The external shocks spread through the so-called channels transmitting the impulses from one opened economy to another. We could speak about the international business cycle that is shared by the most interconnected economies. Nevertheless, this international business cycle is not perfect; the individual business cycles are not worldwide perfectly correlated and timed. This is not only due to significant time lags, but also mainly to build-in differences in economies. No matter the extent of differences, the economies with stronger economic links and thus stronger channel are supposed to be more synchronized than others.

The foreign trade is held as the most important channel for synchronization. Frankel and Rose (1998) described its positive influence on synchronization already and great number of other studies. For overview, see e. g. Baxter and Kouparitsas (2005). On the other hand, some studies did not result in significant impact of mutual foreign trade. (Crosby, 2003, Inklaar & Jong & de Haan, 2008).

The second most important channel is the economic similarity. This channel traditionally follows the argumentation of Krugman (1994) about the economic dissimilarity and its results in the higher asymmetry shock impacts and so in the lower level of business cycle synchronization (Imbs, 2004).

Next, the financial integration of partner economies proved to be coincided with the business cycle synchronisation. The financial integration in the form of business financial linkages, mainly foreign direct investments or other joint ventures increases the synchronisation (Imbs, 2004, Hsu & Wu & Yau, 2011). Other authors did not find enough evidence for this idea (Inklaar, 2008). Last, the impacts of common economic policy were analysed. The role of unified or synchronised monetary, fiscal or exchange rate policies could be an additional strong channel for spreading the economic impulses (Schiavo, 2008, Jansen and Stokman, 2011).

The discussion and econometric tests of the role of foreign direct investment in business cycle synchronisation rank to the aims of this paper. The paper endeavours to profit from the combination of panel data approach and three-stage method to test significance of foreign direct investment in business cycle synchronisation of selected former Central European transition economies to developed European economies.

Role of foreign direct investment

In previous decades, the international trade was held for the most influential factor but its role is nowadays significantly changing. In last three decades, there was substantial rise in mutual foreign

direct investment mainly among the developed countries, while the rise in foreign trade flows is multiple times slower. Thus, the share of foreign direct investment in international economic relations is rising step-by-step and substituting the classical foreign trade. The similar change could be supposed in reflections to business cycle synchronisation. At least the role of foreign direct investment has to be added in explanatory models, it can be no more marginalised.

This is not only the result of administrative steps removing the barriers to free movement of capital among the economies, but chiefly of economic pressure to more and more competitive international business environment. The need to be closer to consumers, to serve them more accurately and flexibly is combined with the effort to minimise the cost of production. The decline in returns to scale from mass production with permanently rising share of transportation costs in total costs leads to lower variable cost of supplying through the foreign direct investment in comparison with the foreign trade.

The stock of foreign trade investment could influence the business cycle synchronisation of economic partners via several channels:

- new technology diffusion; the foreign investors introduce the new technology almost at the same time in the domestic and foreign market, thus causing the simultaneous technology impulses influencing the business cycle worldwide;

- international rent sharing in transnational companies could spread local economic shocks to the other economies, because the negative, resp. positive economic shocks in any national economy is often compensated at the other market expense;

- change in net worth of foreign assets is reflected in market valuation of the whole firm and thought balance sheet effect could spread to other economies;

- international mobility of capital equalises the returns of investment and thus the prices of capital with investment and saving decisions.

Common for all these channels is a close connection with technology and/or financial integration in the form of foreign direct investment. The significance of foreign investment increases, so the role of foreign direct investment in business cycle synchronisation has to be stronger.

MODEL AND METHODOLOGY

The econometric model takes in account the possible strong endogeneity of explanatory variables; therefore, the system of simultaneous equations is used. In general, the model for empirical testing follows Imbs (2004), modifying the situation in two aspects. First, it adds the foreign direct investment among the explanatory variables. Second, it relies on panel data approach. The panel data approach results in significantly more robust

estimates, mainly in situation of not so wide cross-sectional data.

The estimates will profit from error component three stage least square approach described in detail in Baltagi (2008). The resulting estimator is matrix weighted average of within three stage least square and between three stage least square estimators. The whole procedure is described in Baltagi (2008) or Greene (2012).

The full econometric model of simultaneous equation could be described by following system of equations:

$$\rho = \alpha_0 + \alpha_1 I + \alpha_2 T + \alpha_3 D + \alpha_4 Z_1 + \varepsilon_1 \quad (1)$$

$$I = \beta_0 + \beta_1 T + \beta_2 D + \beta_3 Z_2 + \varepsilon_2 \quad (2)$$

$$T = \gamma_0 + \gamma_1 I + \gamma_2 D + \gamma_3 Z_3 + \varepsilon_3 \quad (3)$$

$$D = \delta_0 + \delta_1 I + \delta_2 T + \delta_3 Z_4 + \varepsilon_4 \quad (4)$$

where ρ stands for business cycle similarity, I for foreign direct investment, T for foreign trade intensity, D for industry dissimilarity, Z for set of instrumental variables and ε for error component. Each variable should be indexed for specific country pair and appropriate time. The error component is the sum of time invariant country pair specific (fixed) disturbance and random time error term.

The business cycle synchronisation could be measured using more approaches. The paper relies on the simple correlation of annual GDP growth rates. The complete analysed period 2000–2014 is divided to three subset delimited by years 2000–2004, 2005–2009 and 2010–2014. The correlation coefficients are always calculated in corresponding time spans. All explanatory variables like investment, trade, industrial dissimilarity etc., are averaged in the same time span. It eliminates possible annual disturbance that could arose from random reason.

Foreign trade and foreign direct investment are expressed in form of intensities measuring the relative shares of bilateral flow, respectively stock with respect to total flow, resp. stock. Omitting the discrepancies in official trade statistics, the foreign trade intensity is defined

$$T = \frac{x_{ij} + x_{ji} + m_{ij} + m_{ji}}{x_i + x_j + m_i + m_j} \quad (5)$$

where x_{ij} stands for bilateral export from country i into country j , x_{ji} stands for export from country j into country i , letter m with specific subscript represents imports from respective country into the corresponding country. The x_i is the value of total export from country i , m_i value of import etc. The annual trade intensities are subsequently

aggregated to five years averages to keep the same time span as business cycle correlations.

Similarly, the foreign direct investment intensities are calculated as the shares of bilateral stocks of foreign direct investment to total investment. The formula is following:

$$I = \frac{s_{ij} + s_{ji}}{s_i + s_j} \quad (6)$$

where s_{ij} stands for total stock of foreign direct investment in country j from country i , s_{ji} for total stock of foreign direct investment in country i from country j , while s_i and s_j represent the total stock of foreign direct investment in respective countries.

The industrial structure dissimilarity is evaluated using the sum of absolute differences in relative shares to total manufactured product. The STAN sectoral classification to 1-digit level is used as the proper basis to express the relative shares of individual industries in total manufactures production. The bilateral dissimilarity is defined as follows:

$$D = \sum |a_{ki} - a_{kj}| \quad (7)$$

where a_{ki} is relative share of industry k in country i and a_{kj} relative share of industry k in country j . Greater the dissimilarity index indicates more removed economic structures of economies.

The equations (1)–(4) create the internally consistent system with endogenous links. The crucial equation (1) explains the cycle synchronisation using the typical explanatory variables. According to prevailing literature, it could be expected positive signs for trade and investment intensities, while impact of industrial dissimilarity is anticipated negative. To ensure the required identification of equation system, the instrumental variables are added. In case of equation (1) the binominal proxy for Eurozone membership indicates the common monetary policy.

The equations (2), (3) and (4) are endogenous feedback for primary equation. Investment intensity in equation (2) depends on bilateral trade, industrial dissimilarity and set of instrumental variables. In this case, the instrumental variables contain the binominal Eurozone membership indicator and length of common border. It is expected that both instrumental variables have positive impact to investment stocks. The influence of bilateral trade intensity and industrial dissimilarity is ambiguous, because it is not possible to distinguish automatically the vertical and horizontal investment.

The trade intensity is explained by investment stock, industrial dissimilarity and two instrumental variables measuring the trade barriers. First, the geographical distance between capitals has to approximate the transportation cost, while the second, the length of common border should indicate the cross border trade. It is expected that

stock of investment, industrial dissimilarity and the length of common border have positive impacts to trade intensity, while geographical distance negative. These expectations are based on gravity approach.

Explaining the industrial dissimilarity in equation (4), apart from trade and investment intensity the wider set of instrumental variables is used. According to Imbs (2004) the proxies measuring the gap in economic levels between the countries. The impacts of intensities are expected ambiguous, while the economic gap has to increase the industrial dissimilarity.

EMPIRICAL RESULTS

The estimates are carried out on dataset of selected Central European former transition economies and their economic relation to the selected developed European economies. The developed countries are represented by Germany, France and Italy, the most important business partners of former Central European transition countries. The former transition countries are then represented by the Czech Republic, Slovak Republic, Hungary, Poland and Slovenia. The bilateral pairs consisting from one developed country and one former transition country were created and all required bilateral indicators were calculated separately for time spans 2000–2004, 2005–2009 and 2010–2014. So three measurements of synchronization were obtained for each individual country pair.

These short time series are the data element for constructed balanced panel dataset.

The estimates from error component three stage least squares method are given in Tab. I. The second column shows the estimates without time trend component, while the third column with linear time trend.

The results in Tab. I. are consistent with the theoretical expectations, although in majority of cases the estimates are not significant. In the main equation explaining the business cycle synchronization, measured by simple correlation coefficient of GDP growth rates, the investment intensity is significant at 10% level no matter the linear time trend in introduced. This result supports the tested hypothesis about the important role of investment stocks. At the same time, the impact of trade intensity did not prove to be significant at least at 10% significance level. This could be interpreted as weaker role of trade in comparison with investment, but there is not unambiguous evidence in data.

The instrumental variables are partly significant as it is obvious from estimates of equations (2)–(4). The Eurozone membership describing roughly the common monetary policy is significant without trend model at 5% level, in case of model with linear time trend only at 10% level. Industrial dissimilarity did not reach the 10% significance level at all. It seems that investment intensity and common monetary policy are decisive for level of business cycle synchronization.

I: Simultaneous equations estimation with error component three stage least squares method.

	without time trend	with time trend
equation 1 synchronization		
investment intensity	24.513 (16.879) *	24.801 (17.546)*
trade intensity	0.058 (3.589)	0.087 (3.259)
industrial dissimilarity	0.545 (2.248)	1.596 (1.648)
Eurozone membership	0.502 (0.151) **	0.268 (0.241) *
equation 2 investment		
trade intensity	0.64 (0.134) **	0.643 (0.456) *
industrial dissimilarity	−0.002 (0.092)	0.091 (0.425)
Eurozone membership	0.137 (0.020) **	0.256 (0.041) **
border length	0.066 (2.369)	0.027 (1.404)
equation 3 trade		
investment intensity	−0.965 (0.221) **	−0.658 (1.279)
industrial dissimilarity	0.439 (0.232) **	0.432 (0.124) **
geographical distance	0.022 (0.989)	−0.558 (0.451) *
border length	0.051 (2.198)	0.525 (1.528)
equation 4 dissimilarity		
investment intensity	−3.650 (5.486)	−3.211 (4.866)
investment intensity	2.458 (1.638) *	1.533 (0.973) *
GDP gap	−0.907 (2.543)	−0.217 (0.857)

Standard errors are given in parenthesis

* 10 % significance

** 5 % significance.

The use of system of equations with appropriate estimation method allows incorporating and analysing the endogeneity of major explanatory variables. It follows the individual theoretical attitudes. The investment intensity could be successfully explained from great majority by unambiguously significant trade intensity indicator with positive sign and positive influence of common monetary policy approximated by Eurozone membership binominal variable.

When explaining the trade intensity, only the industrial dissimilarity proved to be important in both models, while the role of investment intensity and geographical distance varied according to the model used for estimation. Industrial dissimilarity relation results in 10% significant level of investment intensity, other variables are not significant.

CONCLUSION

The paper investigates the impacts of stock of foreign direct investment to business cycle synchronization by adding this explanatory variable to commonly used formula. The attention is paid primarily to the synchronization of business cycle of former Central European transition countries with Germany, France and Italy. The analysed period covered 2000-2014. The estimates by error component three-stage least square method resulted in strong support of the significant role of stock of foreign direct investment. The role of foreign trade is not so clear, it is multiply weaker than the role of foreign direct investment stock.

The model also incorporates the endogeneity feedback for main explanatory variables – trade intensity, stock of foreign direct investment and industrial dissimilarity. Trade intensity is strongly determined by industrial dissimilarity indicating the important role of specialisation. The investment intensity is significant only in model without the time trend, allowing for linear time trend the significance disappears. On the other hand, time trend brings the geographical distance to significant role. For investment intensity case, the trade intensity and Eurozone membership are always significant factors. Last, the industrial dissimilarity is positively correlated with investment intensity thus indicating the prevailing vertical investments.

Given the strong evidence for investment intensity role and the absence of evidence supporting the trade intensity on the other hand, it could be concluded that the role of trade was weakened and was prevailed by stock of investment and the common monetary policy approximated by Eurozone membership. It seems that the shift to these explanatory factors follows in case of Central European post-transition countries the same tendency of other Eurozone countries (Hsu, Wu and Yau, 2011).

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