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**НЯКОЛКО РЕГРЕСИОННИ АНАЛИЗИ НАСИНХРОНИЗАЦИЯТА МЕЖДУ БИЗНЕС  
ЦИКЪЛА НА НОВИТЕ СТРАНИ ЧЛЕНКИ И ЕВРО ЗОНАТА**

**A FEW REGRESSIONS ON BUSINESS CYCLE SYNCHRONIZATION BETWEEN THE  
NEW MEMBER STATES AND THE EURO AREA**

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**Abstract:** This investigation uses panel data to measure the effects of financial integration, trade and specialization on business cycle convergence between the new member states outside the Euro area, and the Euro area. Some of our empirical results agree with economic theory and some do not. We attempt to put an emphasis on the empirical results that are not in accordance with theory predictions and find an appropriate explanation for them. Section 2 reviews literature and gives some recent data. Section 3 represents the data and methodology used and interprets the results. Section 4 draws conclusions.

**Key words:** trade, financial integration, specialization, business cycle synchronization, new member states, Euro area

### **1. Introduction**

The process of globalization, the accession to the European Union and the expected future membership in the European monetary union has intensified trade, financial relations and specialization of the new member states. Estimating the effects of specialization, financial integration and trade of the new member countries on business cycle similarity is important because of their eventual accession to the European monetary union. For a common monetary policy to be effective the new member states must have similar business cycles.

Specialization (measured as the sum of differences of countries' relative shares in gross value added over separate industries) is expected to decrease business cycle similarity because each industry has specific cyclical properties and responses to monetary policies. High specialization (or great differences in the structure of gross value added among member states in a monetary union) might generate asymmetric economic disorders.

The effects of trade on business cycle similarity have been extensively explored in literature. Economic theory and empirical investigation agree that trade integration amplifies business cycle similarity. Increased trade openness is likely to amplify business cycle similarity and decrease the necessity of national stabilization policies.

However, the relationship between financial integration and business cycle synchronization has been less explored and has become a matter of disagreement between theory and empirical investigations. A monetary union amplifies financial integration of participating countries (see De Grauwe, P. and Mongelli, F., 2005). If financial integration causes higher synchronization, this ought to help the new member states meet the optimum currency area criteria. If financial integration brings about lower synchronization, this might decrease common monetary policy's effectiveness. The influence of financial integration of the new member states on the business cycle similarity among them and with the Euro area has not been fully

explored in economic literature. The present investigation uses panel data and measures the effects of financial integration, trade and specialization on business cycle synchronization between new member countries outside the Euro area and the Euro area, on one hand, and among the new member states the Euro area, on the other hand. Fixed time and country-pair effects are included to account for global business cycle trends, culture, geography, politics and information. No evidence is found to suggest that financial integration affects business cycle similarity between new member states and Euro area and among new member states.

## **2. Financial integration, trade, specialization and business cycle similarity**

Industrial specialization (measured as the sum of differences of countries' relative shares in gross value added over separate industries) is expected to decrease business cycle similarity because each industry has specific cyclical properties and responses to monetary policies. High specialization (or great differences in the structure of gross value added among member states in a monetary union) might generate asymmetric economic disorders.

The effects of trade integration on business cycle similarity have been extensively explored in literature (see European Commission, 1990; Fidrmuc, J., 2004; Frankel, J. and Rose, A., 1998; Krugman, P., 1993). The small open economies of the new member states are highly integrated with each other and with the Euro area in terms of trade. A lot of investigations have been made in how synchronized the new member states are with each other and with the Euro area as a result of increased trade. Trade integration varies by states (Kocenda, E., 2001; De Haan, J., Inklaar, R. and Jong-a-Pin, R., 2008; Fidrmuc, J. and I. Korhonen, 2003; Korhonen, I., 2003). The level of synchronization caused by trade depends on the type of the shock which hits economy. Trade may increase business

cycle similarity because of spill-over effects and policy coordination, but could also decrease it because of specialization (Babetskii, I., 2005; Horvath, J. and Raffai, A., 2004; Babetskii, I., Boone, L., and Maurel, M., 2004).

The process of globalization and the expected future membership in the European monetary union has intensified the financial integration of the new member states. The influence of financial integration of the new member states on their business cycle similarity with the Euro area has not been fully investigated in economic literature. Real business cycle models predict that increased financial integration will lead to higher synchronization in consumption and lower synchronization in investment and output (Backus, D., Keho, P. and F. Kydland, 1992). Financial integration can cause industrial specialization and thus decrease synchronization.

Financial integration may contribute to business cycle convergence by demand-side effects. If consumers possess assets in foreign stock markets (indication of financial integration) then a decline in these markets lowers domestic wealth and demand. When there is a crisis abroad foreign banks' bonds decrease in value thus causing a fall in the domestic market too. Banks transfer these losses onto their clients by higher interest rates thus hampering economic growth and increasing business cycle similarity.

Empirical results refute the forecasts of real business cycle models. Empirical investigations find evidence of higher correlation in output than in consumption (Imbs, J., 2004).

The contradiction between empirical results and theory expectations could be due to the type of financial integration. Financial market integration may be divided into stock market integration and debt market integration (Davis, S., 2009). Stock market integration can cause negative output correlation because capital flows maximize marginal rate of return as predicted by real business cycle models. Debt market integration may raise

synchronization because of the demand-side effects already described.

Estimating the effects of financial integration of the new member countries is important because of their eventual accession to the European monetary union. For a common monetary policy to be effective the new member states must have similar business cycles. A monetary union amplifies financial integration of participating countries (De Grauwe, P. and Mongelli, F., 2005). If financial integration causes higher synchronization, this ought to help the new member states meet the optimum currency area criteria. If financial integration brings about lower synchronization, this might decrease common monetary policy's effectiveness. Economic theory and empirical investigations disagree on the impact of financial integration on business cycle convergence.

In literature there are two assumptions about the level of financial integration of the new member states. The first assumption is that financial markets of the new member states are less integrated than these in the Euro area but the integration process has sped up after their accession to the European Union (Baltzer, M., Cappiello, L., De Santis, R. and Manganelli, S., 2008). The second assumption is that the new member countries have reached a level of financial integration comparable to the level of the Euro area (BIS Quarterly Review, September 2007). The first assumption is supported by the fast development of financial sector in the new member states and the massive presence of other member states' banks in this sector. Arguments in favor of the second assumption are the goal to join the Euro area and the common institutional and regulatory framework provided by the European Union (European Bank for Reconstruction and Developments, 2006).

In a monetary union the integration of financial markets is crucial to the effective transmission of the common monetary policy. The higher the financial integration is, the more effective the common monetary policy is. Joining the Euro area without a

sufficient level of financial integration could intensify idiosyncratic shocks and lower the effectiveness of the common monetary policy (ECB, 2007).

The relationship between financial structures and monetary policy transmission has been extensively discussed in literature. The differences in financial and bank markets of European monetary union's members can cause asymmetric effect of common monetary policy. These differences are legal and economic. National legislations change slowly, therefore legal differences are constant in the short run (Cecchetti, S., 2001). Economic factors vary more rapidly. The responses to monetary shocks in the new member states and the Euro area are quite different (Jarociński, M., 2004). Short-term output and price responses are stronger in the Euro area, while midterm responses are comparable in size. Interest rate shocks are bigger and more resistant in the new member states whereas exchange rate responses are identical. Financial markets in the new member states have a slow response to strong and/or prolonged fluctuations in interest rates and exchange rates. This delayed reaction might be due to insufficient depth of financial markets, which in the short run impedes the effective transmission of monetary policy changes to financial markets.

Banks play a specific role in monetary policy transmission in the new member states. Banks relate their lending rates to Euro area short-term interest rate but respond more weakly to changes in domestic monetary indicators (Schmitz, B., 2004). A possible explanation of this fact is the domination of foreign-owned banks in the new member states. Since this domination tends to grow stronger, an increased influence of Euro area monetary policy on new member states financial sector could be expected.

Financial depth and the level of financial intermediation in the new member states are low compared to European Union average (Anzuini, A. and Aviram L., 2004). This could explain the longer lag of

monetary transmission in the new member states in comparison with the Euro area.

Most integration investigations have focused on developed countries (Jorion, P. and Schwartz, E., 1986). Emerging markets and new member states have received less attention by researchers (Bekaert, G. and Harvey, C., 1995).

The integration of equity markets among the new member states and with the Euro area has increased in the European Union accession process (ECB Working Paper Series No 683, 2006).

Financial integration is related to certain costs and benefits (Agenor, P., 2003). Benefits are considered to exceed costs if control mechanisms for financial stability are implemented. Joining the Euro area without sufficient financial integration could cause problems with transmission of common monetary policy and common shocks.

The impact of financial integration on business cycle similarity has not been thoroughly explored. There are no explicit replies to the question: 'What is the effect of financial integration of new member states on the business cycle similarity with Euro area and among new member states?' The present investigation attempts to find answers to this question.

The composition of output (the structure of gross value added by sectors of

economy) is important for assessing the degree of structural convergence. If this structure differs substantially by countries, sector disorders may grow into asymmetric country shocks. Kenen (1969) and Dedola and Lippi (2000) show that differences in the composition of output may create idiosyncratic national business cycle because sectors vary in cyclical properties and even in responses to monetary measures.

Structures of gross value added and employment are in a close relationship with the phase of economic development. The higher level of development is characterized by a bigger share of services and smaller share of agriculture in gross value added and employment, while the relationship between industry share and per capita output is U-shaped (Chenery and Taylor, 1968).

Table 1 displays the shares of four sectors (agriculture, industry, construction and services) in gross value added of the new member states and the Euro area for 1997 and 2007. In all sectors the differences between the Euro area and the new member countries have shrunk for ten years. By a process of structural convergence the new member states have shortened the distance in economic development vis-à-vis the Euro area.

**Table 1.** Gross value added at basic prices (percentage of total)

	Agriculture		Industry		Construction		Services	
	1997	2007	1997	2007	1997	2007	1997	2007
<i>Euro area</i>	2,8	1,9	22,7	20,4	5,7	6,5	68,7	71,1
<i>New member states</i>	8,1	3,9	25,8	23,0	6,0	7,4	60,1	65,7
<i>Difference</i>	- 5,3	- 2,0	-3,1	-2,6	-0,3	-0,9	8,7	5,4

Source: Europe in figures. Eurostat yearbook 2009

Like Krugman (1993), we have calculated two indices of output dissimilarity to estimate the difference in the structure of gross value added between five new member states as a group (Czech Republic, Hungary, Latvia, Lithuania, Poland) and the Euro area. The first index (Index of overall specialization – IOS) is the sum of the absolute differences in the shares in gross

value added of six activities (agriculture and fishing; industry (except construction); manufacturing; construction; trade, transport and tourism; financial intermediation and real estate; public administration, community services and activities of households) between the five new member countries and the Euro area:

$$(1) \text{IOS}_t = \sum |GVA_{nms, t, m} - GVA_{ea, t, m}|$$

$GVA_{nms, t, m}$  stands for the share of the five new member states as a group in industry m at moment t.  $GVA_{ea, t, m}$  stands for the share of Euro area in industry m at moment t.

The second index (Index of specialization in services - ISS) is similar to IOS but is calculated on basis of the three service-providing activities (trade, transport and tourism; financial intermediation and real estate; public administration, community services and activities of households):

$$(2) \text{ISS}_t = \sum |GVA_{nms, t, n} - GVA_{ea, t, n}|$$

$GVA_{nms, t, n}$  stands for the share of the five new member states as a group in a service-providing industry n at moment t.  $GVA_{ea, t, n}$  stands for the share of Euro area in a service-providing industry n at moment t.

The higher the values of indices are the higher the level of output dissimilarity between the five new member states and the Euro area is.

Table 2 provides the values IOS and ISS on quarterly basis from 2003 to 2010. The value of overall output dissimilarity between the five new member states and the Euro area from 2003 to 2010 tends to increase slowly but steadily whereas structural dissimilarities in service providing activities remain relatively unchanged.

**Table 2.** ISO and ISS from 2003 to 2010

Quarter	IOS	ISS
2003Q1	24,7	19,5
2003Q2	25,6	19,7
2003Q3	27,0	20,2
2003Q4	27,0	20,1
2004Q1	28,5	20,1
2004Q2	29,0	20,2
2004Q3	29,7	20,4
2004Q4	30,0	20,6
2005Q1	29,0	20,5
2005Q2	28,6	20,4
2005Q3	28,5	20,2
2005Q4	29,1	20,7
2006Q1	28,9	20,6
2006Q2	28,9	20,6
2006Q3	28,0	19,8
2006Q4	27,5	19,8
2007Q1	28,1	19,9
2007Q2	28,0	19,7
2007Q3	26,6	18,9
2007Q4	25,8	18,6
2008Q1	26,2	18,1
2008Q2	26,1	18,1
2008Q3	24,4	17,4

2008Q4	24,8	17,5
2009Q1	27,8	18,0
2009Q2	28,4	18,6
2009Q3	28,2	18,5
2009Q4	28,7	19,2
2010Q1	29,3	19,9
2010Q2	31,7	20,5
2010Q3	32,9	20,8
2010Q4	32,4	20,7

Source: Eurostat

Trade openness is essential for estimating the degree of international integration of a national economy and for choosing an exchange rate regime or a monetary union membership. Trade openness is calculated by dividing the average of exports and imports by GDP. The higher the trade openness, the bigger the influence of international prices of tradables on domestic prices and cost of living and the less useful the autonomous exchange rate policy as a shock-absorbing tool is. Increased trade openness is likely to amplify business cycle similarity and decrease the necessity

of national stabilization policies, as argued by Frankel and Rose (1998 and 2000) and Rose (2000).

The new member states are open economies and meet the trade openness criterion for monetary union membership. The trade openness of the new member states in goods and in services is much above EU-average. The new member states have higher trade openness in goods and lower trade openness in services than the Euro area.

**Table 3. Trade openness in goods (average of exports and imports as a percentage of GDP)**

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
EU-27	:	:	:	:	:	:	9,0	9,8	10,7	10,8	11,3	9,7
NMS	42,5	39,6	46,7	46,0	44,4	45,1	46,6	49,3	52,8	52,2	51,3	42,7
EA	30,3	32,9	37,8	36,1	37,2	36,9	38,2	38,2	40,1	40,4	40,1	33,0

Source: Eurostat

**Table 4. Trade openness in services (average of exports and imports as a percentage of GDP)**

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
EU-27	:	:	:	:	:	:	3,2	3,4	3,6	3,7	3,9	3,8
NMS	13,1	12,7	13,5	13,4	12,8	12,5	12,7	13,3	14,0	14,2	14,8	14,1
EA	8,9	11,4	12,4	12,8	16,7	16,1	16,7	17,6	18,7	19,8	20,3	19,4

Source: Eurostat

**Table 5. Percentage of exports for EU-27 in the total exports of NMS and EA**

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
NMS	74,3	73,2	74,1	73,3	73,4	73,6	73,0	71,2	71,7	69,9	70,6
EA	71,7	69,4	70,3	69,7	70,3	70,2	70,2	69,9	69,7	68,6	67,6

Source: Eurostat

**Table 6. Percentage of imports from EU-27 in the total imports of NMS and EA**

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
NMS	69,2	66,2	67,0	67,7	67,3	71,9	72,1	71,2	72,3	70,2	71,0
EA	70,1	67,8	68,8	69,2	69,1	70,2	68,8	67,6	67,9	66,4	67,6

Source: Eurostat

The new member states are highly integrated in the European Union in terms of trade – above 70 percent of their foreign trade (for both exports and imports) is within EU. These shares are comparable in size with the respective shares of the Euro area.

The Czech Republic, Hungary, Poland and Romania are among the Euro area twenty main trading partners for both exports and imports. The total percentage of the four states in the EA imports grew from 7 in 1999 to 12 in 2009, whereas the total percentage of the four states in the EA exports rose from 8.3 in 1999 to 12.6 in 2009. These numbers show increased trade activity between the NMS and the EA.

The impact of trade integration on business cycle synchronization has been broadly discussed in literature (European Commission, 1990; Fidrmuc, J., 2004; Frankel, J. and Rose, A. 1998; Krugman, P., 1993). The small open economies of the new member states are highly integrated with each other and with the Euro area in terms of trade. A lot of investigations have been made in how synchronized the new member states are with each other and with the Euro area as a result of increased trade. Synchronization caused by trade varies by countries (as shown by Kocenda, E., 2001; De Haan, J., Inklaar, R. and Jong-a-Pin, R., 2008; Fidrmuc, J. and Korhonen, I., 2003; Korhonen, I., 2003) and depends on the type of shock which hits the economy (as discussed by Babetskii, I., 2005; Horvath, J. and Ratfai, A., 2004; Babetskii, I., Boone, L., and Maurel, M., 2004). Fidrmuc, J. and Korhonen, I. (2004) summarize lots of publications on the business cycle similarity between the new member states and the Euro area. Their findings are that the Central European countries are better correlated with the Euro area than Balkan and the Baltic states (except for Estonia).

### 3. Data, methodology and results

The first model specification we employ in our research has been used by different investigators (Sala-i-Martin, 1997; Angeloni, I., Flad, M and Mongelli, F. P., 2005):

$$(3) \text{BSC}_t = b_0 + b_1 \cdot Y_{t-1} + b_2 \cdot \text{IOS}_t + b_3 \cdot \text{ISS}_t + b_4 \cdot \text{TO}_t + b_5 \cdot I_t$$

$$(4) \text{BSC}_t = \ln(\text{RPCGDP}_t) - \ln(\text{RPCGDP}_{t-1})$$

$$(5) Y_{t-1} = \ln(\text{RPCGDP}_{t-1})$$

$$(6) \text{TO}_t = (\text{MIG} + \text{MIS})/2$$

$$(7) \text{MIG} = (\text{EXG} + \text{IMG})/\text{GDP} \cdot 2$$

$$(8) \text{MIS} = (\text{EXS} + \text{IMS})/\text{GDP} \cdot 2$$

$$(9) I_t = \text{GCF}/\text{GDP}$$

$\text{BSC}_t$  is a measure of business cycle convergence between the new member states and the Euro area.  $Y$  denotes the logged real per capita GDP.  $\text{RPCGDP}$  stands for real per capita GDP.  $\text{TO}_t$  is the trade openness and  $I_t$  is the ratio of gross capital formation to GDP.  $\text{MIG}$  stands for market integration of goods,  $\text{EXG}$  – for exports of goods and  $\text{IMG}$  – for imports of goods.  $\text{MIS}$  marks the market integration of services,  $\text{EXS}$  – exports of services and  $\text{IMS}$  – imports of services.  $\text{GVA}_{\text{nms}, t, m}$  stands for the share of new member states as a group in industry  $m$  at moment  $t$ .  $\text{GVA}_{\text{ea}, t, m}$  stands for the share of Euro area in industry  $m$  at moment  $t$ .

The new member states included in the research are the Czech Republic, Hungary, Latvia, Lithuania and Poland. The period covered is from 2003 quarter 1 to 2010 quarter 4. Quarterly seasonally adjusted data are used in the investigation.

In fact the left hand side of equation (3) -  $\text{BSC}_t$ , represents the growth of per capita output which is explained by a number of selected variables, often used in the literature.

**Table 7.** Panel estimation results

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
<i>Constant</i>	0.043 (0.153)	0.030 (0.591)	-0.039 (0.559)	-0.222*** (0.001)	-0.234*** (0.000)	-0.231*** (0.001)	-0.206*** (0.001)
$Y_{t-1}$	-0.005 (0.204)	-0.004 (0.242)	-0.004 (0.256)	-0.003 (0.321)	-0.003 (0.350)	-0.003 (0.411)	-0.002 (0.608)
$IOS_t$			0.002* (0.075)		-0.004*** (0.005)	-0.005** (0.023)	-0.003** (0.050)
$ISS_t$				0.011*** (0.000)	0.017*** (0.000)	0.018*** (0.000)	0.016*** (0.000)
$TO_t$		0.000 (0.785)	0.000 (0.729)	0.001 (0.281)	0.002 (0.154)	0.002 (0.230)	
$I_t$						0.000 (0.864)	0.001 (0.440)
<i>Adjusted R<sup>2</sup></i>	0.010	-0.005	0.032	0.321	0.401	0.390	0.385

Source: Eurostat

Note: P-values in parentheses

\*\*\* - significant at 1%; \*\* - significant at 5%; \* - significant at 10%

In Table 7, Model 1 shows the basic regression results. There is no statistical evidence that economic growth rates of the new member states are influenced by the starting level of per capita income for each period.

Model 2 adds to Model 1 the trade openness as an important explanatory variable suggested by theory. Though, in Model 2 trade openness is insignificant.

Models 3-5 investigate the impact of dissimilarities in gross value added structures via two indices – IOS and ISS. Each index is significant individually and keeps its significance in the presence of the other. It should be emphasized that when ISS is added, the adjusted R<sup>2</sup> rises dramatically and the explanatory power of the model increases.

Model 6 introduces the investment rate in accordance with economic theory suggestions. In Model 6 the investment rate is insignificant and remains insignificant even in Model 7 when trade openness is excluded.

To estimate the effects of financial integration of the new member states on their business cycle similarity with the Euro

area we use another specification similar to the one used by Kalemli-Ozcan et al (2010):

$$(10) \text{SYNCH}_{ij,t} = c_0 + c_1 \text{FINT}_{ij,t} + c_2 \text{TRADE}_{ij,t} + c_3 \text{SPEC}_{ij,t} + \text{FTE} + \text{FCPE}$$

$$(11) \text{SYNCH}_{ij,t} = - \left| \ln(X_{i,t} / X_{i,t-1}) - \ln(X_{j,t} / X_{j,t-1}) \right|$$

$$(12) \text{FINT}_{ij,t} = \ln(\text{DE}_{j,t} / \text{DFC}_{j,t})$$

$$(13) \text{FINT}_{ij,t} = \ln(\text{LE}_{j,t} / \text{LFC}_{j,t})$$

$$(14) \text{TRADE}_{ij,t} = \ln((\text{EX}_{ij,t} + \text{IM}_{ij,t}) / (\text{GDP}_{it} + \text{GDP}_{jt}))$$

$$(15) \text{SPEC}_{ij,t} = \ln \left| \sum \text{GVA}_{i,t,m} - \text{GVA}_{j,t,m} \right|$$

SYNCH<sub>ij,t</sub> measures business cycle similarity. X stands for quarterly seasonally adjusted gross domestic product, consumption or gross fixed capital formation.

FINT<sub>ij,t</sub> is a measure of financial integration. DE stands for households' deposits in Euro, DFC - for households' deposits in foreign currency, LE – for households' loans in Euro and LFC – for households' loans in foreign currency. The i subscript stands for the Euro area as a whole, the subscript j – for each new member states outside the Euro area



individually, not as a group. The subscript  $t$  stands for time.

When the business cycle convergence among new member states is estimated, the subscripts  $i$  and  $j$  stand for different new member states. Then financial integration is measured by the averaging the shares of Euro-denominated deposits (loans) of households for countries  $i$  and  $j$ .

$TRADE_{ij,t}$  is an index of trade. EX stands for exports, IM – for imports.

$SPEC_{ij,t}$  is an index of industrial specialization.  $GVA_{i,t,m}$  stands for percentage share in gross value added of country  $i$  in industry  $m$ .

FTE represent fixed time effects reflecting the impact of global business cycle trends on the business cycle convergence between the new member states and the Euro area.

FCPE are fixed country-pair effects accounting for factors such as culture, geography, politics and information.

Because of data availability issues the new member states included in the research are Bulgaria, Hungary, Latvia, Lithuania and Poland. The period covered is from 2004 quarter 1 to 2010 quarter 4.

Empirical investigations have employed different measures of financial integration

such as capital flows, capital flow restrictions, and asset and liability holdings (Imbs, J., 2004; Kalemli-Ozcan, S., Papaioannou, E. and Peydró, J.L., 2010; Davis, S., 2009). However due to data availability problems these proxies cannot be used to measure the financial integration of the new member states with the Euro area. Therefore in this investigation another measure of financial integration has been used – the ratio of households' Euro-denominated deposits (loans) to all households' deposits (loans) denominated in foreign currency. Using this measure as an indicator of financial integration makes sense because if new member states households can choose between domestic banks and other European Union banks then they may be more likely to borrow and deposit in Euro. The extent to which new member states households use the Euro compared to other currencies can be viewed as a measure of financial integration.

Table 8 presents the output from estimating equation (10) by using the share of euro-denominated loans as a proxy for financial integration

**Table 8. Regression results from estimating equation (10) with the share of euro-denominated loans as an indicator of financial integration**

Variables	SYNCH Y	SYNCH C	SYNCH I
Constant	-0.363* (0.026)	-0.150 (0.439)	-0.338 (0.275)
FINT-Loans	0.005 (0.675)	0.002 (0.883)	-0.004 (0.846)
SPEC	0.001* (0.033)	0.000 (0.509)	0.001 (0.217)
TRADE	0.003 (0.378)	0.000 (0.919)	0.016* (0.035)
Observations	140	140	140
R-squared	0.218	0.196	0.210

Source: Eurostat

Note: P-values in parentheses

\*\*\* - significant at 1%; \*\* - significant at 5%; \* - significant at 10%

The two significant coefficients in Table 8 imply that (1) higher industrial

specialization increases gross domestic product synchronization and (2) enhanced trade raises investment synchronization.

Seemingly the negative empirical correlation between industrial specialization and gross domestic product synchronization contradicts theoretical expectations. However, it should be considered that differences in economic development and structures in Euro area and new member states are still

considerable. As these differences are gradually overcome, the ambiguity of the results could be due to process of real convergence and the catch-up development of new member states.

Table 9 presents the output from estimating equation (10) by using the share of euro-denominated loans as a proxy for financial integration.

**Table 9.** Regression results from estimating equation (10) with the share of euro-denominated deposits as an indicator of financial integration

Variables	SYNCH Y	SYNCH C	SYNCH I
Constant	-0.287 (0.154)	-0.059 (0.807)	-0.542 (0.218)
FINT-Deposits	0.013 (0.596)	0.017 (0.554)	-0.038 (0.408)
SPEC	0.001 (0.205)	5.660E-5 (0.910)	0.001 (0.124)*
TRADE	0.002 (0.366)	0.000 (0.841)	0.018* (0.000)
Observations	140	140	140
R-squared	0.219	0.198	0.214

Source: Eurostat

Note: P-values in parentheses

\*\*\* - significant at 1%; \*\* - significant at 5%; \* - significant at 10%

The only significant coefficient in Table 9 suggests that more intensive trade contributes to increasing investment synchronization.

No significant evidence was found to suggest that financial integration affects business cycle similarity between the Euro area and the new member states.

Table 10 shows the results from estimating equation (1) by using the averaged shares of euro-denominated loans of households as a proxy for financial integration.

**Table 10.** Regression results from estimating equation (10) with the averaged share of euro-denominated loans as an indicator of financial integration

Variables	SYNCH Y	SYNCH C	SYNCH I
Constant	-0.032 (0.022)*	-0.060 (0.000)*	-0.056 (0.041)*
FINT-Loans	-0.004 (0.269)	6.483 (0.988)	-0.004 (0.569)
SPEC	-0.001 (0.631)	-0.002 (0.422)	0.002 (0.741)
TRADE	-0.002 (0.289)	-0.003 (0.165)	0.003 (0.422)
Observations	270	270	270
R-squared	0.125	0.309	0.170

P-values in parentheses \*P<0.1

No conclusions can be made from Table 10 because no coefficients are statistically significant.

Table 11 shows the results from estimating equation (10) by using the

averaged shares of euro-denominated deposits of households as a proxy for financial integration.

**Table 11.** Regression results from estimating equation (10) with the averaged share of euro-denominated deposits as an indicator of financial integration

Variables	SYNCH Y	SYNCH C	SYNCH I
Constant	-0.041* (0.001)	-0.038* (0.003)	0.169* 0.000
FINT-Deposits	-0.003 (0.788)	-0.007 (0.618)	0.010 (0.703)
SPEC	0.001 (0.620)	-0.002 (0.151)	0.004 (0.181)
TRADE	-0.003* (0.055)	-0.003* (0.098)	0.002 (0.531)
Observations	270	270	270
R-squared	0.122	0.309	0.169

Source: Eurostat

Note: P-values in parentheses

\*\*\* - significant at 1%; \*\* - significant at 5%; \* - significant at 10%

Results in Table 11 imply that increased trade among new member states lowers the synchronization of gross domestic product and consumption among new member states. A possible explanation is that enhanced trade activity among new member states leads to higher specialization and hence to less business cycle similarity.

#### 4. Conclusion

Our results show that business cycle synchronization between the NMS and the EA is in negative correlation with the overall distance in output composition between the five NMS and the EA. Since in the process of structural convergence the overall distance is expected to decrease this should lead to higher business cycle similarity between the five NMS and the EA. This inference is in agreement with economic theory. Results also confirm theoretical expectation of a positive relationship between trade openness and business cycle convergence.

What is not in accordance with theory is the established empirical positive correlation between dissimilarities in service providing-sectors and the business cycle convergence. The difference between theoretical predictions and empirical results might be due to two reasons:

1) Changes in relative prices of services;

2) If specialization occurs mainly within industries as in the case with service-providing industries it does not necessarily lead to lower business cycle synchronization (as shown by Calderon C., Chong A. and Stein, E., 2002).

No significant evidence was found that financial integration affects business cycle similarity between the Euro area and the new member states. Results imply that more intensive trade contributes to increasing investment synchronization between new member states and Euro area. It can also be inferred that higher industrial specialization increases gross domestic product synchronization and that enhanced trade

raises investment synchronization between new member states and Euro area. The negative empirical correlation between industrial specialization and gross domestic product synchronization could be explained by the process of gradually overcoming the differences in economic development and gross value added structures in Euro area and new member states.

Evidence was found that more intensive trade lowers synchronization of gross

domestic product and consumption among new member states. This ambiguity might be caused by the great differences in new member states' export structures. On one hand, Hungary and Poland export mainly products of higher value added such as machinery and equipment. On the other hand, Bulgaria, Latvia and Lithuania export predominantly products of low value added such as agricultural and light-industry goods.

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