WHAT MATTERS THE MOST FOR THE BUSINESS CYCLE SYNCHRONIZATION OF BALTIC STATES?

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Grant Research

Reassessment of the OCA theory in the persistently heterogeneous EU

Euro4Europe

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MOTIVATION (I)

- Since a Monetary union requires a “one-size-fits all” monetary policy there is quite strong opinion, that member countries should exhibit **similar business cycles.**
- Lack of cohesion between members of EU and EMU might impede unified economic policies.
- The regional and sub-regional linkages can help augment – or, on the contrary, destabilize – the European Union as a whole (Hegerty, 2017).
- Many researches still argue that the business cycle synchronization in Europe is not high enough for a successful currency union.

MOTIVATION (II)

The theoretical relationship between trade integration and business cycle synchronization also remains equivocal.

The positive relationship between international trade patterns and international business cycle is described in Commission of the European Communities (1990) in an evaluation of the potential benefits and costs of forming an economic and monetary union.

We follow Frankel and Rose (1998) argument that OCA requirements according to **Mundell (1961) and Kenen (1969)** can be fulfilled ***ex-post,***

i.e. assuming that after the introduction of the Eurozone the trade among member countries should increase, which increases business cycle synchronization.

RESEARCH QUESTION

- Did the **trade intensity** increase the **synchronization of business cycle** with trading partners

or

- Did the **introduction of single currency increases the business cycle synchronization** with the trading partners ?

VALUE

- We believe, that the **strength** of main macroeconomic variables **comovements** might help to **better forecast** the trends and **apply** more appropriate **decisions** on macroeconomic policies.

GOAL & HYPOTHESIS

The paper aims to investigate the synchronization of business cycles of the Baltic region (Estonia, Latvia, Lithuania) with the main trading partners.

HYPOTHESIS

We expect, that more intensive international trade results in increased synchronization of business cycles with trading partners

And vice versa - closer co-movements of business cycles with trading partners results in more intensive international trade.

RESEARCH PLAN AND MODEL

1. Investigation of trade intensity and BC in three Baltic States (BS) separately → combining them in to one region.

2. Determination of the main trading partners of the Baltic States.

3. Analysis of BC synchronization and trade intensity between the BS and the main trading partners before and after joining EU.

4. Examination of the impulse of BC direction

5. Examination whether trade or common money matters the most for the Baltic States

Data

Quarterly GDP data from 1995 Q1 to 2019 Q4, n=100

We split data into 2 periods:

- before entering EU, 1995 Q1-2004 Q2; n=38
- after entering EU, 2004 Q3 - 2019 Q4, n=62
- We compared whether the trade intensity and **business cycle synchronization between the Baltic States and their main trading partners differs significantly** before and after joining EU.
- For panel data analysis we split the sample into 4 equal periods.

Trade Intensity

We use two different proxies for bilateral trade intensity (Frankel and Rose, 1998) :

1. Trade intensity normalized by total **export and import** of trading partners

$$wt_{ijt} = (X_{ijt} + M_{ijt})/(X_{i.t} + X_{j.t} + M_{i.t} + M_{j.t})$$

2. Trade intensity normalized by **GDP** of trading partners

$$wy_{ijt} = (X_{ijt} + M_{ijt})/(Y_{i.t} + Y_{j.t})$$

GDP decomposition

Business cycle IS modeled for **output**.

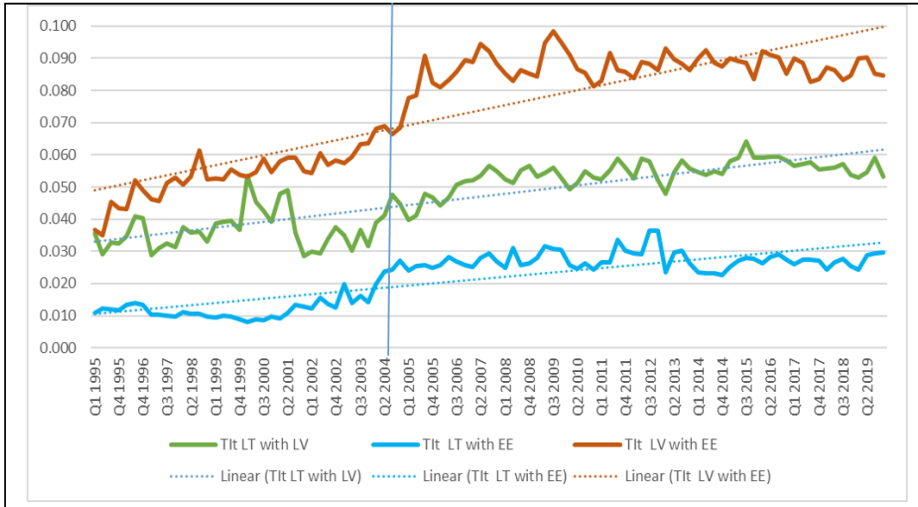
GDP decomposition is done by **HP filter, CF filter** and by **Baxter and King** (1999) bandpass filter.

$$\min_{\tau} \left(\sum_{t=1}^{T} (y_t - \tau_t)^2 + \lambda \sum_{t=2}^{T-1} [(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1})]^2 \right)$$

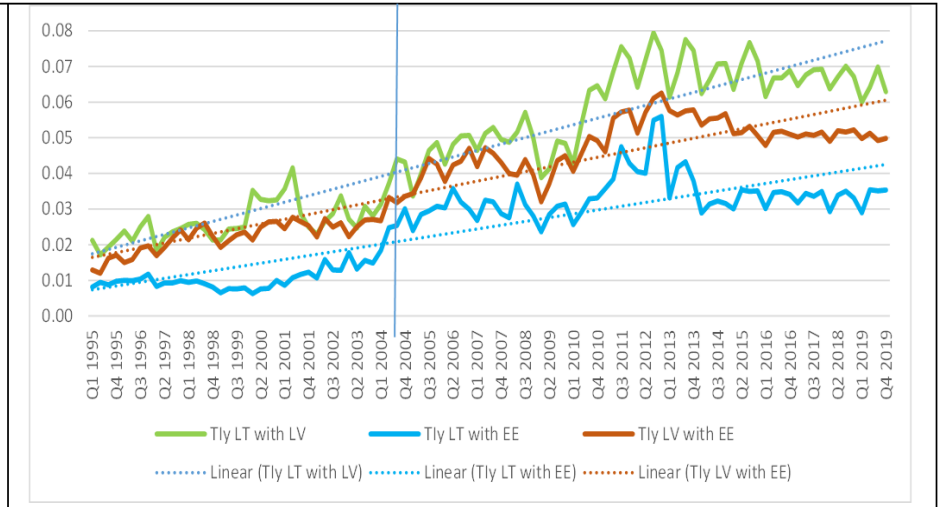
- **HP filter**
  - λ= 1600
  - the business cycle component = $x_t - \tau_t$

- For both **Baxter and King (BK)** (1999)and **Christiano-Fitzgerald** (CF) we used min. period=6 , max. period=32 and smartorder =12

1. Investigation of Trade Intensity between the three Baltic States (EE, LV, LT)



Trade intensity normalised by total trade (TIt)



Trade intensity normalized by GDP (TIy)

Total period is split into two sub periods: before and after joining EU

$$wt_{ijt} = (X_{ijt} + M_{ijt})/(X_{i.t} + X_{j.t} + M_{i.t} + M_{j.t})$$

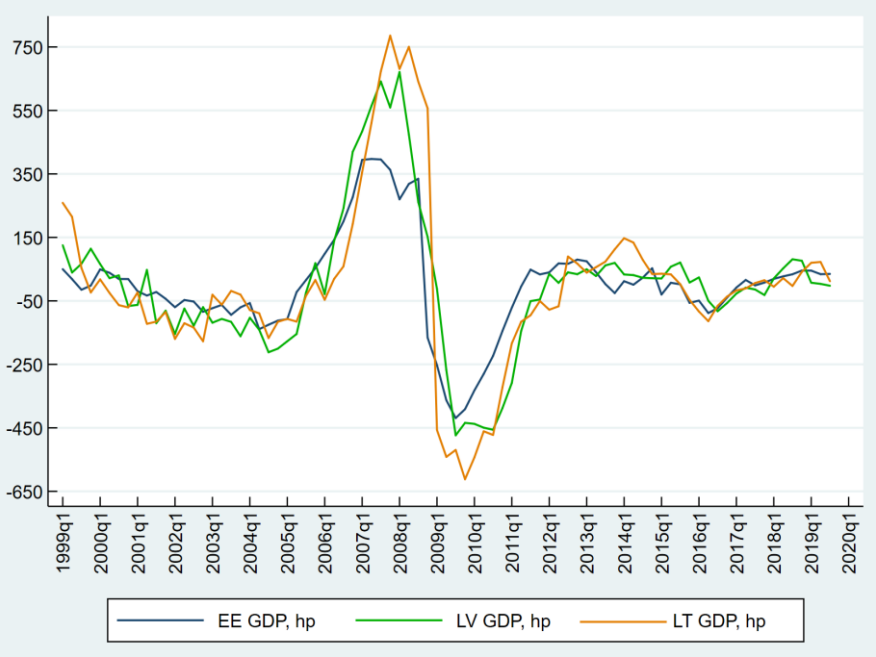
$$wy_{ijt} = (X_{ijt} + M_{ijt})/(Y_{i.t} + Y_{j.t})$$

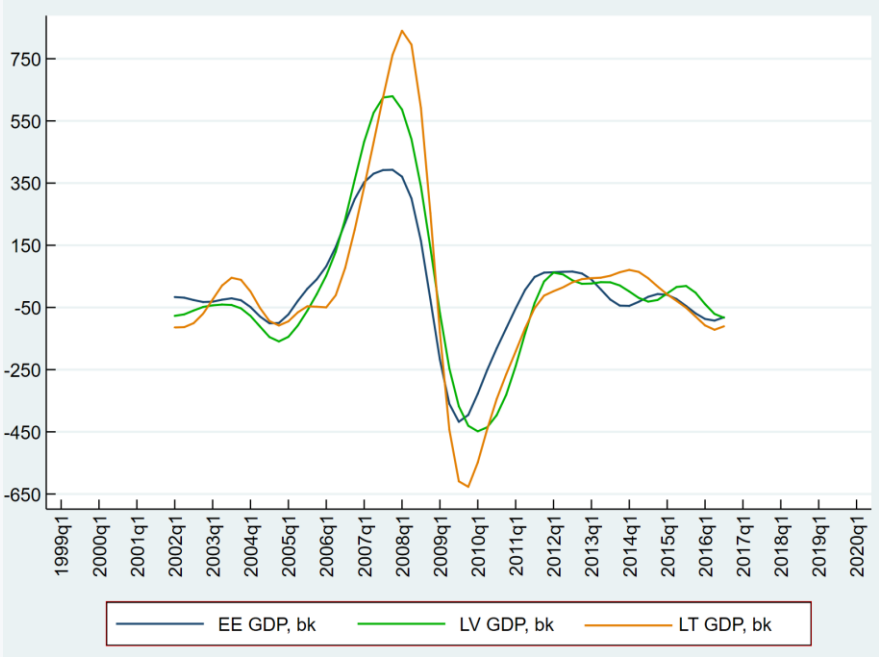
Comparison of average trade intensity between Estonia, Latvia and Lithuania before and after joining EU

	Trade intensity between LT and LV mean				Trade intensity between LT and EE mean				Trade intensity between LV and EE mean			
	t1	t2	Change (%)	p	t1	t2	Change (%)	p	t1	t2	Change (%)	p
Normalized by total trade	0.037	0.054	**45.9**	0.000	0.012	0.027	**125.0**	0.000	0.054	0.087	**61.1**	0.000
Normalized by GDP	0.027	0.06	**122.2**	0.000	0.011	0.034	**209.1**	0.000	0.023	0.048	**108.7**	0.000

t1 – 1995q2 – 2004q2, t2 – 2004q3 - 2019q4,
p value shows the significance of the difference between means of trade intensity of two periods

1.2. Business Cycle of the three Baltic States (HP, BK)





1.3. BC correlation between the Baltic States (EE, LV, LT)

	gdpEE/gdpLV		gdpEE/gdpLT		gdpLV/gdpLT	
	t1	t2	t1	t2	t1	t2
HP	0.1845 *(p=0.2744)*	**0.4103***** ***(p=0.0035)***	0.4676*** *(p=0.0035)*	0.3291*** *(p=0.0009)*	-0.0124 *(p=0.9421)*	**0.4222***** ***(p=0.0006)***
BK	0.7417** *(p=0.0000)*	**0.8772**** ***(p=0.0000)***	0.4582** *(p=0.0213)*	**0.8987***** ***(p=0.0000)***	-0.2884 *(p=0.1620)*	**0.8668***** ***(p=0.0000)***
CF	0.6806*** *(p=0.0002)*	**0.8589***** ***(p=0.0000)***	0.4769** *(p=0.0159)*	**0.8893***** ***(p=0.0000)***	-0.2264 *(p=0.2765)*	**0.8460***** ***(p=0.0000)***

t1: 1995 Q1 – 2004 Q2, *t2*: 2004 Q3 – 2019 Q4

*Significant levels in parentheses with ***, **, and * respectively denoting significance at the 1%, 5%, and 10% levels.*

1.4. Pooling EE, LV, LT into one region (the Baltic States - BS)

Theorethical arguments that the Baltic States (Estonia, Latvia & Lithuania) could be treated as one region.

- „The Baltic countries represent a single economic area and share common shocks“ (S. Kapounek & Z. Kučerova, 2019).
- Baltic countries form a very distinct business cycle cluster (M. Ahlborn , M. Wortmann, 2017).
- Hegerty (2017) analyses Baltic Sea Region of seven countries and finds strong evidence of a Baltic economic region common output and consumption cycles.
- Di Gorgio identified similar responses of the Baltic nations to negative and positive shocks (2016).
- The Baltic States are similar in their historical path, political & social institutions. Geographical proximity & similar resources.

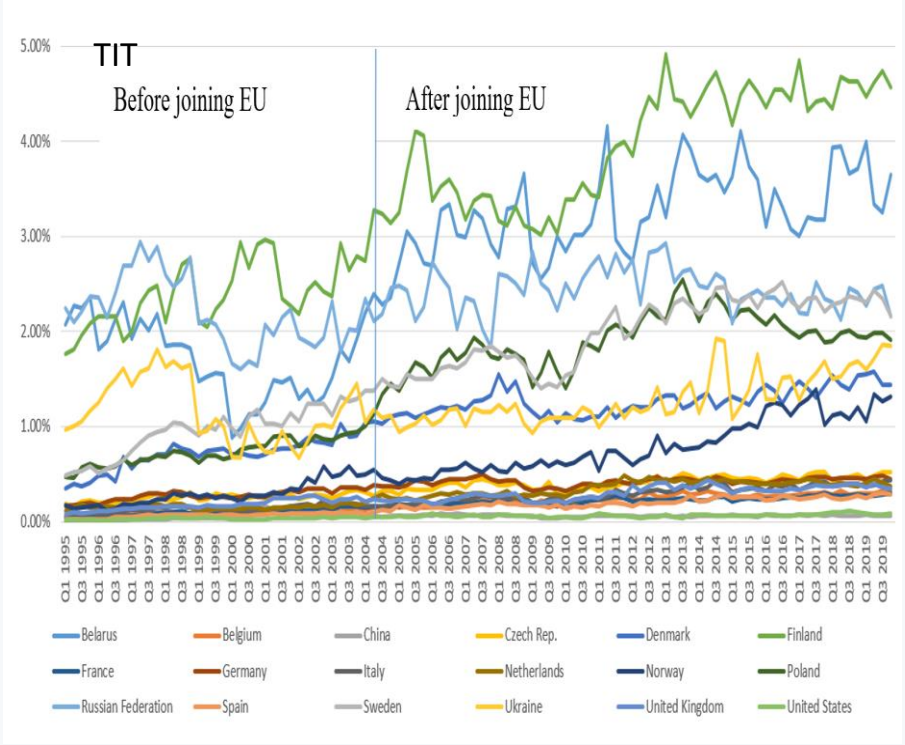
The authors accepted the assumption that **the three Baltic countries (Estonia, Latvia and Lithuania) can be treated as the one region.**

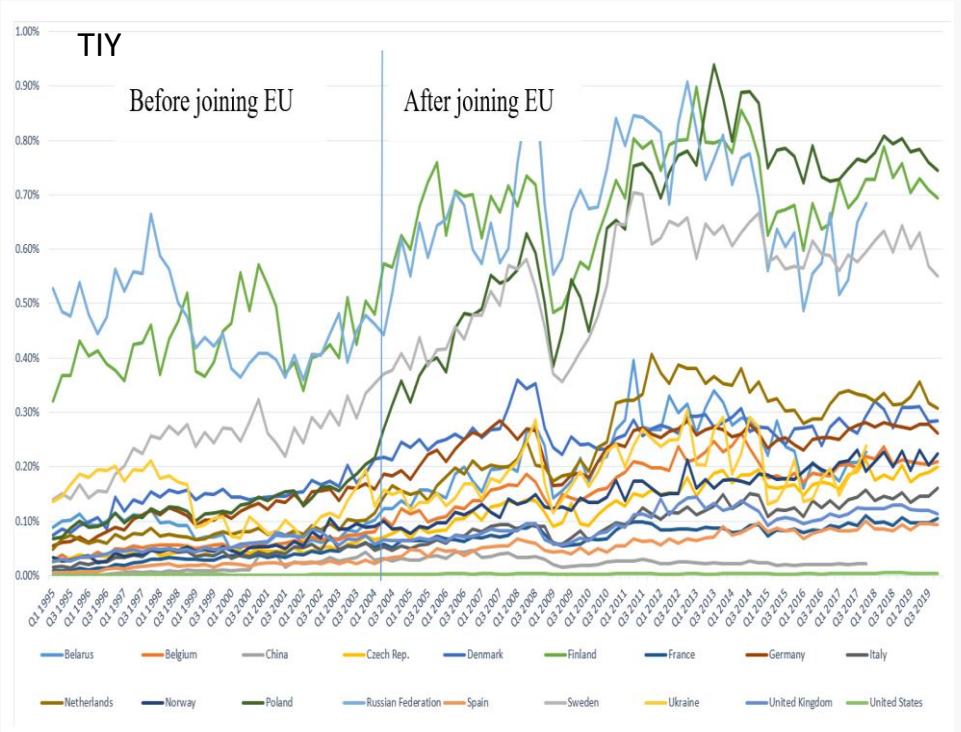
2. Defining the main Trading Partners of the Baltic States

According to (|EX|+|IM|) we selected 18 most important trade partners for Baltic states (they constitute ≈ 86.8% of total trade)

Partner country	% of total Baltic trade	Partner country	% of total Baltic trade
RUSSIAN FEDERATION	17.1	FRANCE	3.0
GERMANY	12.1	BELARUS	2.9
POLAND	7.9	UNITED STATES	2.7
FINLAND	7.7	BELGIUM	2.2
SWEDEN	7.4	CHINA	2.2
NETHERLANDS	4.5	NORWAY	1.9
UNITED KINGDOM	4.0	UKRAINE	1.9
ITALY	3.3	SPAIN	1.4
DENMARK	3.1	CZECH Rep.	1.4
Total % of Baltic states region trade			86.8

3. Comparison of Trade Intensity between BS & Trading Partners before and after joining EU (%)





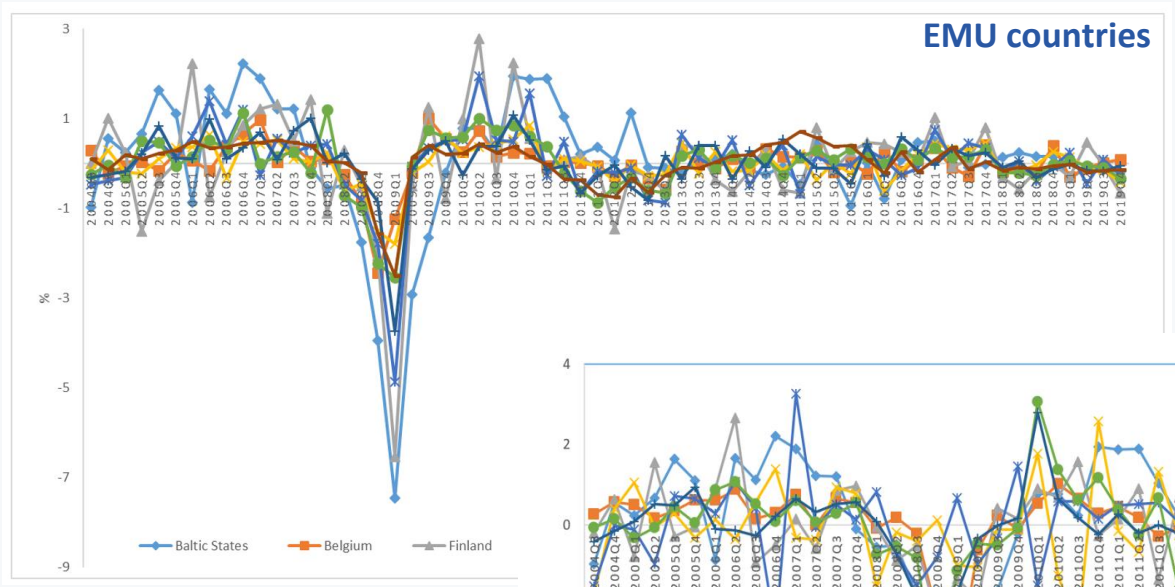
Trade intensity with trading partners has increased regardless to method of TI calculation.

3. Comparison of the correlation between BC of the BS and main Trading Partners before and after joining the EU

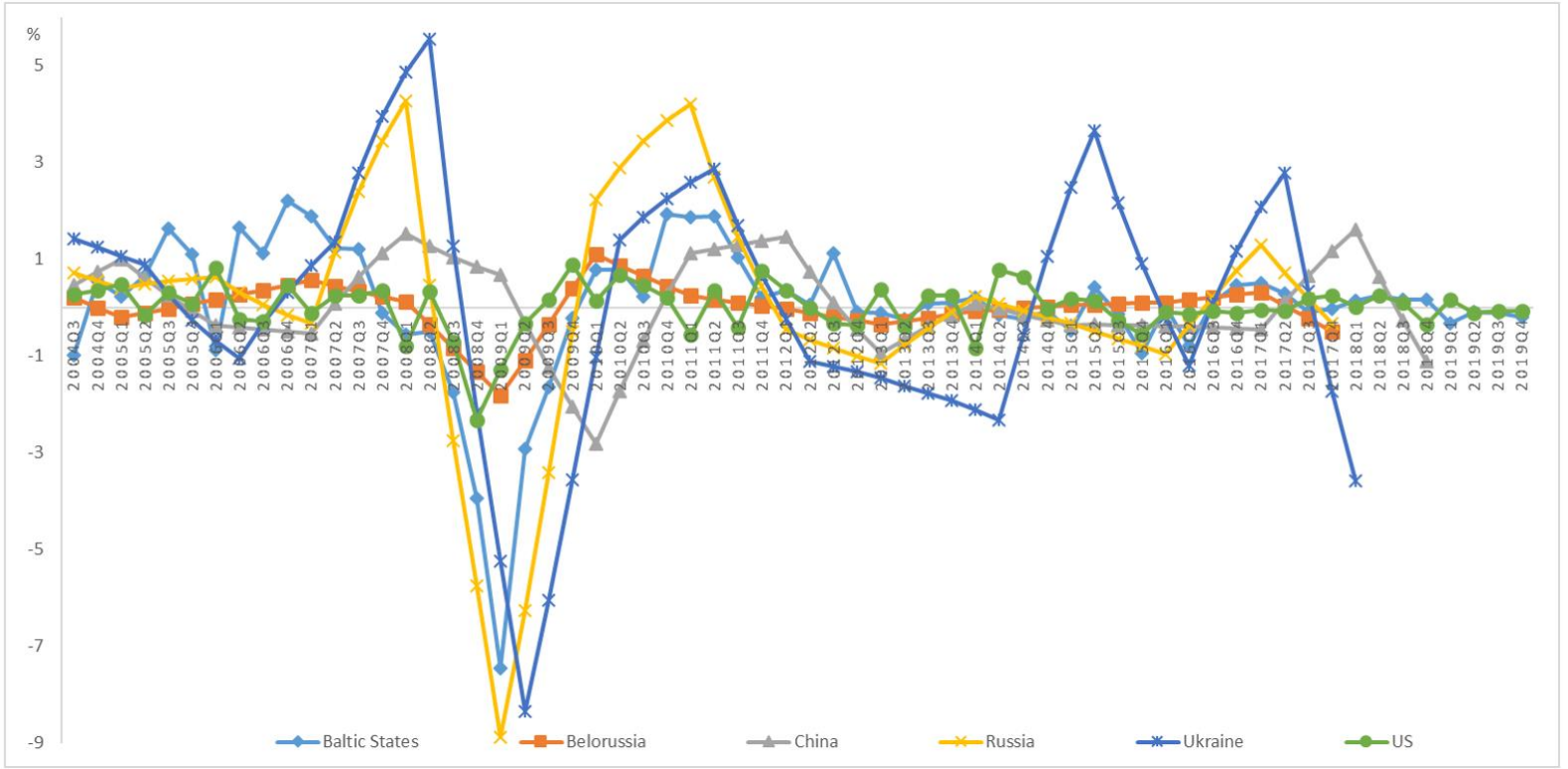
EMU countries				EU countries				Not EU countries			
Trading Partner	Filter	Periods		*Trading Partner*	Filter	Periods		*Trading Partner*	Filter	Periods	
		t1	*t2*			*t1*	*t2*			*t1*	*t2*
Belgium	HP	0.047	**0.5766*** **	*Czech Republic*	HP	0.0880	**0.6891*** **	*Belorussia*	HP	0.1119	**0.7794*** **
	BK	-0.2225	**0.7330*** **		BK	0.1053	**0.7905*** **		BK	-0.0574	**0.8683*** **
	CF	-0.0681	**0.7558*** **		CF	0.3276	**0.8172*** **		CF	0.0786	**0.8901*** **
Finland	HP	0.2557	**0.6473*** **	*Denmark*	HP	-0.1215	**0.4122*** **	*China*	HP	-0.0385	-0.0718
	BK	0.2865	**0.8631*** **		BK	-0.2253	**0.7363*** **		BK	0.3057	-0.0862
	CF	0.4257**	**0.8752*** **		CF	-0.0608	**0.7327*** **		CF	0.1083	-0.1448
France	HP	0.1067	**0.7179*** **	*Norway*	HP	0.2707	0.2849**	*Russia*	HP	-	**0.7794*** **
	BK	-0.1433	**0.8624*** **		BK	0.217	**0.6120*** **		BK	-	**0.8396*** **
	CF	0.0504	**0.8716*** **		CF	0.2653	**0.5283*** **		CF	-	**0.8476*** **
Germany	HP	0.2456	**0.7509*** **	*Poland*	HP	-0.2492	0.1436	*Ukraine*	HP	-0.2582	**0.4689*** **
	BK	0.1628	**0.8477*** **		BK	0.0399	**0.5489*** **		BK	0.484	**0.5545*** **
	CF	0.3895*	**0.8695*** **		CF	0.1544	**0.5764*** **		CF	-0.002	**0.5594*** **
Italy	HP	0.2385	**0.6731*** **	*Sweden*	HP	0.2502	**0.5127*** **	*US*	HP	-0.0652	0.1707
	BK	0.3171	**0.7511*** **		BK	-0.0269	**0.7273*** **		BK	-0.2402	**0.7357*** **
	CF	0.4682**	**0.7984*** **		CF	0.1347	**0.7546*** **		CF	-0.1083	**0.7435*** **
The Netherlands	HP	0.0036	**0.7279*** **	*UK*	HP	0.0286	0.0527				
	BK	-0.4952**	**0.8355*** **		BK	0.3851*	**0.7131*** **				
	CF	-0.2806	**0.8648*** **		CF	0.4583**	**0.7334*** **				
Spain	HP	0.1373	**0.6514*** **								
	BK	-0.0164	**0.7002*** **								
	CF	0.2625	**0.7730*** **								

Business cycle synchronization have increased significantly after the BS joined EU (2004 Q2).

Cyclical component of GDP growth of trading partners in EMU and EU countries in 2004 Q2-2019 Q4



Cyclical component of GDP growth of trading partners in non EU countries in 2004 Q2-2019 Q4



Relationship between business cycles correlation and trade intensity with the trading partners in 2004 Q2-2019 Q4

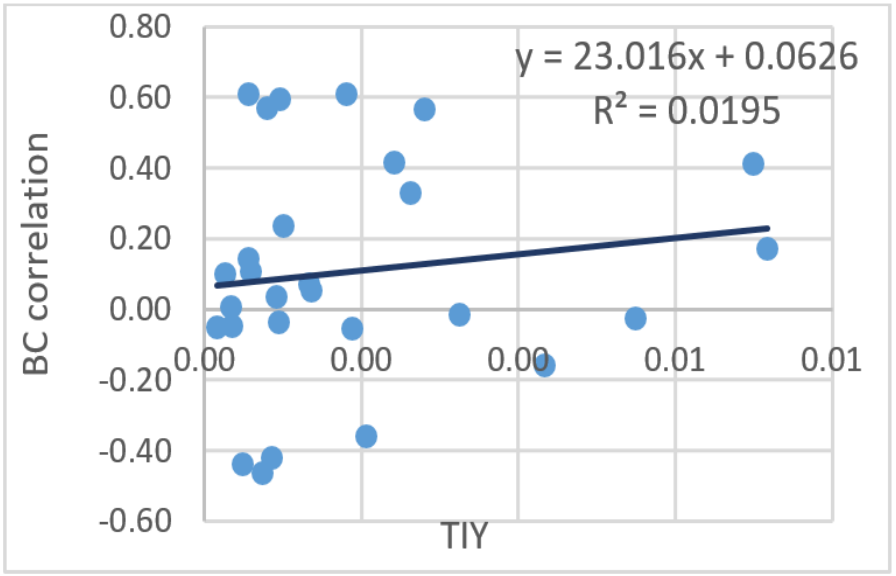


Fig. 4A. Correlation of business cycles and trade intensity with the trading partners in EMU countries

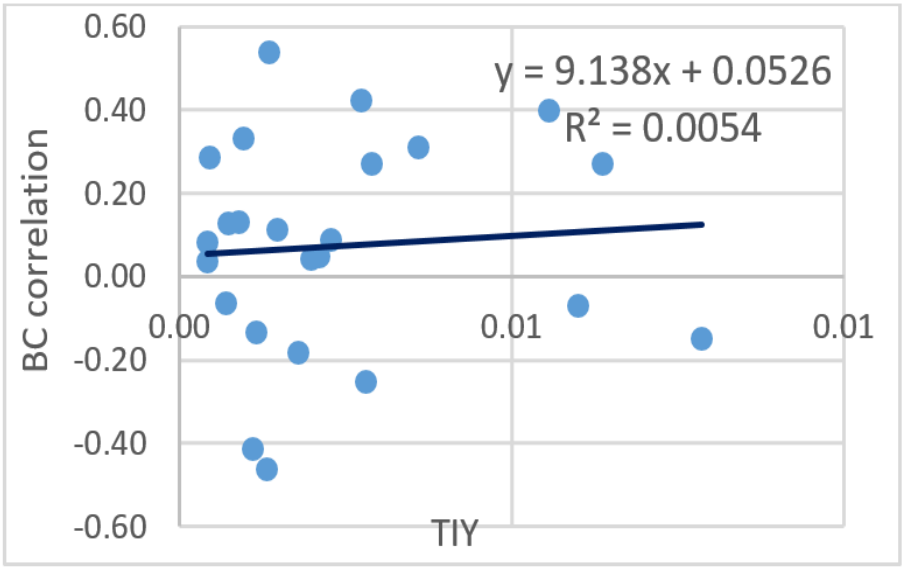


Fig. 4B. Correlation of business cycles and trade intensity with the trading partners in EU countries

The direction of impulse from/to business cycles of the Baltic States and the trading partners in EMU

Partner country	Lags	BC detrended by HP		Lags	BC detrended by BK		Lags	BC detrended by CF	
		Direction of impulse			Direction of impulse			Direction of impulse	
		$BC_{BS} \rightarrow BC_{TP}$	$BC_{TP} \rightarrow BC_{BS}$		$BC_{BS} \rightarrow BC_{TP}$	$BC_{TP} \rightarrow BC_{BS}$		$BC_{BS} \rightarrow BC_{TP}$	$BC_{TP} \rightarrow BC_{BS}$
Belgium	2		TP→BS***	4		TP→BS***	3		TP→BS***
Finland	1	BS→TP***		4	BS→TP***		2	BS→TP***	TP→BS*
France	1		TP→BS***	4	BS→TP***		3		TP→BS***
Germany	1	BS→TP*		4	BS→TP***		5	BS→TP*	TP→BS***
Italy	1	BS→TP***		4	BS→TP***	TP→BS**	6	BS→TP***	TP→BS***
The Netherlands				4	BS→TP***		7	BS→TP*	TP→BS***
Spain	1		TP→BS **	4	BS→TP***		2		TP→BS***

The direction of impulse from/to business cycles of the Baltic States and the trading partners in EU and outside EU

Partner country	Lags	BC detrended by HP		Lags	BC detrended by BK		Lags	BC detrended by CF	
		Direction of impulse			Direction of impulse			Direction of impulse	
		$BC_{BS} \rightarrow BC_{TP}$	$BC_{TP} \rightarrow BC_{BS}$		$BC_{BS} \rightarrow BC_{TP}$	$BC_{TP} \rightarrow BC_{BS}$		$BC_{BS} \rightarrow BC_{TP}$	$BC_{TP} \rightarrow BC_{BS}$
Czech Republic				4	BS→TP***	TP→BS***	9	BS→TP***	TP→BS***
Denmark	1		TP→BS***	5	BS→TP***	TP→BS**	3	BS→TP**	TP→BS**
Norway	6		TP→BS***	4	BS→TP***		7	BS→TP*	TP→BS***
Poland	1		TP→BS***	4/9	BS→TP**/*	TP→BS**	3	BS→TP**	TP→BS**
Sweden	1		TP→BS***	4	BS→TP***		4	BS→TP**	TP→BS***
UK	1		TP→BS***	4	BS→TP**	TP→BS***	8	BS→TP***	TP→BS*
Belarus	5	BS→TP***	TP→BS***	4	BS→TP***	TP→BS**	5	BS→TP***	TP→BS***
China	4	BS→TP***	TP→BS***	11	BS→TP***	TP→BS***	10	BS→TP***	TP→BS**
Russia				4		TP→BS***	7	BS→TP***	TP→BS***
Ukraine	3	BS→TP*		6	BS→TP***	TP→BS***	7	BS→TP***	TP→BS***
US	1		TP→BS***	4		TP→BS***	2	BS→TP*	TP→BS**

Investigation of the effect of bilateral trade intensity and common currency on business cycle synchronization by application of panel data analysis

First stage estimates of bilateral trade intensity

	TI normalized by total trade		TI normalized by total output	
Distance	-1.40*** (0.075)	-1.39*** (0.079)	-1.39*** (0.130)	-1.37*** (0.124)
Border	0.66*** (0.155)	0.85*** (0.166)	0.128 (0.268)	0.465* (0.261)
Intercept	4.333*** (0.539)	4.08*** (0.571)	2.953*** (0.937)	2.494 (0.90)
Currency		0.50*** (0,086)		0.919*** (0.110)
R^2 (between /overal)	0.91/0.83	0.32/0.87	0.74/0.64	0.76/0.64

***, **, and * respectively denote significance at the 1%, 5%, and 10% levels.

OLS estimates from $TI_{it}=a+b_1 lnDistance_i+b_2 Borders_i+b_3\ Currency_i+v_{it}$

Investigation of the effect of bilateral trade intensity and common currency on business cycle synchronization by application of panel data analysis

	FE regr.	RE regr. G2SLS vce oim	RE regr. G2SLS vce robust	RE regr. EC2SLS vce conventional	RE regr. EC2SLS vce robust	FE regr.	RE regr. G2SLS vce oim	RE regr. G2SLS vce robust	RE regr. EC2SLS vce conventional	RE regr. EC2SLS vce robust
TI_{Trade}	.129 (.101)	.008 (.026)	.008 (.017)	.026 (.026)	.026 (.020)					
TI_{GDP}						**.179**** (.076)	.006 (.028)	.006 (.018)	.013 (.028)	.013 (.019)
Currency	**.617***** **(.145)**	**.358***** **(.069)**	**.358***** **(.052)**	**.362***** **(.069)**	**.362***** **(.052)**	**.544***** **(.140)**	**.353***** **(.070)**	**.353***** **(.053)**	**350***** (.070)	**.350***** **(.052)**
Intercept	.501 (.575)	-.083 (.145)	-.083 (.093)	.014 (.142)	.015 (.102)	**1.045*** **(.547)**	(-.084) (.198)	-.084 (.124)	-.034 (.197)	-.034 (.130)
Adjusted R^2 overall	**0.108**	**0.114**	**0.114**	**0.118**	**0.118**	**0.1029**	**0.1139**	**0.1139**	**0.1170**	**0.1170**

G2SLS - general two stage least squares estimator from Balestra and Varadharajan-Krishnakumar (1987)
EC2SLS -error-component two stage least squares from Baltagi, Egger, Pfaffermayr, (2003)

$$Corr\ (m)_{it} = \alpha + \beta_1 TI(w)_{it} + \beta_2\ Currency_{it} + \varepsilon_{it}$$

Discussion

The results raise the question why the effect of increased bilateral trade between the Baltic States and their main trading partners do not comply with the majority of results of the effect of increased TI between **European or OECD countries** (Frankel & Rose, 1998; Calderon, Chong, & Stein, 2007; Inklaar, Jong-A-Pin, & De Haan, 2008).

This could be explained:

- ✓ even theoretically the impact of trade on BCS is ambiguous: openness to trade should lead to a greater **specialization** and insofar **higher TI should reduce BC synchronization**.

(we can expect higher degree of synchronization if **intra-industry** trade dominates)

Discussion (cont.)

The impact of trade intensity on BC synchronisation is **more empirical question**.

Later research delivers a quantitatively counterfactual results: Panel regressions, when controlling for **country-pair fixed** and other effects (including **policy variables** as well as **structural characteristics)** found **no significant effect** of trade intensity on BCS (Abiad et. al., 2013; Duval et al., 2014; Inclaar 2008; Kose 2001, Kose 2003).

Preliminary Conclusions

- After the joining EU and ERM business cycle synchronisation and trade intensity among all three Baltic States have increased significantly.
- Empirical investigation support an assumption that all three countries can be treated as a single region.
- The extent of the increase of business cycle synchronization depends on the trading partner location: Business cycle synchronization between the Baltic States and the main trading partners from the EMU and EU increased in the second period.

Preliminary Conclusions

- Preliminary exploration of instrumental variables supports the results of Frankel and Rose (1998) that the distance between the Baltic States and trading partners matters for the trade.
- The estimates of panel regression indicate *important empirical feature* that only the **common currency** strongly and significantly impacts business cycle synchronization.
- Bilateral trade intensity do not have significant effect on the business cycle synchronization.

The results are not very sensitive to the way we evaluate trade intensity.

QUESTIONS & SUGGESTIONS?

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