



Business Cycle Synchronization in a Currency Union: Why Nobody Loves the Euro?

Workshop “Economic Policy and European Integration at the National Level”
Vilnius University Faculty of Economics and Business Administration
9.00 a.m. – 18.15 p.m. on 19 December, 2019

PERSONAL PRESENTATION



“ahoj”

Professor Jarko Fidrmuc
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Grant Project

**“Reassessment of the OCA theory in the
persistently heterogeneous EU”**

Euro4Europe

PRESENTATION SLIDE

Slide description



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PROJECT “EURO4EUROPE”



Aim – to reassess business cycle synchronization using an integrated approach.

Study the impact of European integration on business cycle asymmetries (BCA) and provide empirical evidence on the long standing dispute among proponents of endogenous optimal currency area (OCA) theories, on whether integration increases BCA (as argued by Frankel and Rose, 1998) or decreases it (Krugman, 1993).

A. Analysis of national BCS

First, a univariate and multivariate analyses at the country level will be conducted using alternative identification strategies in time-frequency domain. The directions of causal relationships will be identified by phase shift.

B. Economic Integration and the Transmission of Macroeconomic Shocks. Here we will focus on transmission mechanisms on the BC. It will employ a GVAR framework to assess the transmission of macroeconomic demand and supply shocks across European countries. The comparison of shock transmission across countries within the euro area and in other world regions will also provide evidence the effects of integration on BC symmetry.

C. The impact of integration on regional BC synchronization.

The third part will analyse the effect of several integration events on BCS at the regional (NUTS2 and NUTS3) level which will allow to identify the causal effects of joining EMU on BC synchronisation using various identification strategies. It will also allow for an assessment of potentially heterogeneous and non-linear treatment effects.



INTRODUCTION



MOTIVATION



HISTORY OF MONETARY INTEGRATION IN EU

- ✓ The early plans of monetary integration since the Werner Report in 1969
- ✓ European Single Market in 1993
- ✓ Launch of the euro with 11 members in 1999
- ✓ Today: 19 members, DK pegging (within ERM), Bulgaria following a currency board
- ✓ But all enlargements after 2010 were a result of former policies with no other exit option.

“IF WE WANT THE EURO TO UNITE RATHER THAN
DIVIDE OUR CONTINENT, THEN IT SHOULD BE MORE
THAN THE CURRENCY OF A SELECT GROUP
OF COUNTRIES. THE EURO IS MEANT TO BE THE
SINGLE CURRENCY OF THE EUROPEAN UNION
AS A WHOLE.”

(JEAN-CLAUDE JUNCKER,
STATE OF THE UNION ADDRESS 2017)

“THIS IS A WRONG PROPOSAL
IN THE WRONG TIME.”

(MARKUS SÖDER, MINISTER OF FINANCE IN
BAVARIA, INTERVIEW FOR WELT)

“... THE ENLARGEMENT OF THE EURO ZONE
MAKES NO SENSE, IT WOULD ONLY
INCREASE THE PROBLEMS”

(CHRISTIAN KERN, FORMER
CHANCELLOR OF AUSTRIA)

INITIAL EXPECTATIONS



KLLK

- ✓ Euro was not expected to increase growth, although related policies (scale effects, financial liberalization, competitiveness, etc.) may have long-run growth effects.
- ✓ Growth volatility was expected to increase (loss of monetary policy instruments).
- ✓ A common currency was especially expected to increase the synchronization of business cycles (endogeneity of OCA criteria, Frankel and Rose, 1998).
- ✓ In the long run, however, trade specialization could also lead to dis-synchronization of business cycles (Krugman, 1993).

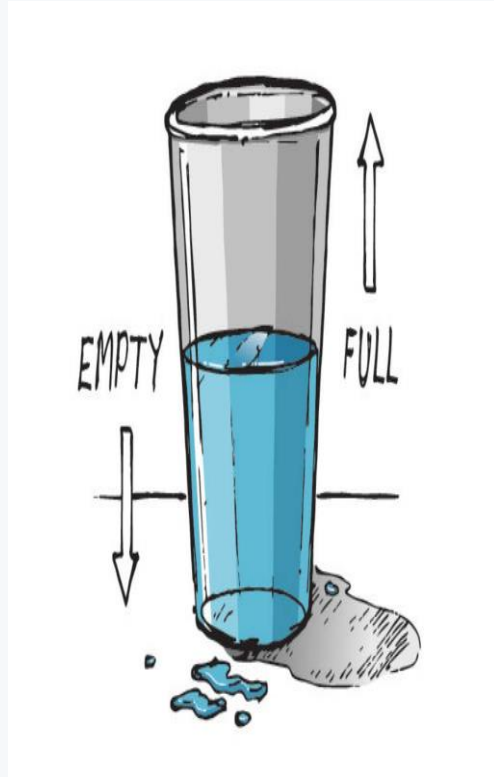
SYNCHRONIZATION



OCA THEORY

- ✓ Optimum currency area theory (Mundell AER, 1961)
- ✓ Synchronization of business cycles
- ✓ Higher business cycles synchronization, smaller costs of sharing currency
- ✓ Smaller cost, given CU benefits (\uparrow trade, FDI, competition) \Rightarrow core & periphery will converge
- ✓ Endogeneity of OCA criteria (Frankel & Rose EJ 1998)

MAIN FINDINGS



RESULTS

- ✓ We use meta-regressions, and difference-in-difference estimations.
- ✓ Introduction of the Euro increases business cycles synchronization significantly
- ✓ However, there remains substantial heterogeneity in the euro area
- ✓ Core-periphery divide post-EMU weakens but remains



META ANALYSIS



DID THE EURO INCREASE BC SYNCHRONIZATION?



RESEARCH QUESTIONS

- ✓ What does the econometric evidence say?
- ✓ Did business cycles synchronization in EU differ before and after 1999?
- ✓ We answer these questions by carrying out a systematic assessment of the evidence

META-ANALYSIS



LITERATURE REVIEW

- ✓ Card and Krueger, AER 1995
- ✓ Originally, from medicine et al, but now slowly gaining acceptance in economics:
- ✓ Annual MRA conference, suite of dedicated econometric tests and estimators, data protocols, customised software, textbooks
- ✓ Christensen G & E Miguel (2018) “Transparency, Reproducibility, and the Credibility of Economics Research,” Journal of Economic Literature



DATA COLLECTION



DATA COLLECTION



DATA SET

- ✓ We produce a hand-collected data set comprising all BCS estimates we could find
- ✓ We quantify all the study & research design features we thought could be important
- ✓ The data collection was conducted in the second half of 2017
- ✓ The data set was updated in the first half of 2019

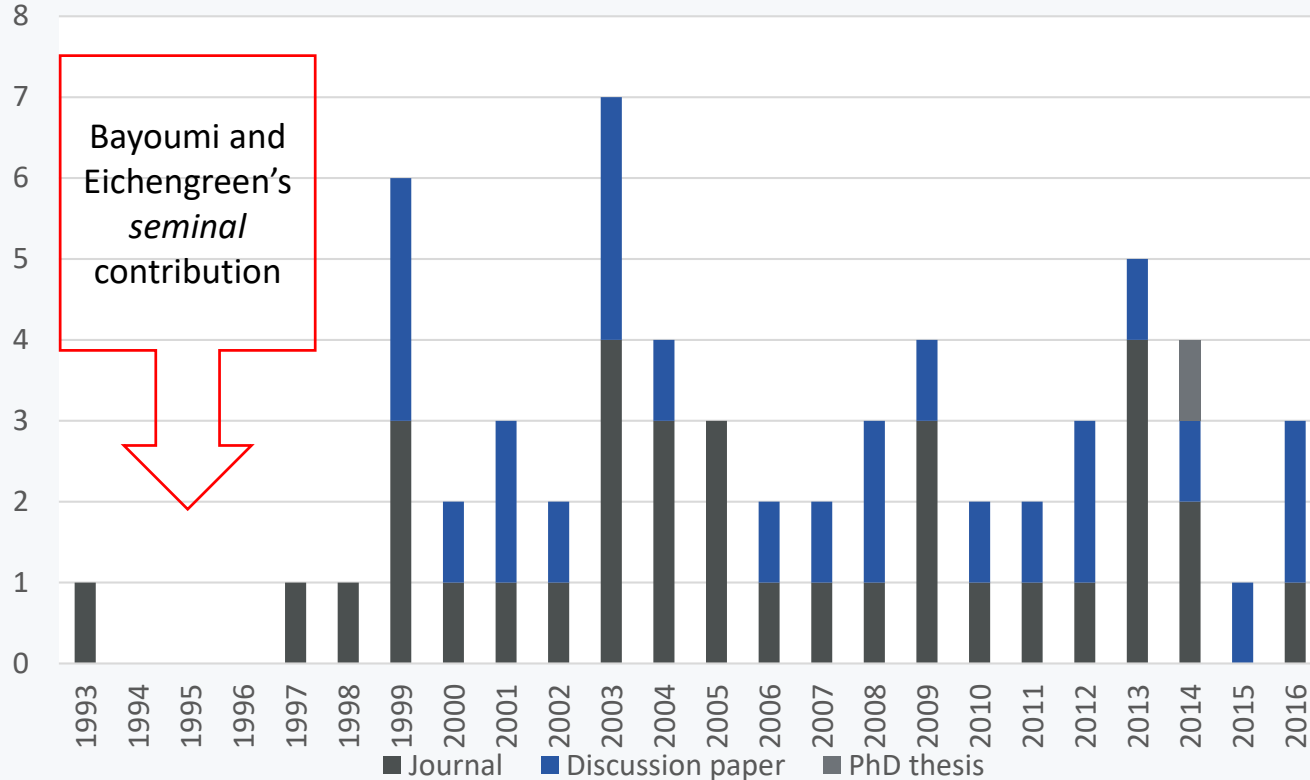
DATA COLLECTION – II



DATA SET

- ✓ Search on Google Scholar, SSRN and RePEc
- ✓ Strings: business AND cycle AND (correlation OR synchronization OR synchronization) AND (EU OR European Union OR Euro Area)
- ✓ We require papers to report numerical values; many only plot time-changing correlation coefficients...
- ✓ Our sample: 2,979 (now updated to 3,715) BCS estimates from 63 (updated to 91) papers
- ✓ The studies report 1 to 528 correlations for different country pairs and periods (average: 41).

OUR SAMPLE I: PUBLICATION YEAR



DATA DESCRIPTION



MEDIA & AUTHORS

- ✓ About 52% are working papers, and 48% in journals
- ✓ Authors 75% in Univs, 35% in Central Banks (10% joint affiliation)
- ✓ Reported BCS seem slight larger in working papers than journals, but same CB/Univ

DATA DESCRIPTION



METHODS

- ✓ About 60% use GDP, while inflation and industrial production 15% each
- ✓ Synch measured wrt EU for 48% of BCS estimates, to Germany for 38% & to euro area for 14%
- ✓ Data quarterly 52%, annual 38%, 10% monthly
- ✓ HP filter (56%) still most popular method , Blanchard Quah in 20%, simple correlations in 17%
- ✓ Note: year refers to the midpoint of est. window

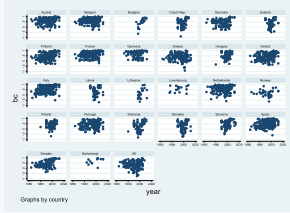
DATA DESCRIPTION



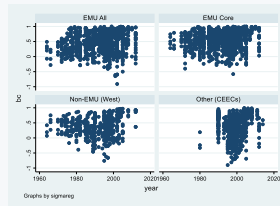
FURTHER PROPERTIES

- ✓ Share of estimates GDP for synchronicity up 45% to 70%
- ✓ Reference for synchronicity Germany in 48% of the estimates before 1999 and 18% after in the overlapping case (73% and 10% in the non-overlapping case)
- ✓ before 1999, 70% authors affiliated with universities and 40% with central banks, overlapping case,
- ✓ after 1999, the former share rises to almost 90% while the latter shrinks to almost 15%, non-overlapping.

BUSINESS CYCLES ACCROSS COUNTRIES



BUSINESS CYCLES ACCROSS COUNTRIES

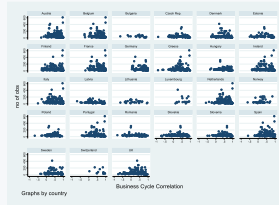




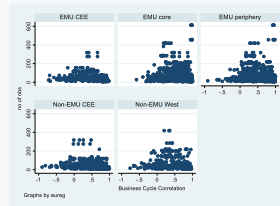
DESCRIPTIVE STATISTICS



FUNNEL PLOTS ACROSS COUNTRIES



FUNNEL PLOTS ACROSS COUNTRIES



SIMPLE T-TESTS ON BCS AVERAGES



	Before 1999		After 1999		t-test	
	<i>No obs</i>	Mean	<i>No obs</i>	Mean		
All Countries	2011	0.427	968	0.601	-13.306	***
EMU	592	0.419	279	0.608	-8.177	***
EMU core	674	0.552	302	0.735	-9.43	***
Non-EMU West	339	0.334	96	0.620	-7.907	***
CEECs	406	0.308	291	0.449	-3.655	***

SIMPLE T-TESTS ON BCS AVERAGES

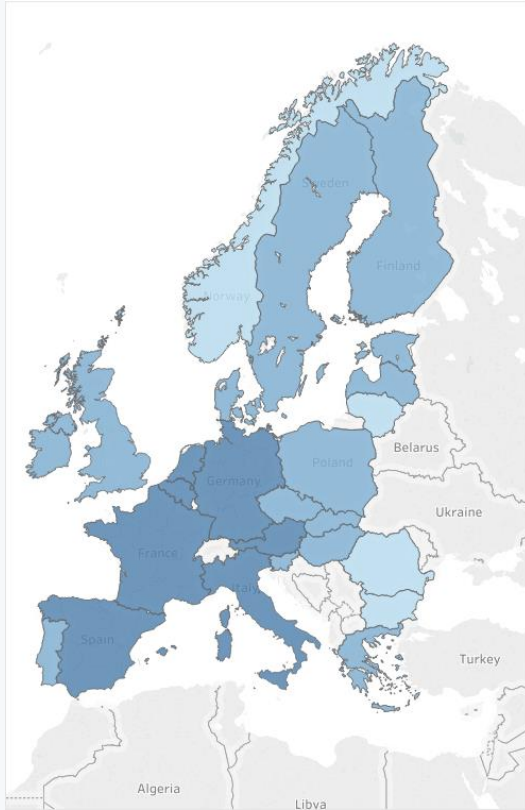
Austria	117	0.58	0.254	50	0.752	0.23	-4.127	***
Belgium	121	0.625	0.23	48	0.72	0.257	-2.338	**
Bulgaria	5	-0.012	0.427	3	0.347	0.526	-1.061	
Czech Rep.	52	0.236	0.344	35	0.499	0.358	-3.439	***
Denmark	88	0.401	0.275	33	0.59	0.36	-3.082	***
Estonia	46	0.347	0.352	30	0.484	0.406	-1.56	
Finland	116	0.312	0.288	46	0.693	0.299	-7.518	***
France	135	0.61	0.235	60	0.771	0.25	-4.348	***
Germany	61	0.73	0.212	44	0.79	0.244	-1.352	
Greece	102	0.355	0.287	56	0.362	0.386	-0.129	
Hungary	55	0.439	0.304	35	0.586	0.318	-2.204	**
Ireland	109	0.335	0.317	55	0.632	0.299	-5.765	***
Italy	133	0.518	0.285	59	0.749	0.293	-5.13	***
Latvia	44	0.346	0.365	29	0.488	0.423	-1.522	
Lithuania	5	-0.071	0.34	13	0.179	0.377	-1.289	
Netherlands	124	0.528	0.312	54	0.682	0.295	-3.062	***
Norway	29	0.107	0.245	4	0.224	0.257	-0.891	
Poland	53	0.334	0.284	37	0.44	0.293	-1.714	*
Portugal	119	0.378	0.301	54	0.587	0.314	-4.167	***
Romania	39	0.165	0.373	25	0.343	0.434	-1.752	*
Slovakia	53	0.257	0.352	43	0.254	0.498	0.032	
Slovenia	54	0.375	0.326	41	0.608	0.295	-3.603	***
Spain	129	0.477	0.287	55	0.706	0.318	-4.786	***
Sweden	102	0.378	0.266	25	0.806	0.165	-7.677	***
UK	120	0.303	0.35	34	0.56	0.326	-3.824	***



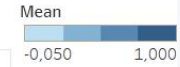
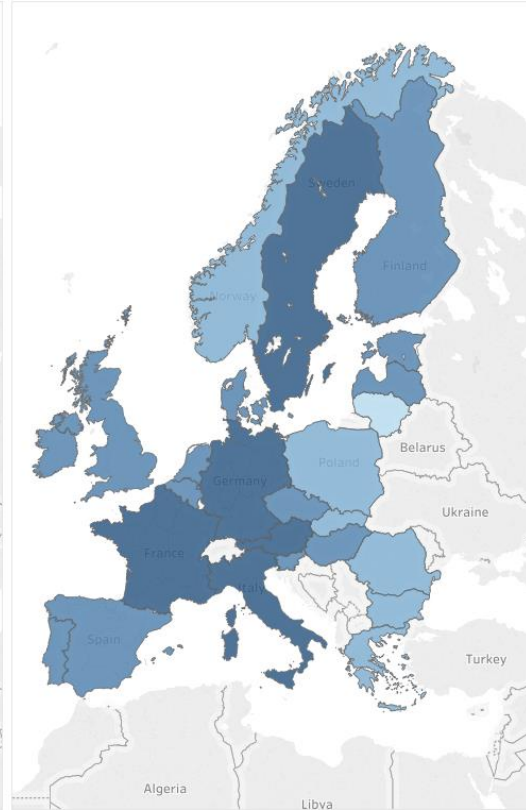
REGIONAL PATTERN



Before 1999



After 1999





META REGRESSIONS



META REGRESSION



REGRESSION

- ✓ We use Fisher transformation of the reported correlation coefficients as the dependent variable

$$\frac{1}{2} \log \left(\frac{1 + \rho_{ij}}{1 - \rho_{ij}} \right) = \tilde{\rho}_i + \sum_{k=1}^K \beta_{ijk} D_{ijk} + \tau_i + \varepsilon_{ij}$$

- ✓ Country effects ρ_i tell the average correlation coefficient for country i , controlling for K factors (e.g. publication year, variable, methodology, sample size, frequency, author affiliation, journal or not) in publication j

EVIDENCE



VARIABLES

- ✓ Publication: type (wp/journal), # authors, author affiliations (academic/central bank);
- ✓ Reference country: Germany/EU/euro area or other;
- ✓ Data properties: start & end of data sample, frequency (annual/quarterly/monthly), number of observations;
- ✓ Focus variable: GDP/industrial production/ supply & demand shock/inflation/other;
- ✓ Methodology: simple correlation/ Blanchard-Quah/HP filter/other;
- ✓ Convergence: country specific trends and fixed effects.

META-REGRESSIONS OF BCS



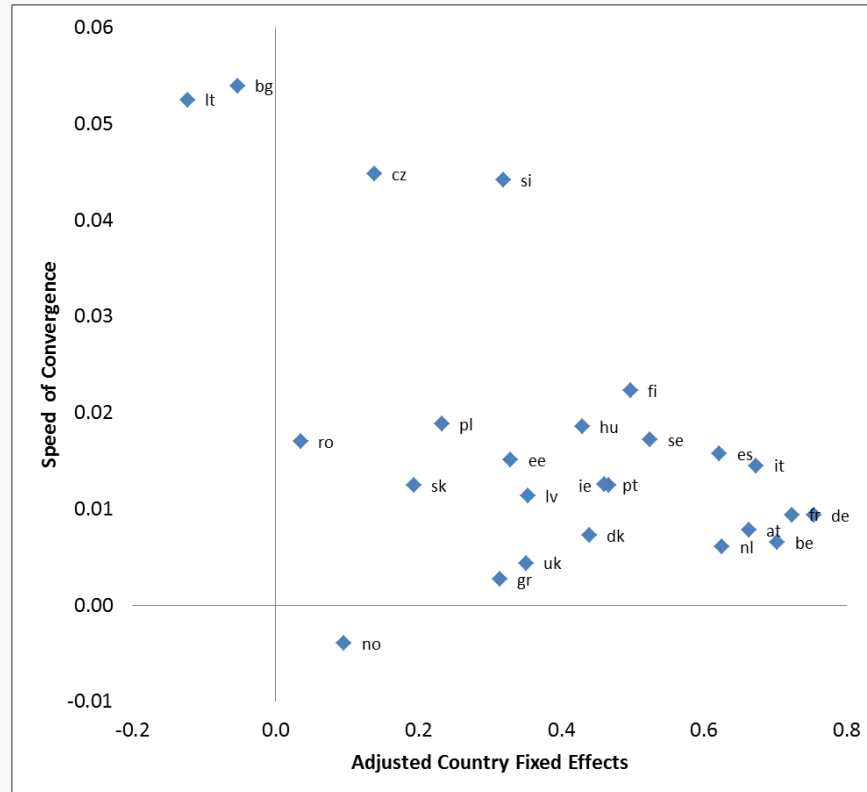
	(1)	(2)	(3)	(4)	(5)	(6)
phd thesis	-0.382***					-0.217***
journal	-0.244***					-0.072***
single country	-0.065					
central bank	-0.216***					
refc_de		-0.134**				
refc_eu		0.204***				0.147***
correlation			0.048			0.108***
time series			-0.216***			-0.131***
Blanch-Quah			-0.337***			
HP filter			0.288***			0.155***
GDP				0.123**		
industrial prod				-0.130*		
demand shocks				-0.503***		-0.390***
supply shocks				-0.412***		-0.316***
inflation				-0.223***		-0.188***
monthly					0.033	
annual					0.398***	0.168***
no of obs.	2979	2979	2979	2979	2979	2979
adjusted R ²	0.695	0.691	0.735	0.733	0.704	0.760

BMA AND WALS



	post mean	BMA st. error	PIP	coefficient	WALS st. error	t stat
phd thesis	-0.006	0.036	0.05	-0.158	0.096	-1.65*
journal	-0.084	0.019	1.00+++	-0.081	0.017	-4.74***
single country	-0.001	0.044	0.02	-0.052	0.293	-0.18
central bank	0.000	0.003	0.02	0.006	0.021	0.30
refc_de	-0.208	0.021	1.00+++	-0.184	0.028	-6.50***
refc_eu	0.000	0.004	0.02	0.026	0.026	1.00
correlation	0.090	0.046	0.86+	0.086	0.028	3.06***
time series	-0.106	0.045	0.91++	-0.084	0.032	-2.61***
Blanch-Quah	0.010	0.041	0.08	0.072	0.074	0.98
HP filter	0.154	0.034	1.00+++	0.147	0.024	6.07***
GDP	0.008	0.030	0.09	0.093	0.035	2.67***
industrial prod	0.010	0.039	0.09	0.062	0.045	1.36
demand shocks	-0.398	0.060	1.00+++	-0.359	0.078	-4.57***
supply shocks	-0.324	0.058	1.00+++	-0.299	0.074	-4.03***
inflation	-0.162	0.051	0.95++	-0.087	0.044	-2.00**
monthly	0.003	0.014	0.06	0.046	0.033	1.37
annual	0.176	0.021	1.00++	0.168	0.022	7.52***

COUNTRY FIXED EFFECTS & SPEED OF CONVERGENCE



SENSITIVITY ANALYSIS – ESTIMATION METHODS



	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	preferred	WLS	WLSY	MEDREG	COOKR	REM	EIV
phd thesis	-0.217***	-0.292***	-0.187***	-0.243**	-0.166*	-0.267***	-0.225**
journal	-0.072***	-0.087***	-0.069***	-0.095***	-0.073***	-0.004	-0.073***
refc_eu	0.147***	0.108***	0.182***	0.142***	0.154***	0.076*	0.144***
correlation	0.108***	0.149***	0.030	0.118***	0.094***	0.141**	0.110***
time series	-0.131***	-0.113***	-0.106***	-0.096***	-0.122***	-0.090	-0.132***
HP filter	0.155***	0.083***	0.068***	0.178***	0.158***	0.101*	0.156***
demand shocks	-0.390***	-0.369***	-0.434***	-0.359***	-0.383***	-0.377***	-0.388***
supply shocks	-0.316***	-0.319***	-0.352***	-0.279***	-0.303***	-0.287***	-0.315***
inflation	-0.188***	-0.243***	-0.181***	-0.178***	-0.179***	-0.155**	-0.186***
annual	0.168***	0.119***	0.116***	0.188***	0.174***	0.049	0.171***
no of obs.	2979	2979	2979	2979	2979	2979	2979
R ² /Pseudo-R ²	0.760	0.763	0.793	0.2927	0.465	0.417	0.462

Preferred – preferred estimation (OLS with standard errors clustered by countries), WLS – weighted (number of observations) least squares, WLSY – weighted (number of years) least squares, MEDREG – median regression, COOKR – Cook’s Distance Robust Regression, REM – random effects model, EIV – errors-in-variables regression.

SENSITIVITY ANALYSIS – SELECTED SUBSAMPLES



	(1) preferred	(2) gdp	(3) quarterly	(4) noger	(5) emu	(6) pre2008	(7) outlier
phd thesis	-0.217***	-0.124**	-0.210***		-0.257***		-0.204***
journal	-0.072***	-0.007	0.013	-0.069**	-0.081***	-0.101***	-0.074***
refc_eu	0.147***	0.174***	0.057	0.050*	0.169***	0.105**	0.146***
correlation	0.108***	0.046	0.199***	0.098*	0.172***	0.162***	0.114***
time series	-0.131***	-0.177***	-0.071*	-0.237***	-0.172***	0.299***	-0.132***
HP filter	0.155***	0.179***	0.217***	0.077**	0.190***	0.158***	0.163***
demand shocks	-0.390***	-0.387***	-0.318***	-0.558***	-0.419***	-0.241***	-0.375***
supply shocks	-0.316***	-0.313***	-0.240***	-0.437***	-0.327***	-0.182***	-0.302***
inflation	-0.188***		-0.209***	-0.439***	-0.200***	-0.075	-0.152***
annual	0.168***	0.197***		0.261***	0.155***	0.039	0.149***
no of obs.	2979	2227	1532	1836	2187	1507	2932
R ²	0.765	0.795	0.722	0.822	0.790	0.693	0.782

Preferred – preferred estimation (full sample), gdp – only GDP data, quarterly – only quarterly data, noger – excluding studies using Germany as a reference country, emu – including only euro area countries (as of 2017), pre2008 – excluding studies which were published after the financial crisis (2008 or later), outlier – excluding observations in the lowest and highest percentiles. Standard errors clustered by countries in parentheses. ***, **, and * denote significance at 1%, 5%, and 10% level, respectively.



EXTENSIONS



DIFFERENCE IN DIFFERENCE ESTIMATION



SPECIFICATION

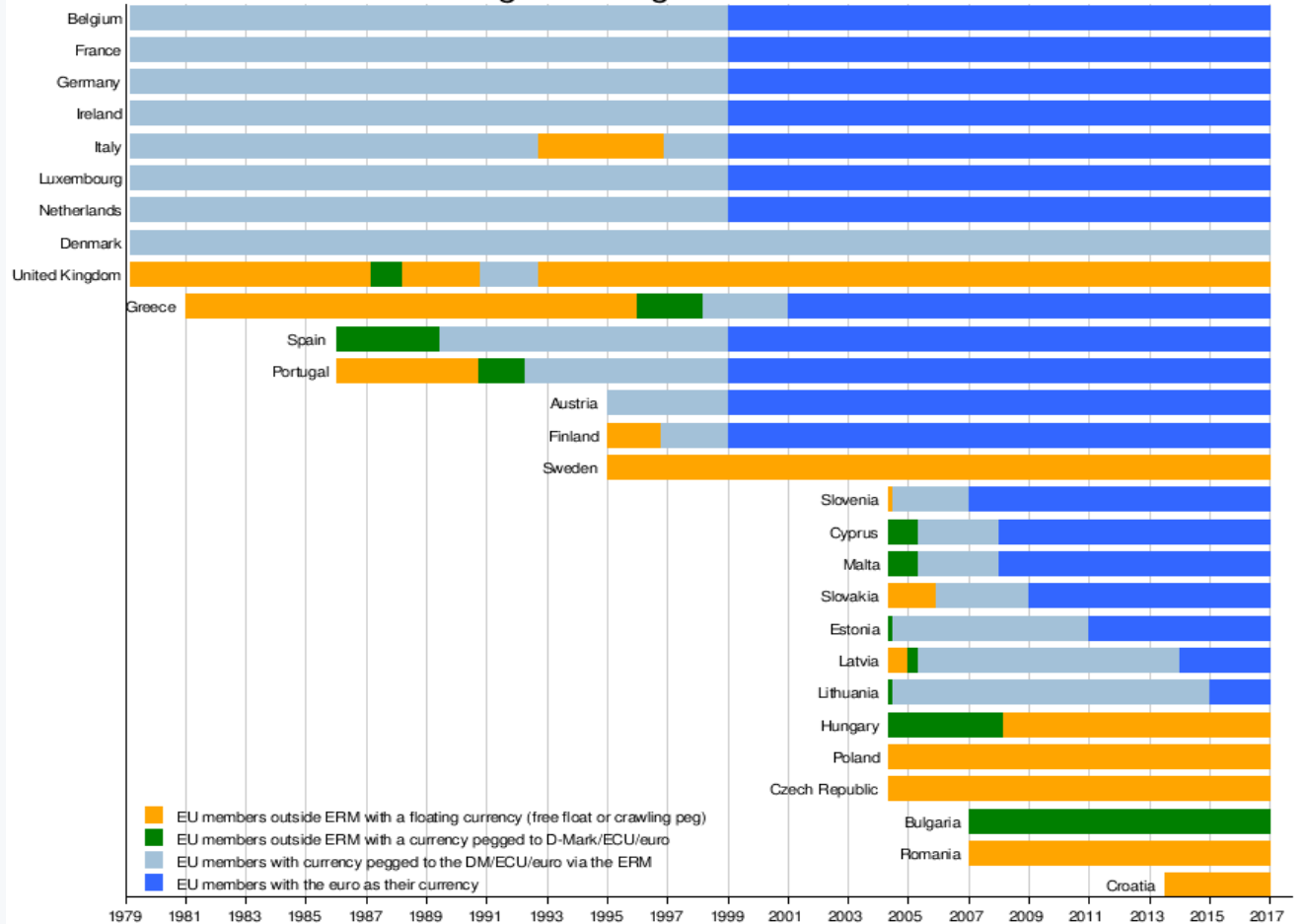
- ✓ The euro was introduced in 11 countries in 1999 and then stepwise enlarged by Greece, (Cyprus and Malta), Slovenia, Slovakia, and the Baltic States
- ✓ Thus we can use the difference-in- difference approach to estimate the effects of euro introduction on business cycle synchronization

$$\rho_{ij} = \alpha EMU_i + \tilde{\rho}_i + \sum_{k=1}^K \beta_{ijk} D_{ijk} + \tau_i + \varepsilon_{ij}$$

- ✓ where EMU is a dummy equal to 1 if the country was euro member and 0 otherwise.

TREATMENT

Exchange-rate regimes for EU members



DIFFERENCE-IN-DIFFERENCE ESTIMATION



	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
D-i-D (all)	0.109***	0.155***	0.181**	0.165**	0.093				
D-i-D (old)						0.255***	0.211**	0.193**	0.107
D-i-D (new)						-0.022	-0.077	-0.065	0.065
Dummy euro (all)	0.195***	0.212***							
Dummy euro (old)						0.283***			
Dummy euro (new)						-0.034			
Post 1999	0.318***								
country fixed effects	no	no	yes	yes	yes	no	yes	yes	yes
time effects	no	yes	yes	yes	yes	yes	yes	yes	yes
control variables	no	no	no	yes	yes	no	no	yes	yes
country sp. trends	no	no	no	no	yes	no	no	no	yes
No. of observations	2,979	2,9779	2,979	2,979	2,979	2,979	2,979	2,979	2,979
R ²	0.128	0.344	0.384	0.458	0.479	0.412	0.387	0.461	0.479



CONCLUSIONS



CONCLUSIONS



MAIN FINDINGS

- ✓ Genuine effect, 50% increase in BCS (.4 pre€ to .6 post€)
 - ✓ Journal & PhD diss lower BCS (wrt WP)
 - ✓ Blanchard-Quah lower BCS (wrt HP filter)
 - ✓ SS/DD shocks & inflation lower BCS (wrt GDP)
 - ✓ Quarterly data lower BCS (wrt annual)
- ✓ However, heterogeneity has remained significant within the euro area.

FURTHER READING



PUBLICATIONS

- ✓ Business Cycle Synchronization in a Currency Union: Taking Stock of the Econometric Evidence, Working Paper 28, BOFIT, Helsinki.
<https://helda.helsinki.fi/bof/handle/123456789/14922>
- ✓ Campos, Nauro F. & Fidrmuc, Jarko & Korhonen, Jukka, 2019. "Business cycle synchronisation and currency unions: A review of the econometric evidence using meta-analysis," International Review of Financial Analysis, Elsevier, vol. 61(C), pages 274-283.
<https://www.sciencedirect.com/science/article/pii/S1057521918301650>
- ✓ Nauro Campos, Jarko Fidrmuc, Jukka Korhonen: Glass half full or half empty: Reviewing the dispute about the effects of the euro on the synchronisation of business cycles, VOX, 26 September 2017.
<http://voxeu.org/article/effects-euro-synchronisation-business-cycles>

THANK YOU!

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