

# **Intra-industry trade between CESEE countries and the EU15**

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Joint work with

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# Outline

Motivation

Method

Results

Conclusions

# Focus

*Determinants of IIT of 19 CESEE countries (11 NMS and 8 CCPC) with the EU15*

## Why IIT?

- *It accounts for both exports and imports*
- *Prominent feature of European integration*
- *Indicator of real convergence across countries*
- *Indicator of current account balance*

# Research question: What drives IIT?

Chart 1: IIT levels in 2010

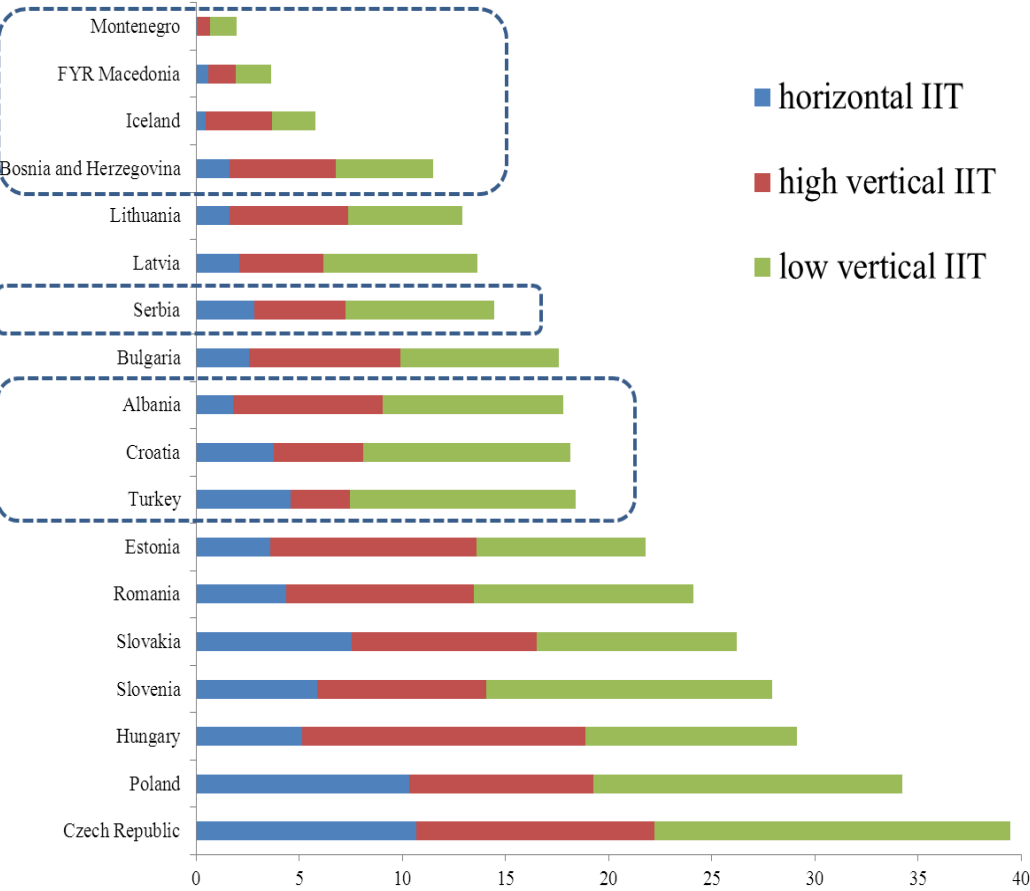
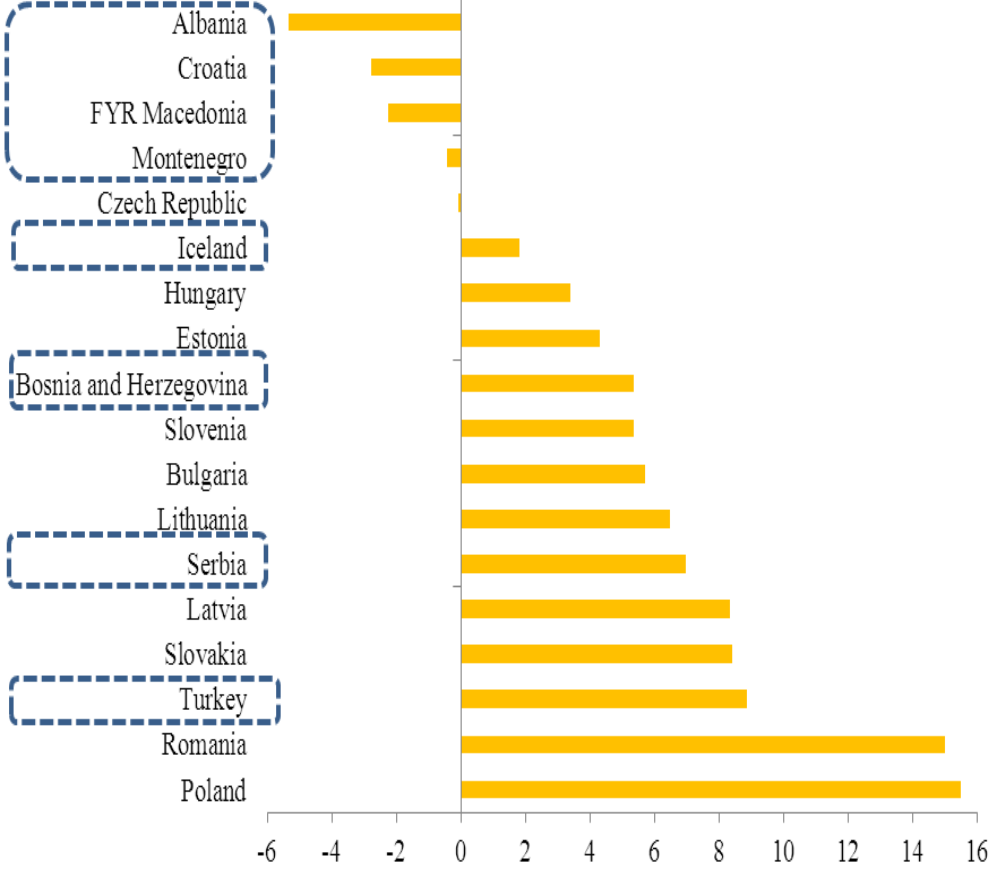


Chart 2: Changes from 1998



Source: BACI and authors' calculations

# Paper's contribution

- *New insight into European integration policies: Broad cross-country focus*
- *New variables (e.g. related to the quality of political institutions)*
- *Improvements to technical approach: Structure and truncation of the dependent variable*

# Dataset

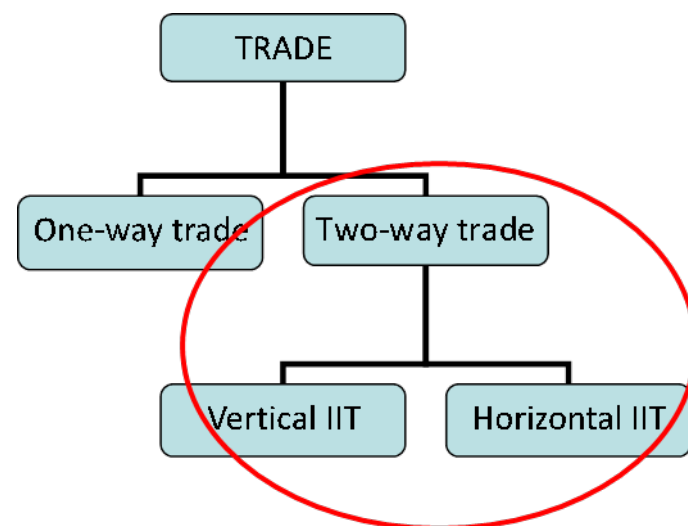
*Cross-section time series (panel)*

- *Period: 1998 – 2010 (annual frequency)*
- *Country dimension: 19 CESEE countries*

## Dependent variable (IIT)

Grubel-Lloyd index (trade overlap)

*BACI database (HS1996, 6 digit)*



# Explanatory variables

Unit labour costs (wage shares & price deflator)

Capital endowments (stock of capital, FDI)

Trade agreements with the EU15

Exchange rate regime

Institutional variables (corruption, democracy, corpor. tax)

# Regression models

- *Linear dynamic panel regressions (fixed-effects)*
- *Fractional response models*

# Regressions (CCPC)

	intra-industry trade							HIIT	VIIT	VIIT (low)	VIIT (high)
	GMM			PoolQMLE	APE	PoolQMLE	APE	GMM			
	1	2	3	8	9	10	11	16	17	18	19
LT(IIT) Lag(-1)	0.461***	0.516***	0.435***	2.694***	0.741***	1.898***	0.555***	-0.028	0.247***	0.166	-0.133
ULC, diff EU15	0.951										
FDI*ULC, diff EU15	-0.005										
W/GDP, diff EU15		1.467	0.708	0.467	0.129	-0.566***	-0.166***	-1.630	0.539	1.385	-3.452***
FDI*W/GDP, diff EU15		0.046	0.053*	0.007	-0.002	0.002	0.000	-0.152	0.037*	0.032	-0.088**
marginal W/GDP											-3.998
Deflator		-0.327***	0.947***	-0.218**	-0.060	0.007	0.002	0.276	0.936**	1.811	-0.596
FDI*Deflator		-0.196**	-0.252***	-0.089**	-0.025**	-0.093***	-0.027***	0.362	-0.592***	-0.400**	-1.030***
marginal Deflator		-1.544	-0.618	-0.771					-2.740		
Ln(K.Stk/GDP)diffEU15	-0.373*	-0.569***		-0.319***	-0.088***			0.559	-1.415***	-0.844	-1.183
FDI*Ln(K.Stk/GDP)	0.018*	0.053**		0.023**	0.006			-0.058	0.131***	0.012	0.369***
marginal Ln(K.Stk/GDP)	-0.261	-0.240		-0.176							
FDI/GDP	-0.013**	0.226***	0.294***	0.092**	0.025***	0.088***	0.025***	-0.488**	0.588***	0.432**	0.867***
marginal FDI/GDP	-0.008	0.020	0.017	-0.002	-0.003	-0.017	-0.005	-0.116	-0.028	0.008	-0.203
Corp.Tax, diff EU15	0.013**	0.013**	0.023**	0.006*	0.002**			0.015	0.028**	0.023	0.021
FTA (EU member)			-0.199***			-0.119***	-0.035***	-0.584***	-0.083	-0.168	0.222
XR Regime			0.115***			0.038***	0.011***	0.019	0.104***	0.100*	0.058
Corruption, diff EU15			-0.208***			-0.091**	-0.027***	0.144	-0.372***	-0.145	-0.313*
Democracy, diff EU15			0.014					-0.041	0.110***	0.139	0.084
Intercept	-1.244***	-0.792***	-2.523***					-4.508**	-1.710***	-4.670**	-1.729



# Regressions (NMS)

	intra-industry trade								HIIT	VIIT	VIIT (low)	VIIT (high)
	GMM				PoolQMLE	APE	PoolQMLE	APE	GMM			
	4	5	6	7	12	13	14	15	20	21	22	23
LT(IIT) Lag(-1)	0.411**	0.411**	0.414**	0.494**	1.601**	0.475**	1.600**	0.481**	-0.134	0.519***	0.441**	0.329***
ULC, diff EU15	-0.114											
FDI*ULC, diff EU15	-0.007											
W/GDP, diff EU15		-0.339	-0.843	-0.896	-0.216	-0.064	-0.341	-0.102	0.916	-1.061	-2.189***	0.455
FDI*W/GDP, diff EU15		0.017	0.003	0.009	-0.008	-0.002	-0.016*	-0.005	0.062	-0.014	-0.053**	0.040
marginal W/GDP											-2.518	
Deflator		-1.021**	-1.155*	-1.22**	-0.282	-0.084	-0.356	-0.107	-3.451*	-0.456	-0.165	-0.359
FDI*Deflator		0.109	0.071	0.087	0.046	0.014	0.179	0.005	0.158	0.051	-0.057	0.141
marginal Deflator												
Ln(K.Stk/GDP)diffEU15	0.007	0.169			-0.042	-0.012			-0.299	-0.062	-0.179	-0.167
FDI*Ln(K.Stk/GDP)	-0.005	-0.024			0.005	0.001			-0.035	0.004	0.034	-0.007
marginal Ln(K.STk/GDP)												
FDI/GDP	0.002	-0.099*	-0.072	-0.084	-0.054	-0.016	-0.031	-0.009	-0.117	-0.065	0.019	-0.118
marginal FDI/GDP												
Corp.Tax, diff EU15	0.004	0.005*	0.008**	0.009**	0.002*	0.001			0.046***	0.001	0.006	-0.001
FTA (EU member)			-0.128**	0.060*			-0.060**	-0.018	-0.339*	-0.131	-0.231	0.048
XR Regime			0.015***	0.015***			0.012***	0.004**	0.035***	0.014***	0.020**	0.008
Corruption, diff EU15			-0.006	-0.009			0.006	0.002	0.058	-0.030	-0.114**	0.096*
Democracy, diff EU15			-0.024	-0.024					-0.004	-0.004	-0.057	0.049
Intercept	-0.812**	0.122	0.352	0.375					-1.011	-0.152	-0.549	-1.979

# Main findings

- *CCPC are lagging behind NMS in terms of IIT integration*
- *Common factors: Fiscal policy incentives, exchange rate regimes*
- *CCPC-specific factors: Quality of political institutions (corruption) plays an important role*

**Thank you for your attention.**

# Appendix

Grubel-Lloyd Index

Baseline regression specification

Regression results

Abbreviations

# Grubel-Lloyd Index

Weighted GLI values:

$$GLI_{ii',t} = \sum_{k=1}^{5000} w_{k,t} * GLI_{ii',k,t} = 1 - \frac{\sum_{k=1}^{5000} |X_{ii',k,t} - M_{ii',k,t}|}{\sum_{k=1}^{5000} X_{ii',k,t} + M_{ii',k,t}}$$

Weights are given by:

$$w_{k,t} = \frac{X_{ii',k,t} + M_{ii',k,t}}{\sum_{k=1}^{5000} X_{ii',k,t} + M_{ii',k,t}}$$

Structural feature of IIT:

$$\frac{\text{Min}(X_{ii',k,t} M_{ii',k,t})}{\text{Max}(X_{ii',k,t} M_{ii',k,t})} > 0.1$$

Horizontal IIT:

$$\frac{1}{1 + 0.15} \leq \frac{UV_k^x}{UV_k^m} \leq 1 + 0.15$$

Note:  $k$  = traded product,  $i$  = country in question,  $i'$  = partner country,  $X$  = exports,  $M$  = imports,  $t$  = year,  $UV$  = unit values.

# Panel baseline regression specification

$$\ln\left(\frac{IIT_{it}}{1-IIT_{it}}\right) = \alpha_i^g + \gamma_t^g + \beta_1 \ln\left(\frac{IIT_{it-1}}{1-IIT_{it-1}}\right) + \beta_2 Ec.DIST_{it}^g + \beta_3 ULC_{it}^g + \beta_4 FDI_{it}^g + \beta_5 TA_{it}^g + \beta_6 EXR_{it}^g + \beta_7 INST_{it}^g + \varepsilon_{it}^g$$

# Results (Dynamic Panel Estimates)

	CPCC			New Member States			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	GMM	GMM	GMM	GMM	GMM	GMM	GMM
LT(IIT) Lag(-1)	0.461*** (0.125)	0.516*** (0.133)	0.435*** (0.056)	0.411** (0.203)	0.411** (0.206)	0.414** (0.202)	0.494** (0.202)
ULC, diff EU15	0.951 (0.641)			-0.114 (0.698)			
FDI/GDP	-0.013** (0.005)	0.226*** (0.085)	0.294*** (0.076)	0.002 (0.006)	-0.099* (0.058)	-0.072 (0.060)	-0.084 (0.056)
FDI*ULC, diff EU15	-0.005 (0.119)			-0.007 (0.047)			
Ln(K.Stk/GDP)diffEU15	-0.373* (0.222)	-0.569*** (0.158)		0.007 (0.273)	0.169 (0.265)		
FDI*Ln(K.Stk/GDP)	0.018* (0.010)	0.053** (0.025)		-0.005 (0.034)	-0.024 (0.033)		
Corp.Tax, diff EU15	0.013** (0.007)	0.013** (0.007)	0.023** (0.011)	0.004 (0.003)	0.005* (0.003)	0.008** (0.004)	0.009** (0.004)
W/GDP, diff EU15		1.467 (1.173)	0.708 (0.566)		-0.339 (0.930)	-0.843 (0.807)	-0.896 (0.835)
Deflator		-0.327*** (0.119)	0.947*** (0.308)		-1.021** (0.513)	-1.155* (0.622)	-1.22** (0.591)
FDI*W/GDP, diff EU15		0.046 (0.060)	0.053* (0.032)		0.017 (0.025)	0.003 (0.015)	0.009 (0.018)
FDI*Deflator		-0.196** (0.077)	-0.252*** (0.061)		0.109 (0.068)	0.071 (0.061)	0.087 (0.058)
FTA (EU member)			-0.199*** (0.073)			-0.128** (0.062)	0.060* (0.033)
XR Regime			0.115*** (0.034)			0.015*** (0.004)	0.015*** (0.004)
Corruption, diff EU15			-0.208*** (0.038)			-0.006 (0.027)	-0.009 (0.022)
Democracy, diff EU15			0.014 (0.019)			-0.024 (0.039)	-0.024 (0.039)
Intercept	-1.244*** (0.339)	-0.792*** (0.301)	-2.523*** (0.714)	-0.812** (0.320)	0.122 (0.482)	0.352 (0.611)	0.375 (0.588)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-Test	.000***	.000***	.002***	.000***	.000***	.000***	.000***
SW -Test	.000***	.000***	.000***	.000***	.000***	.000***	.000***
Sargan Test	0.206	0.336	0.183	0.623	0.679	0.594	0.587
BIC	203.82	210.39	148.97	235.00	242.32	207.70	210.26
AB Test - 1 <sup>st</sup> order	0.029**	0.024**	0.024**	0.117	0.120	0.105	0.104
AB Test - 2 <sup>nd</sup> order	0.089*	0.835	0.855	0.323	0.300	0.352	0.334
AB Test - 3 <sup>rd</sup> order	0.370	0.837	0.367	0.264	0.246	0.235	0.237
Observations	73	73	62	110	110	106	118
N. of countries	8	8	7	11	11	11	11

**Note:** p<0.1\*, p<0.05\*\*, p<0.01\*\*\*. Coefficients: Std. Errors in parentheses robust with respect to serial correlation and heteroscedasticity. F-Test, p-values for joint significance of time fixed effects under Ho: no joint effect of time fixed effects. SW (Shapiro-Wilk) test for normality of residuals, p-values reported under Ho: residuals are normally distributed. Sargan Test for over-identifying restrictions, p-values reported under Ho: the instruments as a group are exogenous. AB (Arellano-Bond) test for autoregressive residuals of 1<sup>st</sup>, 2<sup>nd</sup> or 3<sup>rd</sup> order, reported p-values for Ho: no serial correlation.

# Results (Fractional Response Models)

Dep. Var.: <i>IIT with EU15</i>	Candidates and Potential Candidates			New Member States				
	Pooled QMLE (1)	APE (2)	Pooled QMLE (3)	APE (4)	Pooled QMLE (5)	APE (6)	Pooled QMLE (7)	APE (8)
IIT Lag(-1)	2.694*** (0.609)	0.741*** (0.065)	1.898*** (0.625)	0.555*** (0.079)	1.601** (0.688)	0.475*** (0.211)	1.600** (0.622)	0.481** (0.189)
FDI/GDP	0.092** (0.045)	0.025*** (0.007)	0.088*** (0.033)	0.025*** (0.005)	-0.054 (0.040)	-0.016 (0.014)	-0.031 (0.038)	-0.009 (0.012)
Ln (K.Stk/GDP)	-0.319*** (0.089)	-0.088*** (0.025)			-0.042 (0.175)	-0.012 (0.046)		
FDI*Ln (K.Stk/GDP)	0.023** (0.011)	0.006 (0.004)			0.005 (0.021)	0.001 (0.006)		
Corp. Tax, diff EU15	0.006* (0.004)	0.002** (0.001)			0.002* (0.001)	0.001 (0.001)		
W/GDP, diff EU15	0.467 (0.527)	0.129 (0.091)	-0.566*** (0.195)	-0.166*** (0.031)	-0.216 (0.548)	-0.064 (0.155)	-0.341 (0.487)	-0.102 (0.138)
Deflator	-0.218** (0.102)	-0.060 (0.056)	0.007 (0.097)	0.002 (0.038)	-0.282 (0.298)	-0.084 (0.087)	-0.356 (0.331)	-0.107 (0.114)
FDI*W/GDP	0.007 (0.022)	-0.002 (0.003)	0.002 (0.010)	0.000 (0.002)	-0.008 (0.016)	-0.002 (0.006)	-0.016* (0.009)	-0.005 (0.003)
FDI*Deflator	-0.089** (0.044)	-0.025** (0.009)	-0.093*** (0.029)	-0.027*** (0.004)	0.046 (0.040)	0.014 (0.013)	0.179 (0.035)	0.005 (0.012)
FTA			-0.119*** (0.032)	-0.035*** (0.005)			-0.060** (0.030)	-0.018 (0.013)
Float XR Regime			0.038*** (0.012)	0.011*** (0.002)			0.012*** (0.003)	0.004** (0.002)
Corruption, diff EU15			-0.091** (0.037)	-0.027*** (0.008)			0.006 (0.017)	0.002 (0.006)
Log pseudolikel.	-20.12	-	-20.11	-	-40.42	-	-39.39	-
AIC	0.670	-	0.669	-	0.826	-	0.837	-
BIC	-324.99	-	-325.01	-	-537.76	-	-514.98	-
Observations	81	81	81	81	118	118	118	118
N. of clusters	8	8	8	8	11	11	11	11

**Note:** \*\*\*p<0.01, \*\*p<0.05, \*p<0.10. Standard errors in parentheses, robust to general second moment misspecification, conditional variance and serial correlation. All models have time dummies from 1999 to 2010. All models are estimated with pooled Bernoulli QMLE and have time averages of the explanatory variables except the interaction terms and the dummies for trades agreements and EU membership. The standard errors for the APE are obtained with 500 bootstrap replications.



# Results (Vertical IIT and Horizontal IIT)

	Candidates and Potential Candidates				New Member States			
	Horizontal (1)	Vertical (2)	V-Low (3)	V-High (4)	Horizontal (5)	Vertical (6)	V-Low (7)	V-High (8)
Lag HIIT	-0.028 (0.035)				-0.134 (0.164)			
Lag VIIT		0.247*** (0.061)				0.519*** (0.145)	0.441** (0.186)	
Lag VIIT L			0.166 (0.139)					0.329*** (0.052)
Lag VIIT H				-0.133 (0.129)				-0.118 (0.171)
FDI/GDP	-0.488** (0.193)	0.588*** (0.115)	0.432** (0.177)	0.867*** (0.262)	-0.117 (0.157)	-0.065 (0.067)	0.019 (0.068)	-0.167 (0.337)
Ln (K.Stock)	0.559 (0.926)	-1.415*** (0.533)	-0.844 (0.956)	-1.183 (0.799)	-0.299 (0.531)	-0.062 (0.250)	-0.179 (0.402)	-0.007 (0.337)
FDI*lnKStk	-0.058 (0.120)	0.131*** (0.045)	0.012 (0.093)	0.369*** (0.095)	-0.035 (0.067)	0.004 (0.027)	0.034 (0.052)	
Corp. Tax	0.015 (0.014)	0.028** (0.012)	0.023 (0.015)	0.021 (0.021)	0.046*** (0.015)	0.001 (0.003)	0.006 (0.006)	-0.001 (0.006)
W/GDP	-1.630 (1.581)	0.539 (0.735)	1.385 (1.221)	-3.452*** (1.212)	0.916 (1.530)	-1.061 (0.647)	-2.189*** (0.828)	0.455 (0.819)
Deflator	0.276 (0.564)	0.936** (0.408)	1.811 (1.144)	-0.596 (1.567)	-3.451* (1.886)	-0.456 (0.507)	-0.165 (0.874)	-0.359 (1.869)
FDI*W/GDP	-0.152 (0.093)	0.037* (0.022)	0.032 (0.025)	-0.088** (0.041)	0.062 (0.050)	-0.014 (0.018)	-0.053** (0.027)	0.040 (0.037)
FDI*Deflator	0.362 (0.238)	-0.592*** (0.123)	-0.400** (0.199)	-1.030*** (0.295)	0.158 (0.180)	0.051 (0.070)	-0.057 (0.075)	0.141 (0.190)
FTA	-0.584*** (0.113)	-0.083 (0.099)	-0.168 (0.210)	0.222 (0.253)	-0.339* (0.178)	-0.131 (0.092)	-0.231 (0.231)	0.048 (0.220)
Float XR	0.019 (0.044)	0.104*** (0.035)	0.100* (0.057)	0.058 (0.067)	0.035*** (0.011)	0.014*** (0.005)	0.020** (0.009)	0.008 (0.007)
Corruption	0.144 (0.164)	-0.372*** (0.100)	-0.145 (0.176)	-0.313* (0.181)	0.058 (0.092)	-0.030 (0.023)	-0.114** (0.049)	0.096* (0.050)
Democracy	-0.041 (0.073)	0.110*** (0.035)	0.139 (0.089)	0.084 (0.096)	-0.004 (0.043)	-0.004 (0.043)	-0.057 (0.046)	0.049 (0.050)
Intercept	-4.508** (1.995)	-1.710*** (0.560)	-4.670** (1.824)	-1.729 (1.849)	-1.011 (1.913)	-0.152 (0.652)	-0.549 (1.232)	-1.979 (1.861)
Time Fix Eff	Yes .000***	Yes .000***	Yes .001***	Yes .000***	Yes .000***	Yes .000***	Yes .000***	Yes .000***
F-Test	.000***	.086*	.168	.000***	.000***	.000***	.001***	.000***
SW -Test	0.540	0.010**	0.650	0.218	0.427	0.219	0.130	0.156
Sargan Test	264.52	151.50	254.94	279.76	381.95	187.31	267.34	283.23
BIC	0.034**	0.191	0.032**	0.043**	0.024**	0.013**	0.011**	0.040**
AB Test - 1 <sup>st</sup>	0.293	0.567	0.036**	0.104	0.188	0.913	0.396	0.024**
AB Test - 2 <sup>nd</sup>	0.185	0.394	0.078*	0.264	0.134	0.474	0.350	0.090**
AB Test - 3 <sup>rd</sup>	62	62	62	62	106	106	106	106
Observations	7	7	7	7	11	11	11	11
N. countries								

**Note:** p<0.1\*, p<0.05\*\*, p<0.01\*\*\*Std. Errors in parentheses robust with respect to serial correlation and heteroscedasticity. F-Test, p-values for joint significance of time fixed effects under Ho: no joint effect of time fixed effects. SW (Shapiro-Wilk) test for normality of residuals, p-values reported under Ho: residuals are normally distributed. Sargan Test for over-identifying restrictions, p-values reported under Ho: the instruments as a group are exogenous. AB (Arellano-Bond) test for autoregressive residuals of 1<sup>st</sup>, 2<sup>nd</sup> or 3<sup>rd</sup> order, reported p-values for Ho: no serial correlation.

# Abbreviations

CESEE = Central, Eastern and South-Eastern Europe

NMS = New EU Member States

CCPC = EU candidate countries and potential candidates

IIT = intra-industry trade

VIIT = vertical intra-industry trade

HIIT = horizontal intra-industry trade

GLI = Grubel-Lloyd index