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Assessing the impact of European Integration on sectoral trade in services

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Nadine Behncke[1]

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JEL: F13, F15
Keywords: Trade in Service, European integration, gravity equation

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1. Introduction

Trade in service has been growing steadily in recent years. One remarkably case study for analyzing trade in services presents the European Union. The world´s most important services trader has quite impressively deepened its economic integration over time. Today, the European Union offers a single market for 27 member countries. However, compared to goods the single market in services has not been completed because services were considered far less important than goods in the development of the European single market.[1]

Among other reasons, this can be attributed to the low tradability of services which has just started to rise due to progress in communication and information technologies. Therefore, the founders of the European Community mostly focused on trade in goods and covered trade in services only in the agreements when it offered a complimentary function to merchandise trade like transport services or provided low impediments on a general level (tourism). Additionally, the single market definition of a service departs from services that are covered in balance of payment statistics. In general, the *freedom to provide services* does cover mostly business and professional services like lawyers or accountants. On the other hand, not included services like transport, financial or insurance services are covered in additional treaty sections with own liberalization approaches.

Furthermore, services cannot move completely freely in the single market because of the existing heterogeneous regulations for professional services across member countries. Recent work by Kox and Lejour (2006) demonstrates how regulatory heterogeneity acts a as trade barrier and dampens trade in services between member states. Nevertheless, trade in business and professional services is important in magnitude within the European Union and with the rest of the world.

To facilitate services trade within the European Union and deepen economic integration, the European Commission took great efforts with the launch of the service directive. With regard to the growing importance of services trade, it would be interesting to see whether European Integration has a significant effect on trade in services.

However, academic research into the effects of European economic and monetary integration in the service sector has been quite low. While there have been several strings of literature that measure and analyze the size and impact of impediments to trade in services or the effects

[1] See e.g. Langhammer, 2005 for evidence on a “not yet perfect customs union of services”.

of the recent service directive[2] the literature on trade effects due to economic integration in the single market using gravity equations is quite small.[3]

Thus, the purpose of this paper is to contribute to the literature analyzing the effects of European Integration on intra EU services trade.

First, we will estimate the effect of real and monetary European integration on services trade between member countries using a data set from Eurostat covering the time period between 2000 and 2010.

Furthermore, we focus on the question whether European Integration differs at the sector level, i.e. between balance of payments categories. One should expect a different impact of European Integration on services sectors since legislative integration attempts cover different time spans with varying degrees of political motivation. For example, the abolishment of impediments in transport services has started with the Treaty of Rome while liberalization of financial services was attempted in the 90s and liberalization of business services has just started recently with the service directive.

The existing literature on the impact of European integration on sectoral services trade is quite limited. Available studies give mixed results if European integration has contributed significantly to increased services trade between member countries. One of the first papers to address this topic are Lejour and de Paiva Verheijden (2004). They compare intra-regional trade in goods and services in Canada and the European Union using a gravity model. The effects of European integration are measured by a dummy variable which takes the value of one if both trading partners are members of the European Union and zero otherwise. The authors get a negative significant effect. According to their interpretation, this means that the Canadian internal market does function better than the European market and that there is still some uncovered trade potential for intra-European trade.

Recent empirical evidence from Van der Marel (2011) also hints to a services trade increase between EU members due to the single market. While he finds no evidence in the ordinary least square (OLS) estimations that include controls for multilateral resistance terms, the estimate of the EU-dummy turns significant when he starts to account for zero trade flows. Especially the PPML regressions provide a high impact of European Integration in terms of significance and magnitude. The author offers two decent reasons for the sensibility of the EU indicators with respect to the estimation method: First, one can assume that services trade

[2] See e.g. Weber and Asmus (2008), Dettmer (2012), Monteagudo, J., A. Rutkowski, D. Lorenzani (2012) for recent research on the service directive.

[3] However, there exist a number of papers that analyze the impact of Regional integration agreements on services trade using gravity models but they do not address explicitly the impact of European Integration on trade in services. See e.g. Ceglowski (2006).

actually increases with the prospect of becoming an EU member in the near future. Once he accounts for these anticipated effects, the EU dummy turns significant in the OLS regressions. Second, the change in significance hints to the possibility that the EU dummy is sensitive to biased sample selection.

In a recent paper, Baier and Bergstrand (2007) discuss convincingly that estimations of the effects of RTAs on trade are affected by endogeneity (selection) bias. Additionally, Egger et al (2009) demonstrate that ignoring endogeneity bias is relatively more important than ignoring the zero trade flow issue. One should therefore prefer estimation methods that solve the endogeneity problem of the EU dummy over estimation methods dealing with zero trade flows. Applying these recommendations, Guillin (2012) finds a positive and statistically significant EU effect for aggregate services trade.

In contrast to these studies, Walsh (2008) looks at different services sectors and gets positive significant as well as insignificant EU effects using OLS and several panel estimators like fixed effects (FE), random effects (RE) and the Hausman-Taylor (HT) approach that controls for endogeneity of selected variables. His preferred estimator is the HT approach which he uses for all considered sectoral service imports. However, the variable of interest, the EU dummy, is only statistically significant for transport services.

In a more recent paper, Fink (2009) also analyzes the effects of European integration on sectoral services exports and imports using data from Eurostat for the years 1999-2002. In contrast to most previous mentioned papers he applies a theoretically founded gravity equation which controls for correct specified multilateral resistance terms. His results suggest a positive impact of European integration on both total service exports and imports. However, the EU effect differs when different balances of payment categories are considered. In terms of significance and magnitude of the EU-coefficient trade in construction services and trade in merchanting and other trade related services, which is a subcategory of business services, have increased the most because of European Integration.

One problem in evaluating the effects of a regional trade agreement using a dummy variable lies in its potential endogeneity because countries probably select endogenously into trade agreements. Baier and Bergstrand (2007) demonstrate that the most plausible effect of the average impact of a free trade agreement, i.e. the EU, on bilateral trade is obtained from a gravity equation using a panel FE estimator that controls for multilateral resistance effects in the form of time-varying country and partner effects and also country-pair effects or a first difference (FD) estimator that includes time-varying country and partner effects.

Most of the aforementioned studies do not use this estimation approach. They are either using panel estimation methods without controlling for time varying multilateral resistance terms or control for it using only OLS but now neglecting a potential endogeneity bias of the EU dummy.

In addition to answering the question if the impact of European Integration differs between services sectors, the present paper contributes to the existing literature from an empirical point of view by taking into consideration a potential endogeneity bias of the EU dummy and a correct specification of multilateral resistance terms in a panel data set. Our results offer evidence for a high positive impact of European integration on aggregate services trade while we find no robust evidence for an effect of monetary integration. However, there exist notable differences at the sector level. According to our results, European integration has positive effects especially for business services, travel and EDV services. In addition, it can be observed that these effects have increased over the considered time period.

The remainder of the paper is structured as follows: Section 2 describes the data set while section 3 introduces the estimation methodology. Section 4 presents the results and section 5 concludes the paper.

2. The Dataset

The bilateral services trade flows are from the European Commission´s Eurostat database. Services exports are expressed in millions of Euros and converted into US $. Nominal goods exports are expressed in millions of US $. GDP data measured at current prices and expressed in million US $, as well as internet users per 100 people are taken from the World Development Indicators database. In addition, information on country-pair specific variables like distance, sharing a border (continguity), and speaking a common language (language) comes from the CEPII-database.

The indicator Government Effectiveness (GovEff) is provided by the World Bank governance indicators database.

Summary statistics of all variables are given in table 1.

Table 1: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
$LnExporte_{odt}$	38115	1.540789	2.685342	-4.990977	9.914205
$LnGDP_{ot}$	84942	11.90317	1.703195	8.256068	15.103
$LnGDP_{dt}$	84942	11.90317	1.703195	8.256068	15.103
$LnDist_{od}$	84942	7.092647	0.6591632	4.087945	8.233851
EU_{odt}	84942	0.7055167	0.4558128	0	1
$Euro_{odt}$	84942	0.1950272	0.396224	0	1
$Contiguity_{od}$	84942	0.0968661	0.2957771	0	1
$Language_{od}$	84942	0.037037	0.1888537	0	1
$GovEff_{odt}$	77220	1.198051	0.6394996	-0.4096509	2.337917
$InternetUser_{odt}$	84942	47.80533	22.87845	3.573255	91.12326

The dataset contains 84942 possible observations over 27 EU countries, 11 years and 11 service sectors taken from the balance of payment.

Looking at table 1 reveals an obvious problem when analyzing trade in services. With just about 38000 observations for services exports, more than half of the possible observations are missing. The Eurostat database does not distinguish between countries that do not report trade flows (missing values) and country pairs with no bilateral trade (zero trade). Since trade in services often does require a close proximity between exporter and importer it can be suspected that at least a part of the missing values are zero or close to zero trade. A further potential problem with regard to the trade data exists in the considered time period. Eurostat offers two different data bases for trade in services. The first one covers the period 1985-2003 while the second covers the period 2004 onwards.

Table 2 presents the available observations in our data set and illustrates the difference in data coverage between the two time periods.

Table 2: Observations of Country-Pairs Services Exports by Year and Sector

Sector/Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Sum
Transport	211	306	470	520	606	634	634	621	614	612	607	5835
Travel	224	285	455	536	622	643	640	651	661	662	662	6041
Construction	100	72	43	27	497	554	561	550	555	553	561	4073
EDV	98	70	41	21	509	526	535	523	546	548	543	3960
Insurance	98	70	45	24	510	542	549	540	561	565	560	4064
OBS	98	73	46	27	559	580	579	564	584	583	584	4277
Finance	92	68	42	25	535	562	570	570	596	602	603	4265
Culture	98	73	44	23	496	533	535	521	541	522	530	3916
GOV	93	70	45	27	503	532	533	556	579	587	591	4116
Patent	95	68	43	24	520	537	539	533	540	545	532	3976
Commun.	98	73	41	24	497	534	546	512	542	520	534	3921
Sum	1305	1228	1315	1278	5854	6177	6221	6141	6319	6299	6307	38115

Since 2004 the number of observations increases steadily, covering between 76 and 82 % of possible observations while just about 17 % are available between 2000 and 2003.[4] In addition, the data coverage of service sectors also differs remarkably. Over the whole time period most data coverage is available for travel services and transport services, with 78 and 76 %, respectively. The data coverage differs only slightly between the remaining service sectors at a lower level, differing between 51 % for cultural services and 55 % for other business services. At the sectoral level one can observe also the difference in the number of available observations before and after 2004. Until 2003 one can identify an increasing number of observations only for Transport and Travel services, covering about 76 % of possible observations and increasing up to 90 % afterwards. The number of observations of the other sectors decreases between 2000 and 2003 covering on average just between 3 and 4% of possible observations. The data coverage in these sectors jumps up to 75 % in 2004 and slightly increases up to over 80 % in some sectors. The observed sectoral differences can be attributed to the fact that observations for intra EU15 trade and CEECEU15 trade are reported only for transport and travel services in 2000 and between 2002 and 2003. In contrast, observations for intra CEEC trade and EU15CEEC trade are available for nearly all sectors.

[4] The dataset covers 27 exporter * 26 Partner = 702 country-pairs * 11 service sectors (years) = 7722 possible observations for each year (for each sector).

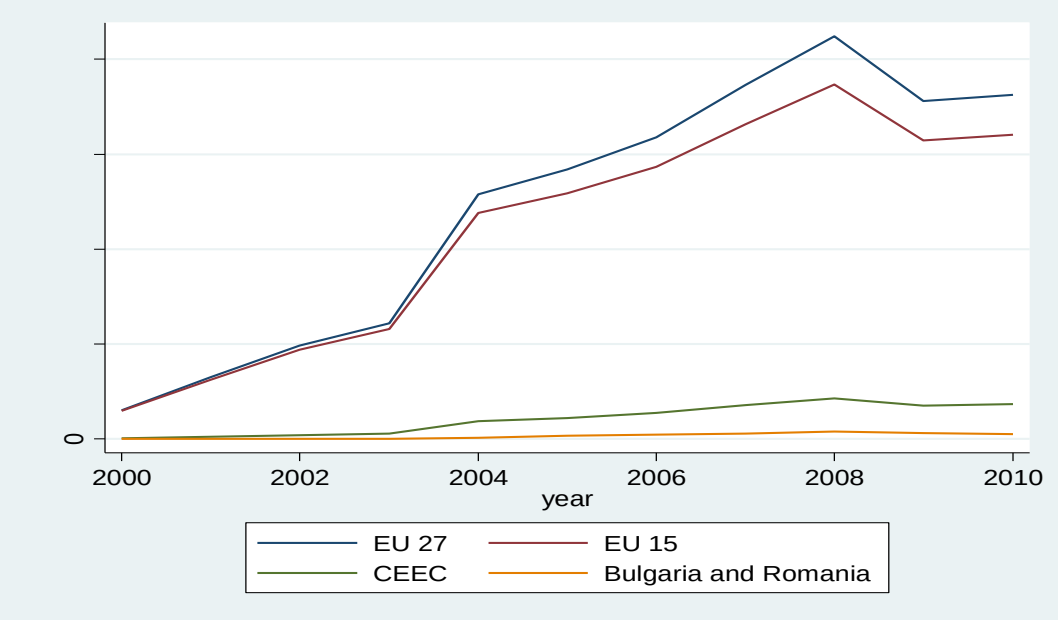
Furthermore, one can observe a huge difference between available observations at the country level. The highest data coverage provides France with 76 % while Spain covers only 6 % of all possible observation. With regard to the time dimension, countries often don´t provide data at the beginning of the time period. This could be problematic because we are interested in estimating an effect of EU integration. Since this variable varies over time because of the enlargements in 2004 and 2007 it is essential to have observations for reliable estimation results before 2004. Nevertheless, the data reveal that all EU 15 countries provide observations starting in 2002.[5] All CEEC countries provide data starting at the latest in 2003 with the exception of Poland which starts in 2004. This coverage should allow for enough time variation to estimate an EU effect.[6]

However, the varying number of available observations influences the volume of intra EU services exports. Figure 1 illustrates the development of intra-EU services exports according to our data set and distinguishes between several groups.

The data reveal that the value of intra EU27 service exports can be attributed mostly to exports from EU15 countries to EU27 countries. The export value of the 10 CEECs to EU27 countries is remarkably lower.

Nevertheless, one can observe that the export value is somewhat influenced by the increased data availability in the year 2004.

Figure 1: Intra EU 27 services exports



[5] Belgium, Ireland, Luxembourg and the United Kingdom don´t publish observations between 2000 and 2001.

[6] Data coverage of Bulgaria and Romania starts in 2004 and 2005, respectively. However, both countries have become EU members only in 2007.

Looking at EU 15 exports shows that exports consist mostly of transport and travel services in terms of value until 2003 since we cannot identify a jump in the data in 2001 where observations are available for all sectors. However, the increased level is heavily influenced by the higher number of observations of the EU 15 countries between 2003 and 2004. In addition, the value of services exports has increased as the values are remarkably higher in 2004 than in 2001.

One has to keep these facts in mind when searching for an EU effect on services trade. This sharp increase in available observations can overstate the estimated EU effect since it coincides with the eastern EU enlargement.

3. Empirical Estimation

This section introduces the estimation methodology. Two issues are considered problematic when properly estimating the effect of trade or regional agreements on trade flows. As already stated, the formation and deepening of an agreement is not exogenous to trade flows because economic factors that affect trade flows are also affecting the formation of a regional agreement. Since the same economic factors influence both, the selection of countries into an agreement and trade flows, endogeneity bias may arise that overstates or understates the true effect of the agreement (c.f. Baier and Bergstrand, 2007). Several methods exist to address this potential endogeneity problem. Baldwin and Taglioni (2007) as well as Baier and Bergstrand (2007) show use of panel data and a correct specification of the multilateral resistance terms using FE or FD estimators can potentially eliminate this endogeneity bias. Following their recommendations, we start by providing the gravity equation using FE to control for a possible endogeneity bias with time-constant multilateral resistance terms. In the second part we introduce the gravity model that controls for time-varying multilateral resistance terms using first OLS and then panel estimators such as FE and FD to control again for endogeneity bias.

3.1 Model Specification: OLS and FE

Following the literature we use the following specification as a baseline model:

$$ln(X)_{odst} =$$
$$\beta_0 + \beta_1 lnGDP_{ot} + \beta_2 lnGDP_{dt} + \beta_3 lndist_{od} + \beta_4 Gravity_{od} + \beta_5 influence_{odt} +$$
$$\beta_6 EU_{odt} + \beta_7 Euro_{odt} + \gamma_t + \delta_{ods} + \varepsilon_{odst} \qquad 1)$$

Where X are exports from country o to partner d of service s in year t, dist is the distance between the trading partners. *Gravity* is a vector that entails the two standard dummy variables of a common spoken language (language) and two countries sharing a border (continguity). *Influence* is a vector consisting of factors that can influence services trade via institutional factors or due to progress in communication and information technologies.

The main variable of interest is the time-varying dummy variable EU which takes a value of one if both countries are a member of the European Union and zero otherwise. Additionally, we control for monetary integration with the time-varying dummy variable Euro. This variable takes the value one if both countries have adopted and *use* the Euro in their daily life starting 2002 and zero otherwise. Arguably, this definition departs from usual definitions of the Euro-dummy but we believe it is suitable because of the uniqueness of services trade. The remaining terms γ_t and δ_{ods} control for unobservable time-effects that are common for all trading partners and for sector-specific country-pair effects, respectively. According to the theory-motivated gravity equation by Anderson and van Wincoop (2004) the country-pair effects should control for the multilateral resistance terms in a cross-sectional setting. Empirical support for this implementation comes from Egger and Pfaffermayr (2003) and Cheng and Wall (2005) who favor this specification over a specification with country effects, partner effects and time effects.

Additionally, in a series of papers Egger (2000, 2005) finds evidence for fixed effects specifications over random effects specifications in a panel data context. We also use the Hausman Test for choosing between FE and RE. The test clearly favors FE over RE and is in line with the above mentioned results.[7] Since our data set consists of 702 (27 country * 26 partner) country pairs or 7722 panels (country pair * 11 service sectors) over 11 years we test for the presence of heteroskedasticity and autocorrelation. The results of the Wooldridge test for autocorrelation and the Breusch-Pagan Test for heteroskedasticity strongly indicate the presence of both problems in the data.[8] Thus, we apply robust standard errors clustered across sectors in our estimations.

[7] Chi2(4)= 434.86, P=0.000.

[8] Serial Correlation: F (1,5323) =733.783 Prob > F =0.000; Breusch-Pagan: chi2(1)=60.17, Prob > chi2 = 0.00.

3.2 Model Specification: Multilateral Resistance

While the use of country-pair effects to account for endogeneity bias created by prices is suitable in a cross-section model they are not sufficient in a panel data set with an additional time dimension. Among others, Baldwin and Taglioni (2006) show that in a panel data set, the multilateral resistance variables need to be time-varying. Ignoring the time dimension would lead to an omitted variable bias. Following these authors, a correct estimation of the gravity model in a panel setting suggests the following estimation:

$$ln(X)_{odst} = \beta_0 + \beta_3 lndist_{od} + \beta_4 Contiguity_{od} + \beta_5 language_{od} + \beta_6 Euro_{odt} + \beta_7 EU_{odt} + \gamma_{ot} + \gamma_{dt} + \delta_{ods} + \varepsilon_{odst} \quad 2)$$

The equation accounts now for time-varying country effects γ_{ot} and time-varying partner effects γ_{dt}. This should completely eliminate the bias coming from the wrong specification of the multilateral resistance terms or the "gold-medal error" (Baldwin and Taglioni, 2006).[9] Again, sectoral country-pair effects δ_{ods} are included to account for additional unobserved heterogeneity in country pairs. GDP variables are missing on the RHS due to two reasons: On statistical grounds they are collinear with time-varying resistance terms because their information is captured by the resistance terms. On a theoretical note, Fink (2009) reminds that theoretical derivations of the gravity model are based on a single-sector model. In a multi-sector model, the estimation model cannot be reduced to a specification with exporter and importer GDP (Hummels, 2001). A theory-consistent gravity model can therefore only include GDPs when the dependent variable captures total trade between countries. Since services trade only accounts for a small fraction of total trade which is around 20 %, it is unsuitable to control for GDP terms. However, using services value added instead of total GDP is an imperfect solution because value added differs from consumption in the partner country unless trade is balanced which is often not the case (Fink, 2009 p. 8).

In addition to the FE estimator one can also use the FD estimator for a precise estimation. Wooldridge (2010, Chapter 10) discusses how one should choose between FD and FE while treating endogneity issues. As long as T = 2 both estimators give the same results but start to differ when T>2. The choice of the estimator is determined by the assumption about the error

[9] We are aware that one should include time varying country-sector, time varying partner-sector, and time varying sector fixed effects in a panel data set using sectoral data to capture fully multilateral resistance terms (see e.g. Sheperd, 2008). However, due to computational problems we consider the solution above.

term.[10] FE is more efficient than FD when T >2 and there is no serial correlation while FD is more efficient if the error term follows a random walk. Wooldridge (2010, p. 324) points out that the spurious regression problem can arise when T is large and (some) regressors follow a unit root process which is very likely for aggregated variables. By first differencing the data, they are closer to a unit root process and avoid the spurious regression problem.[11] However, Wooldridge (2010) remarks the truth about the "right" coefficient will lay somewhere between the FE and FD estimation results.

Due to these reasons, we will estimate our equation using FE and FD. Following Baier and Bergstrand (2007) we estimate the next equation using FD controlling for multilateral resistance with time varying country and partner effects as a robustness check.[12]

$$dln(X)_{ods,t-(t-1)} = \beta_6 dEU_{od,t-(t-1)} + \beta_7 dEuro_{od,t-(t-1)} + \gamma_{o,t-(t-1)} + \gamma_{d,t-(t-1)} + \varepsilon_{ods,t-(t-1)} \quad 3)$$

Due to the first differencing of the regressors all time invariant variables are dropped. The GDP variables are again captured by the multilateral resistance terms. The lagged values of these terms can be interpreted as changes over time, cf. Baier and Bergstrand (2007).

[10] It can be tested if the assumption of (strict) exogeneity is violated. One can apply a Hausman Test or directly test for strict exogeneity of the EU dummy using FE by including a future value of the regressor (cf. Wooldridge, 2010 p. 325). If the future regressor is statistically significant the assumption of strict exogeneity is violated and FD is more efficient than FE.

[11] FD removes one time period while FE just removes the mean. Therefore FD is closer to a unit root.

[12] We test in our FE regression for strict exogeneity by including a future value of the EU-dummy. However, the estimated coefficient is statistically not significant suggesting that the assumption of strict exogeneity is not violated and FE is more efficient than FD.

3.3 Model specification: Testing different effects of EU integration at the sector level

In addition to estimating the EU effect on total services trade we are interested in determining whether EU integration has a different effect across sectors and how much this effect varies.

To estimate sectoral EU integration effects, we test the following specification:[13]

$$\begin{aligned} ln(X)_{odst} = {} & \beta_0 + \beta_3 lndist_{od} + \beta_4 Contiguity_{od} + \beta_5 language_{od} + \beta_6 Euro_{odt} \\ & + \theta_1 EU - Travel_{odt} + \theta_2 EU - Transport_{odt} + \theta_3 EU - Constr_{odt} \\ & + \theta_4 EU - Insurance_{odt} + \theta_5 EU - Patents_{odt} + \theta_6 EU - Comm_{odt} \\ & + \theta_7 EU - Finance_{odt} + \theta_8 EU - EDV_{odt} + \theta_9 EU - OBS_{odt} \\ & + \theta_{10} EU - Culture_{odt} + \theta_{11} EU - Gov_{odt} + \gamma_{ot} + \gamma_{dt} + \delta_{ods} + \varepsilon_{odst} \end{aligned} \quad 4)$$

The specification is nearly identical to the one we used in the section before. The main exception is with regard to the final 11 interaction terms. They aim to capture the different impact of European integration on the bilateral trade between EU countries in services sectors. For example, $EU - Travel_{odt}$ takes the value of one during the years a country pair trades travel services and both countries are member of the EU and the value of zero otherwise.

In order to test formally whether the effect of EU is the same for each service sector on its intra-European trade volume, we perform the following F-test:

H_0: $\theta_1 = \theta_2 = \theta_3 = \cdots = \theta_{11}$ (H_a: At least one equality does not hold)

If the null hypothesis is substituted into equation 4), equation 4) becomes equation 2). With regard to the EU-dummy, equation 4) is just a restricted version of equation 2), where service trade is not distinguished according to its sector.

The regression results are presented in the following section. To preclude these results, the null hypothesis of the F-test above, is rejected at the 1 per cent level of significance regardless of the estimation procedure. This provides some evidence, that the effect of European integration on services trade differs across services sectors.

[13] See Aristotelous (2006) for using this approach to identify if the effects of the Euro differ between EMU countries.

4. Empirical Evidence for an EU effect on services trade

4.1 Results controlling for endogeneity bias of the EU dummy

We first estimate the standard gravity model as specified in equation 1). Table 3 presents the baseline estimation results using different OLS and FE specifications with regard to the inclusion of time specific effects.

Table 3: Gravity equation using various specifications

	Ols, no effects	Ols, time effects	FE	FE, time effects
$LnGDP_o$	0.665***	0.652***	0.651***	0.494***
	(0.019)	(0.0181)	(0.057)	(0.0894)
$LnGDP_d$	0.624***	0.631***	0.836***	0.811***
	(0.0175)	(0.0170)	(0.052)	(0.0756)
$Ln(dist)_{od}$	-0.573***	-0.572***		
	(0.0539)	(0.0515)		
$Contiguity_{od}$	0.407***	0.408***		
	(0.115)	(0.109)		
$Language_{od}$	1.234***	1.150***		
	(0.143)	(0.136)		
EU_{od}	-0.582***	0.230***	0.006	0.0659**
	(0.047)	(0.0596)	(0.0274)	(0.0311)
$Euro_{od}$	0.283***	0.275***	-0.092***	-0.0834**
	(0.0639)	(0.0622)	(0.0323)	(0.0328)
Constant	-9.430***	-9.064***	-16.181***	-14.02***
	(0.506)	(0.484)	(0.407)	(1.479)
Observations	38115	38115	38115	38115
R-squared	0.357	0.379		
Within R2			0.1806	0.1845
Root MSE	2.14	2.10		
F-test: Time-Effects			F(10,6060)=236.46***	F(10,6060)= 65.64***
Hausman-Test			chi2(4)=434.86***	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The models in Column 1 and 2 show the results for services exports using pooled OLS and OLS with time effects, respectively. In column 1 all variables are highly statistically significant and have the expected signs. Interesting to note, is the very high coefficient of language in contrast to continguity and distance suggesting that language differences are more important than geographic distance for trade in services. The only exception is the variably of interest, the EU dummy, which is negative. The inclusion of time effects turns the sign of the EU dummy in column 2. In addition, the magnitude of the coefficient decreases, indicating that European Integration increases services exports between member countries on average about 26 %.[14] As addressed in the previous section there might be endogeneity problems with

[14] (exp(EU)-1)*100.

the EU dummy variable due to unobserved time-invariant heterogeneity. Also, the F-test of the time dummies reveals that they are statistically significant. Excluding these effects would lead to biased estimation results. Thus, panel methods should be preferred over pooled OLS. As already pointed out, we use the fixed effects estimator although one could also use the random effects or first difference estimator. According to the results of the Hausman-Test we should prefer FE over random effects.

The results are given in columns 3 (without time dummies) and 4 (with time dummies).

The coefficient of the EU dummy is now not statistically significant and has also decreased in magnitude seeming to exert no influence. On the other hand, the Euro coefficient has switched its sign and also decreased in magnitude but it is statistically significant at the 1 % level. In column 4, the EU dummy is again statistically significant at the 5 % level with a positive coefficient. The Euro dummy also keeps its statistically significant coefficient. The results of the two way FE estimator imply that European Integration led on average to an increase of services exports by about 6,8% between member countries while the use of a common currency hints to a decrease of about 8,7 %.

Although the FE estimator is supposed to deal with a potential endogeneity bias between the LHS variable and the EU dummy there remains the possibility that the EU dummy is subject to an omitted variable bias.

There is increasing empirical evidence that progress in information technologies, in particular the internet, improved the tradability of many services (see e.g. Choi, 2010 and Freund and Weinhold, 2002). Additionally, it could be shown that regulations and especially regulatory heterogeneity are barriers for trade in services (see e.g. Kox and Lejour, 2006). Recently, the European Commission has launched its service directive to overcome these trade impediments. Despite of these efforts, member states are very heterogeneous with regard to their ambition to convert the directive into domestic law. Therefore, it is possible that the EU dummy is biased because of omitted trade facilitating technological and political factors. We account for these factors by including a variable for the difference in the number of persons between trading partners who have access to internet $(Internet_{odt})$ and a variable that captures the effectiveness of a government to put new laws into action and provide public services (Gov_{odt}). The results are shown in table 4 using again our preferred two way FE estimator.

Table 4: Gravity equation controlling for regulation and technological progress

	FE time	FE time	FE time
$LnGDP_{ot}$	0.380***	0. 495***	0. 384***
	(0.0898)	(0. 089)	(0. 089)
$LnGDP_{dt}$	0.797***	0. 820***	0. 803***
	(0.078)	(0. 0755)	(0. 078)
EU_{odt}	0.063**	0. 072**	0. 063**
	(0.0314)	(0.0312)	(0. 031)
$Euro_{odt}$	-0. 097***	-0. 0404	-0. 094***
	(0.0367)	(0.0330)	(0. 036)
Gov_{ot}	0. 205***		0. 2029***
	(0. 049)		(0. 049)
Gov_{dt}	0. 028		0. 025
	(0.045)		(0. 044)
$Internetdiff_{odt}$		-0.0127	-0. 0016
		(0. 0011)	(0. 0011)
Constant	-12.89***	-14.139***	-12.97***
	(1.480)	(1.489)	(1.477)
Observations	37293	38115	37293
Within R2	0.17	0.1846	0.173

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Controlling for technology and political factors does not change the signs or the magnitude of the EU and Euro coefficients very much. Both variables remain statistically significant on a 5 or at least 10% level. Nevertheless, the inclusion of these factors leads to a slight decline in the significance level of the EU dummy. This might suggest that positive EU effects for services trade are correlated with the effectiveness of governments to adopt directives that open services markets and provide services. However, only the government effectiveness in the exporting country has a very strong positive effect on service exports while the government effectiveness in the partner country has a positive but not significant influence.[15] One reason for the high coefficient of the exporting country might be again that it captures a countries ability (and willingness) to implement service trade regarding directives into national law which is essential for the integration of services markets. Interestingly, in contrast to other studies, progress in information technologies, measured by the difference of internet users across county pairs, seems to have no influence on services trade between

[15] If one looks at the determinants of services imports. Government effectiveness of the partner country is statistically significant while it insignificant in the reporting country.

European Countries. This is a puzzling result since anecdotic as well as empirical evidence hints to a trade improving influence.[16]

The next section provides the results for a theoretically implementation of a gravity model in a panel setting.

4.2 Estimation controlling for endogeneity bias and multilateral resistance terms

The following table presents the results for estimations that control first for multilateral resistances and second for a potential endogeneity bias. The Results in column (1) are estimated using OLS which does not correct for endogeneity bias while column (2) shows our preferred FE specification.

Table 5: Results theory derived gravity equation

	OLS	FE	FD
$Ln(dist)_{od}$	-0.844***		
	(0.056)		
$Contiguity_{od}$	0.509***		
	(0.107)		
$Language_{od}$	0.228*		
	(0.139)		
EU_{odt}	1.520***	0.431***	0.173**
	(0.155)	(0.087)	(0.086)
$Euro_{odt}$	0.008	-0.124**	-0.065
	(0.220)	(0.052)	(0.058)
Constant	7. 550***	1.146***	
	(0.402)	(0. 087)	
Observations	38115	38115	30503
GeoYear	Yes	Yes	Yes
PartnerYear	Yes	Yes	Yes
R-squared	0.48		0.0809
Within R2		0.22	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As a robustness check, column (3) presents results using FD estimation. While controlling for multilateral resistance terms does not lead to a change in the signs of the coefficients it increases the coefficients in magnitude. In the OLS regression, where the EU dummy is now highly significant, the single market leads ceteris paribus to an increase of intra-EU services exports of about 357 % while the use of a common currency has no effect. In the preferred FE

[16] One explanation may lay in the considered sample selection. The trading partners in our sample consist of EU and OECD countries, while e.g. Choi (2010) considered trade with the rest of the world. Thus, our internet variable should contain less variation across trading partners than his internet covariate.

specification the Euro dummy turns negative and statistically significant while the EU dummy remains highly significant. According to this result the single market should -all other things equal- increase intra-European services exports by about 51 %. The results of the first difference specification support them. The Euro und EU dummies don´t change their signs although the EU dummy looses some of its statistical significance and the magnitude of the coefficients decreases. An increase in the magnitude of the EU coefficient after controlling for multilateral resistance terms has also been observed by Baier and Bergstrand (2007).

They note that earlier studies about trade agreement effects always understate the (positive) integration effect because of the wrong specification of multilateral resistance terms. Another possible explanation for the high magnitude of the EU coefficient may lay in the still relatively low level of services trade as well as the remaining high natural and unnatural trade impediments for services. At the EU government level, true efforts to recognize and abolish trade barriers for services have only started recently. It can therefore be expected, that a minimal improvement or deepening of European Integration has a huge effect on intra-European services trade.

However, one can also expect that the EU-effect will differ between service sectors since recent political efforts have focused on the prominent category of business services. In addition, one would await positive effects for travel as tourism and the easy movement of (private) persons between European members countries have been promoted since the beginning of the integration process. One the other hand, it is questionable if European integration has sizeable effects for e.g. construction services since trade in this sector depends heavily on the freedom of movement of low and medium skilled people which has been a sensitive political topic at the time of the EU eastern enlargement.

4.3 Results: Evidence for EU integrations effects at the sector level

4.3.1 Average Effects of EU integration at the sector level between 2000 and 2010

In the present section we present the results of an EU effect on sectoral service exports. Moreover, we test whether the EU effect differs between services sectors. Table 6 gives the results.

Table 6: Gravity equation and sectoral EU effects

	Ln(export) FE, time effects	Ln(export) FE	Ln(export) FD
$LnGDP_{ot}$	0.466***		
	(0.0881)		
$LnGDP_{dt}$	0.816***		
	(0.0732)		
$Euro_{odt}$	-0.0886***	-0.111**	-0.065
	(0.0327)	(0.0511)	(0.0579)
EU_constr	-0.218	0. 077	0.321**
	(0.139)	(0.158)	(0.159)
EU_EDV	0.434***	0.704***	0.307*
	(0.0923)	(0.128)	(0.159)
EU_FIN	-0.200	0.079	0.196
	(0.149)	(0.165)	(0.175)
EU_Comm	-0.0233	0.254**	0.064
	(0.101)	(0.127)	(0.129)
EU_Culture	-0.477***	-0.165	0.140
	(0.109)	(0.133)	(0.183)
EU_OBS	0.343***	0.634***	0.341**
	(0.0707)	(0.106)	(0.151)
EU_Patents	-0.0945	0.179	0.017
	(0.111)	(0.135)	(0.195)
EU_Gov	-0.881***	-0.620***	-0.006
	(0.177)	(0.167)	(0.155)
EU_Travel	0.201***	0.503***	0.195**
	(0.0461)	(0.0891)	(0.091)
EU_Transport	0.232***	0.471***	0.147
	(0.0450)	(0.0898)	(0.091)
EU_Insurance	0.0494	0.341**	0.354
	(0.135)	(0.160)	(0.253)
Constant	-13.52***	1.241***	
	(1.449)	(0.0871)	
GeoYear	No	Yes	Yes
PartnerYear	No	Yes	Yes
Observations	38115	38115	30503
R-squared	0.072	0.236 (within)	0.0758
F-Test code	F(10,6060)=10.85***	F=11.56***	F(11,5671) = 1.20

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Column 1 uses the FE estimator but does not uses time-varying country and partner dummies. This is done in column 2 which are our preferred results. Column 3 gives results of the FD estimation. As previously explained it is used as a robustness check.

Results in column 1 suggest a different impact of European Integration between sectoral services exports. The single market seems to have a very high impact on EDV and OBS exports. European Integration leads on average to higher exports between member states of about 54 % and 41 %, respectively. Positive but smaller effects can be found for Travel and Transport. On the other hand, European Integration seems to lead to a decrease of cultural and government service exports. All coefficients are highly significant at the 1 % level. Controlling for multilateral resistance terms with time varying country and partner dummies leads to some changes in the results as column 2 shows. EDV, Travel, OBS and Transport remain statistically significant but the magnitude of the coefficients has increased. For example, European Integration leads now, ceteris paribus, to an increase of OBS exports between EU countries of 89 %. Additionally, the coefficients of Insurance and Communication services are now statistically significant and also suggest a positive effect of European Integration. On the other hand, the negative coefficient of cultural services is no longer statistically significant.

The estimation with FD leads to a decrease of the significance level in almost all coefficients. Only the coefficients of OBS and Travel remain statistically significant at the 5 % level while EDV is only statistically significant at the 10 % level. The magnitude of almost all coefficients also drastically decreases by about 50 %. In terms of significance, construction exports are an exception. Using FD the positive coefficient is significant at the 10 % level. One explanation may be the high seasonal time dependence of these exports. Construction services are mostly provided during summer months.

Summarizing the results of all specifications, we conclude that EDV, OBS and Travel exports are most likely affected by European Integration in a positive way. These three coefficients are robust to the estimation method and remain statistically significant. In addition, the performed F-test clearly rejects the null hypothesis that European Integration has the same effect on all considered services sectors at the 1% significance level. It seems European Integration has mostly benefited those intra-European sectoral services exports where have been always low trade barriers (travel), which can be considered complementary to or facilitating goods trade (EDV services and transport) or where have been implemented major initiatives to abolish trade impediments recently (business services).

4.3.2 Evolution of sectoral EU integration effects between 2000 and 2010

Although we have shown that travel, OBS and EDV and transport services have been affected the most by European Integration in recent years, it would be interesting to see how these effects evolved over time. For example, trade in OBS is hindered by many regulatory differences between member countries. Starting with the service directive in 2006 the EU commission has begun to abolish these trade impediments. However, member states had to transpose this directive into national law just until the end of 2009. Since our data coverage ends in 2010 it is arguable whether we can truly predict the effects of EU integration on business services trade. To follow the sectoral integration effect over time would therefore give some insights whether just the anticipation of further integration, i.e. the expected launch of the services directive, or the integration itself causes higher trade and whether these effects increase over time.

To show this, we have broken down the sectoral EU dummies into yearly sectoral EU dummy variables replacing the original EU dummies.[17] In other words, we have re-estimated the theory consistent gravity-model controlling for time-varying multilateral resistance terms using the FE estimator which includes now each sectoral EU dummy multiplied with 11 time dummies.

Table 7 presents the results for the evolution of OBS, Travel, Transport and EDV services which are significant in both the FE and FD estimations.[18] Note that all estimated non-significant coefficients are graphed as zero.

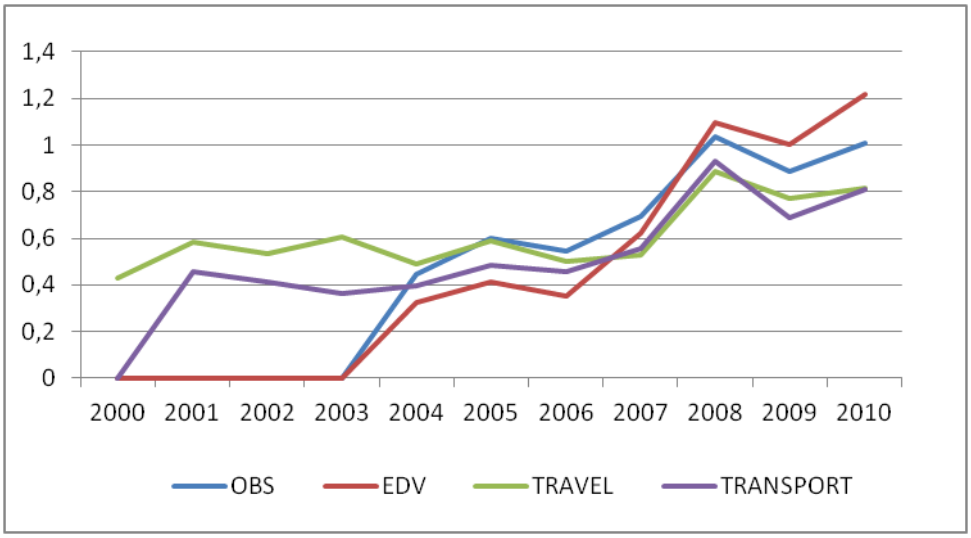
In the case of OBS, the effect of EU integration on intra EU-trade is in line with what one would expect due to the increased political attention. Interestingly, one can see first a significant EU effect in 2004, when the first version of the Service Directive ("Bolkestein directive") was discussed.[19] The influence was strongest in 2005 and equal to the integration effect for travel services. The EU effect has slightly decreased in 2006 indicating that the launch of the service directive seems not to have a huge trade improving influence. One reason for this may be that the Bolkestein directive has been much more ambitious in terms of scope and depth than the launched service directive. The anticipated trade improving effects were started to be realized with the expectation of the Bolkestein directive and have been somewhat lessened due the launched less ambitious service directive.

[17] We follow Carrere (2006) with this approach to track the evolution of the EU dummy over time.

[18] We have included Transport because it just misses the 10% significance level in the FD estimation with a P-Value of 0.105.

[19] One explanation for this strong effect may be found in the data availability: The OBS and EDV coefficients were dropped due to collinearity problems in the years 2000, 2002 and 2003. According to the data analysis in section 2 are these the years where only a fraction of observations are available.

Table 7: Evolution of sectoral EU dummies over 2000 – 2010



Afterwards, the effect has increased until 2008 and again declined in 2009 which can largely be explained by the fact that EU countries had time to transpose the directive into national law until the end of 2009.[20] Several associations accompanied and evaluated the progress of this process. They mentioned in their reports that not all countries would adopt the directive in time (see e.g. Eurochambers, 2010). At the end of 2009 just around 50 % of the EU countries had successfully implemented the directive which would explain the slight decrease. Most other countries followed in 2010 which can explain the renewed upwards trend of the coefficient.

According to the results in table 6, EU integration has a steadily increasing influence on intra-EU trade in EDV services starting in 2004. The trade facilitating effect of EDV services on other services as well as on merchandise trade seems to be one explanation why there has been given so much attention to this sector since 2004. While also covered by the services directive investing in information and communication technologies has been an integral part of the EU2020 strategy or the "KMU strategy" to improve competitiveness in the EU (see e.g. EC 2010). This multitude of political efforts may explain to a certain degree why EU integration has benefited EDV services trade much more than trade in OBS, recently.

The effect of EU-integration on intra-EU trade in travel and transport follows largely the same pattern. Until 2004 the EU effect had been strongest in these two sectors, reflecting the fact that there are already almost no trade restrictions in the single market. Especially trade in transport services is already liberalized since it is covered in the treaty of Rome. Furthermore, the high EU coefficients in 2005 may reflect the anticipated positive trade effects of the EU

[20] A second and most likely explanation may be the economic crisis in 2008/2009. All considered service sectors in the table follow the same pattern during this time. As business service are used frequently as intermediate inputs one may expect certain complementarities to trade in goods.

enlargement in 2004 which would result in more trade in transport services and also more opportunities for trade in travel services. Since then, both EU effects have been steadily increased reaching their peak in 2008 albeit slower than for EDV and OBS and then rapidly declining in 2009. The peak can be attributed to effects realized by the second east enlargement (Bulgaria and Romania) and some indirect effects due to the service directive. The reason for the decline in 2009 may be found in the economic crisis. Trade in transport services is directly linked to merchandise trade and trade in travel services, i.e. tourism can be expected to decrease in a recession which is characterized by high unemployment.

Overall, the depicted patterns of the sectoral EU coefficients are largely consistent with observed political and economic developments in the covered time period. Due to the recent high political attention we observe the highest EU effects for intra-European exports of EDV and OBS services. Although on a slightly lower level EU integration - mostly in the form of recent EU enlargements - has also contributed to an increase of intra-European exports of travel and transport services.

5. Conclusion

This paper contributes to the existing literature about the effects of EU integration on services trade in several ways. First, our results support results of existing studies in finding a significant positive effect of European Integration on intra-European services exports. Controlling for a possibly endogeneity of the EU-dummy and multilateral resistance terms our results suggest total services exports have increased due to the single market by about 51 %. Furthermore, we look at the link between European Integration and sectoral services exports. We find evidence that European Integration has affected services sectors differently. At the sectoral level, travel, EDV and business services exports seem to have increased the most due to European Integration. Analyzing the evolvement of the sectoral EU-effects over time shows that exports of EDV and OBS have steadily increased due to European integration starting in 2004 and have been affected the most since 2006/2007. This observation provides some evidence that the increased political attention resulting in the service directive and the EU2020 strategy has led to a deepening integration of the single market for EDV and business services.

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