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Is there an economic rationale for leaving or joining the EU? Evidence from a political economy framework

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Abstract

Over the past few years, European Citizens have become increasingly skeptical of the EU and its institutions. The recent Brexit is a striking illustration of this trend. This questions the rationale and the relevance of European Integration. In this paper, we rely on the median voter approach to identify the driving forces behind the binary choice of economic integration in the EU and to estimate the relevance of such integration for the EU as a whole and for each country pair. Our model is based on the political-economy framework while it also accounts for recent developments such as the interdependence effects (Baier et al. 2014) and imperfect competition (Baier and Bergstrand, 2004). From this theoretical basis, we develop a conditional fixed-effect logit model. The model relates the relative utility for economic integration to various observables, such as differences of countries in factor endowments and technology, to estimate the likelihood of economic integration in the EU. Our database includes the partners of all effective economic integration agreements in the world, i.e. 105 countries (10,920 country pairs), from 1981-2013. Results show that the probability for economic integration in Europe overall is equal to 82.6%. It is even greater for most Western EU countries and most country pairs. Thus, these results suggest that economic integration is generally very relevant for EU countries, including Great Britain.

This paper corresponds to an independent research which does not necessarily reflect the views of the NBC and the University of Toulon. We are grateful to two anonymous referees for very helpful comments.
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1. Introduction

In recent years, European Citizens have become increasingly skeptical of the relevance of the EU and its institutions. For example, in a recent survey (European Commission 2014), 56% of EU citizens state that they are not confident in the EU. In comparison, these skeptical citizens represented only 32% in 2007. At the same time, several countries have raised the question of leaving the EU, especially during their national elections. The most striking example remains Great Britain, whose citizens voted for the Brexit referendum on June 23, 2016. While no other country has voted yet for an exit, several countries have proposed such consideration, including France during its recent election in May 2017 and Greece during the sovereign debt crisis of 2010.

The goal of this paper is to evaluate the relevance of European integration as a whole and for each separate country pair. Although there is an extensive literature focusing on the effects of the EU (effects on trade, welfare, inequality, etc…),[1] the economic relevance of such integration has only been nominally investigated. This paper aims to fill this lack of literature. For that purpose, we rely on the political-economy framework suggested by Levy (1997), to propose an empirical model identifying the driving forces behind the binary choice of economic integration in a world trade model and then evaluate European integration with respect to the model. This framework is enlarged so as to test for interdependence effects (Baier *et al.* 2014) as well as imperfect competition factors (Baier and Bergstrand 2004), as emphasized in recent works. This makes an additional contribution of this paper.

From this theoretical basis, we develop a conditional fixed-effect logit model that relates the relative utility of economic integration to various observables, such as differences of countries in factor endowments and technology, in order to estimate the likelihood of economic integration in the EU. Our database includes the partners of all effective economic integration agreements in the world, i.e., 105 countries (10,920 country-pairs), from 1981-2013. This corresponds to our reference countries' framework, which makes it possible to calculate the probability for any EU country to remain in the EU.[2]

This article is constructed as follows. Section 2 presents the theoretical framework and derives the empirical equation to be estimated, with the description of data, sources and estimation procedures. Section 3 discusses the results, while the final section (Section 4) discusses policy implications with respect to the results.

2. The model

The model proposed herein is partially relying on Levy (1997)'s political-economy framework based on the median voter approach. In addition, our model includes an enlarged set of variables, especially gravity variables as well as interdependence variables suggested by Baier *et al.* (2014). In a differentiated product framework (Baier and Bergstrand 2004), it is assumed that countries only differ in their factor endowments, which provide an income I. There are two industries: one for homogenous products with constant returns to scale and the other for

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[1] For a survey, refer to Péridy and Roux (2012).

[2] The database used in this paper is an extraction of various international data available in WDI, ILO, CEPII as well as specific data on the Productivity Capability Index created by the authors at the University of Toulon (LEAD, http://lead.univ-tln.fr/bdd.php). Additional information is provided in Tables 1 and 2. The 105 countries are chosen so as to cover more than 90% of world trade while ensuring that the corresponding data are reliable and available for all variables in these countries.

differentiated products with a total number of n varieties and increasing returns to scale. Next, we consider that agents can be represented by identical utility functions U with σ as the constant cross-price elasticity of substitution between varieties, which are sold at equilibrium price p.

Under the above conditions, the relative utility of a median voter agent for an economic integration (EI) versus autarky (AUT) is given by the following (Levy 1997):

$$\frac{U_i^{EI}}{U_i^{AUT}} = \left(\frac{I_i^{EI}}{I_i^{AUT}}\right)\left(\frac{p^{EI}}{p^{AUT}}\right)^{-\alpha}\left(\frac{n^{EI}}{n^{AUT}}\right)^{\alpha/(\sigma-1)} \qquad (1)$$

where α is the share parameter in the utility function.[3]

Based on the median voter approach, a given country will implement an economic integration (e.g. a Free Trade Area, FTA) if the EI leads to an increase in its utility, i.e., $\frac{U_i^{EI}}{U_i^{AUT}} > 1$. This will occur in the event of a rise in income, i.e., $\left(\frac{I_i^{EI}}{I_i^{AUT}}\right) > 1$, a decrease in prices (terms of trade effect), i.e., $\left(\frac{p^{EI}}{p^{AUT}}\right) < 1$ or an increase in the number of varieties available, i.e., $\left(\frac{n^{EI}}{n^{AUT}}\right) > 1$. The EI condition is also represented by $logU^{EI}$-$logU^{AUT} > 0$. At this stage, it is worth mentioning that the Levy model (1997) is similar to that of Baldwin and Venables (1995), which analyses welfare effects of FTAs in imperfect competition.

Before estimating equation (1), we must take into account the bilateralism. Bilateralism implies that a free trade agreement is only implemented (between i and j) if it is beneficial to both concerned parties, i.e., $\frac{U_i^{FTA}}{U_i^{AUT}} > 1$ and $\frac{U_j^{FTA}}{U_j^{AUT}} > 1$. To this end, the forthcoming FTA should demonstrate significant potential to increase income, reduce prices and/or raise the number of varieties for the two partner countries as modeled by Equation (1). In line with international trade theories including the gravity model's literature, this potential could be represented by observable variables such as differences between countries in factor endowments and technology, trade costs and economies of scale (market size).[4] A detailed description is given following empirical equation (2).

$$FTA_{ijt} = \beta_o + \beta_1(ln\,DTEC_{ijt}) + \beta_2(lnDWAGE_{ijt}) + \beta_3(lnDRENT_{ijt}) + \beta_4(lnSCOMP_{ijt}) + \beta_5(lnDIST_{ij}) + \beta_6(CONT_{ij}) + \beta_7(LANG_{ij}) + \gamma_i + \delta_j + \theta_t + \varepsilon_{ijt}, \qquad (2)$$

This empirical model relates to the theoretical equation (1) by first taking into account the determinants of income, i.e., factor endowments as well as the number of varieties and prices. To avoid data scarcity of factor endowments, we use factor rewards, which we assume to be negatively related to factor endowments. In this regard, $DWAGE_{ijt}$ reflects the difference in wages between country i and j at time t. The difference in the rate of reward for capital

[3] Levy (1997) assumes that the production function for the differentiated good is homothetic. Liu (2006) shows that under the homotheticity condition, the profit maximization condition (MC=MR) and the free-entry condition (p=AC) result in no solution for the assumed differentiated good. Liu however demonstrates that the underlying condition of the homotheticity is not necessary for the homotheticity assumption of the Cobb-Douglas production function for differentiated goods. As a result, the Levy's modeling should be seen with the corrections provided by Liu (2006). The authors are thankful of the anonymous referee to raise this point.

[4] For completing the list of these observables, we also got inspired by the abundant literature on the gravity model. For a recent survey on this literature, please, refer to Kabir *et al.* (2017). We also mention throughout the text other references to this literature when required.

($DRENT_{ijt}$) is proxied by the rental rate of capital. We can expect that the greater the difference in factor rewards between two countries, the lower the probability of implementing an EI (e.g. FTA). This phenomenon can be justified by the Viner theory, which states that FTA establishment is more beneficial when occurring between similar countries.

$DTEC_{ijt}$ measures the productivity difference between countries *i* and *j* at *t*, based on an extension of the productivity capability index developed by Archibugi and Coco (2004). It is calculated as an unweighted index of three variables, i.e., technology-creation index, technology-infrastructure index and human skill index. Each variable is calculated by considering several variables described in Table 2. Overall, ten variables are included in the calculation of the global index. We expect that the greater the productivity difference between two countries, the lower the likelihood for an EI (e.g. FTA), once again according to the Viner theory.

The number of varieties is measured as the sum of the number of companies (size variable) or alternatively by the sum of GDP in countries *i* and *j*. Indeed, in accordance with the New Trade Theory of regional integration (Baldwin and Venables 1995), it is expected that the greater the size of two countries, the more likely that they create an EI (e.g. FTA) in order to benefit from an increase in the number of available varieties.

In the gravity model literature, GDP has been similarly seen as a pro-trade factor (Bergstrand 1989). However, the impact of the difference in factor endowments is mixed in the literature. Usually, the impact is negative on intra-industry trade but positive in the case of inter-industry trade (Helpman and Krugman 1985). The negative impact, expected above, is justified because the similarity of countries in factor endowments implies an increased trade in the differentiated goods sector that leads to an increased trade volume.

$DIST_{ij}$, $CONT_{ij}$ and $LANG_{ij}$ represent distance, contiguity and difference in languages respectively. These are traditional trade cost variables, which reflect the price variable in equation (1). In this respect, the higher the cost of trade, the lower the probability of reducing prices through creation of an FTA. Bilateral distance is measured with a spatially weighted index that takes into account the geographical distribution of the population, as developed by Cepii (Dist Database). Correspondingly, we expect its coefficient to be negative. $CONT_{ij}$ and $LANG_{ij}$ are dummy variables that take the value of 1 for common border and language respectively, and 0 otherwise. We expect a positive sign for these last two variables. Note that our expectations for these last three variables are similar to the literature on gravity models which generally estimates more trade among closer countries (in terms of physical and cultural distance). Finally, $\gamma_i + \delta_j + \theta_t$ denote country and time-specific effects in an effort to encapsulate potentially omitted variables.

As a sensitivity analysis, we also propose an extended version of the model:

$$FTA_{ijt} = \beta_o + \beta_1(ln\,DTEC_{ijt}) + \beta_2(lnDWAGE_{ijt}) + \beta_3(lnDRENT_{ijt}) + \beta_4(lnSCOMP_{ijt}) + \beta_5(lnDIST_{ij}) + \beta_6(CONT_{ij}) + \beta_7(LANG_{ij}) + \beta_8(MDIST_{ij}) + \beta_9(MEI_i) + \beta_{10}(MEI_j) + \beta_{11}(ROWEI_{ij}) + \gamma_i + \delta_j + \theta_t + \varepsilon_{ijt}, \quad (3)$$

This extension first includes several multilateral variables, as presented in Baier *et al.* (2014). In addition to the variables previously defined, $MDIST_{ij}$ accounts for multilateral distance. It is measured as the sum of the distance between country *i* and all its partners, and between country *j* and all its partners:

$$MDIST_{ij} = \frac{1}{2N}\left(\sum_{k=1}^{N} DIST_{ik} + \sum_{k=1}^{N} DIST_{jk}\right)$$

In other words, $MDIST_{ij}$ measures the distance between these countries and the rest of the world as a proxy for remoteness. We can expect that the greater the multilateral distance, the smaller the relative bilateral distance between *i* and *j,* and thus the greater the probability of these two countries creating an EI (a positive sign is expected).

Three additional multilateral variables are included as described in Baier *et al.* (2014). This makes it possible to test the role of multilateral EI on the likelihood of the creation of an EI between two partners *i* and *j*. The first two correspond to *own-EI*:

$$MEI_{i,t-5} = \sum_{k \neq j}^{N} EI_{ik,t-5}$$

$$MEI_{j,t-5} = \sum_{k \neq i}^{N} EI_{jk,t-5}$$

where $MEI_{i,t-5}$ is a multilateral index of country i's EIs with every other country (non j) lagged 5 years (to prevent endogeneity). $EI_{ik,t-5}$ is a dummy variable equal to 1 if *i* and *k* have an EI in year t-5 and 0 otherwise. A similar definition can be given for $MEI_{j,t-5}$. It is expected that the higher the multilateral EI, the more likely a bilateral EI between *i* and *j* (Baier *et al.* 2014). The third variable corresponds to *cross-EI* effects:

$$ROWEI_{ij,t-5} = \sum_{k \neq i,j}^{N} \sum_{l \neq i,j}^{N} EI_{kl,t-5}$$

We expect that a cross-EI has a positive effect on establishing an EI between *i* and *j*.

The list of variables including their expected signs and data sources is provided in Table 1. Table 2 details the components of the productivity capability index used to construct the variable $DTEC_{ijt}$ for the model.

Table 1: Expected sign and sources for the variables

Variable	Name	Expected sign	Source
Difference in technology	DTEC	-	refer to Table 2
Difference in wages	DWAGE	-	ILO Global Wage Database (2014)
Difference in rental rate of capital	DRENT	-	WDI (World Dev. Indicators)
Sum of GDP	SGDP	+	WDI (constant 2005 US$)
Sum of the number of companies	SCOMP	+	WDI
Distance	DIST	-	CEPII: Geodist database
Contiguity	CONT	+	CEPII: Geodist database
Common Language	LANG	+	CEPII: Geodist database
Multilateral distance	MDIST	+	CEPII: Geodist database
Multilateral own FTA for i	MEIi	+	own calculation
Multilateral own FTA for j	MEIj	+	own calculation
cross-FTA	ROWEI	+	own calculation
Difference in GDP	DGDP	-	WDI (constant 2005 US$)

Table 2: The Productivity Capability Index

Name	Component indicators	Sources of data
Technology-Creation Index	1) Number of patent grants per 1 million people 2) Number of publications in scientific and technical journals per 1 million people	World Intellectual Property Organization, World Bank (WDI)
Technology-Infrastructure Index	3) Fixed broadband Internet subscribers per 100 people 4) Telephone fixed-lines per 100 people 5) Mobile cellular subscriptions per 100 people 6) Electric power consumption (kWh per capita)	World Bank (WDI)
Human-Skill Index	7) Literacy rate, adult total (% of people ages 15 and above) 8) Enrolment in tertiary education per 100,000 inhabitants 9) Mean years of schooling of adults	World Bank (WDI) United Nations Educational, Scientific and Cultural Organization (UNESCO) United Nations Development Programme (UNDP)
Productivity Capability Index	10) Technology Creation Index 11) Technology Infrastructure Index 12) Human Skill Index	--

3. Estimation

The empirical equation (2) and the extended version (3) should be estimated using limited dependent variable models, such as panel probit or panel logit, that are based on the maximum likelihood (ML) procedure. In addition, the presence of country and time fixed-effects in the model suggests the application of fixed-effect estimators. The model, however, contains a much larger number of country pairs (panel ID: 105*105=11025) compared to time periods (33 years: 1981-2013); in this case (large N versus small T), the ML estimation of fixed effects would be subject to serious inconsistency unless employed with conditions on the fixed effects (conditional ML method). Such conditioning is only possible under logistic regression (for details, see Maddala 1987 or Verbeek 2004). Consequently, we rely on a panel fixed-effects logit regression for the estimation of equations (2) and (3), although the estimates from a panel fixed-effects probit model have been also provided for comparison.

In order to address the multicollinearity bias in the variables, we use them in an "orthogonalized" scale. This allows us to make the variables mathematically independent and consequently to obtain the net effect of each one on the EI binary-choice variable. However, the method does not significantly affect the fitted measures (estimated probabilities) from the model.

The results are displayed in Table 3. The standard model in panel logit (1) clearly shows that the probability of joining an EI area is negatively related to factor rewards, suggesting that an EI is generally established between similar countries. In addition, the number of varieties, proxied by the sum of the number of companies, is positively related to the probability of creating an EI. This finding implies that EI generally involves large countries. This result remains robust if the variable is replaced by the sum of GDP (column (5)). The sign of distance and other trade costs is negative, denoting a preference for geographically proximate partners with similar languages. Finally, the sign of differences in technology is negative, as expected by the new trade theory, indicating that partners prefer joining EIs where only small technological differences exist across countries.

Our results are consistent with trade theories of economic integration, which indicate that the gross trade creation of EI areas is greater if partners are similar in terms of factor endowments and technology (Viner theory), if the area has a significant size (New Trade Theory) and if the bilateral relative trade costs are low (local CA). Interestingly, the multilateral variables are also significant and exhibit the expected signs. This means that an increase in multilateral distance or multilateral EI reinforces the probability of creating an integrated area for bilateral partners in the EU.

Column (2) displays the calculated marginal effects based on the estimates provided in Column (1). To interpret these results, we can, for example, assume that a one-percent increase in technological differences between two countries reduces the probability of a bilateral EI between them by 0.52 percent, according to the marginal effect of *DTEC*.

For the purpose of comparison, Column (3) estimates the model without country and time effects. Interestingly, the estimated coefficients remain stable in sign following this exclusion.

The next 8 columns in Table 3 evaluate the sensitivity of our main estimates to modifications in data, model specification or estimator. The first sensitivity test (Column 4) includes the correction for the temporal-dependence bias as suggested by Liu (2008). This bias arises from the fact that once a country pair establishes an EI agreement, e.g. FTA, the dependent variable changes from the value 0 to 1, but can never return to the value 0. Such a bias can be corrected by removing the observations from the year after the creation of the FTA (Liu 2008). In this case, if an FTA is established, only the first observation where FTA=1 is kept. This method also addresses the endogeneity problem due to the impact of post-FTA trade on factor rewards in our model. However, one drawback of this method is that it greatly increases the proportion of FTA values equal to 0 as compared with values equal to 1, while significantly reducing the number of observations. Column (4) provides the Liu-based estimates. They are relatively different from our previous results in column (1), but provide the same sign and significance level. This consistency in sign makes us more confident about the direction of effects in the model. However, the explanatory power from column (1) is much higher than suggested by column (4): Pseudo-R2=59% versus Pseudo-R2=19%. This superiority provides us a reason to favor the original model over the Liu-based model. This choice is justified by the fact that our main objective in here is predicting future FTA (and Non-FTA) events and so the predictive power of the model counts a lot for us.

Correspondingly, columns 5 to 11 provide other sensitivity tests by replacing some of the independent variables with their alternatives (columns 5-8), including multilateral variables (columns 9-10) as suggested by Baier *et al.* (2014), and using an alternative estimator: probit model (column 11). Overall, the estimates from these last columns are similar in sign, magnitude, and significance level to the outcomes we obtained based on our initial model in column (1). This increases our confidence in the robustness of our results in columns (1) and (2).

We rely now on the estimated model (2), using our estimates in Column (1) of Table 3, to calculate the probability of creating an EI area for all country pairs in our database. The calculated probability matrix is given in Table 4. In order to remove insignificant temporal variations, we report the average values from the last 5 years, i.e., 2009-2013. As a remark, the averaged probabilities range within the full scale [0,1]. We also calculated the average probability (weighted by GDP) for each country to implement an economic integration area with other European countries.

Table 3: Estimation results

		(1)	*(2)*	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Dependent variable		**FTA**	***Marginal effects***	**FTA**	**FTA-Liu**	**FTA**	**FTA**	**FTA**	**FTA**	**FTA**	**FTA**	**FTA**
Difference in technology	DTEC	-0.854***	*-0.0052*	-0.518***	-0.093***	-0.533***	-	-	-	-0.598***	-0.655***	-0.477***
Difference in wages	DWAGE	-0.442***	*-0.0051*	-0.847***	-0.886***	-0.893***	-0.797***	-0.570***	-0.470***	-0.526***	-0.450***	-0.159***
Difference in capital rent	DRENT	-0.371***	*-0.0037*	-0.721***	-0.557***	-0.714***	-0.486***	-0.402***	-0.400***	-0.560***	-0.415***	-0.207***
Sum of companies	SCOMP	0.077**	*0.0016*	0.478***	0.952***	-	0.330***	0.232***	0.264***	0.312***	0.081***	0.003*
Bilateral distance	DIST	-1.771***	*-0.0083*	-1.067***	-0.634***	-1.161***	-1.649***	-1.679***	-1.602***	-1.347***	-1.524***	-0.949***
Contiguity	CONT	0.459***	*0.0031*	0.238***	0.170***	0.222***	0.471***	0.458***	0.447***	0.343***	0.424***	0.242***
Common Language	LANG	0.478***	*0.0047*	0.194***	0.180***	0.211***	0.519***	0.540***	0.532***	0.291***	0.377***	0.266***
Sum of GDP	SGDP					0.725***						
Difference in GDP	DGDP					-0.272***						
Difference in human skills	DHSK						-0.361***					
Difference in infrastructure	DINF							-0.422***				
Difference in tech. creation	DCRE								-0.439***			
Multilateral distance	MDIST									1.710***	3.770***	
Multilateral own FTA for i	MEIi									0.872***	0.031***	
Multilateral own FTA for j	MEIj									0.873***	0.031***	
Cross-FTA	ROWEI									0.0015*	0.0002*	
Constant		-10.09***	-	-3.204***	-4.744***	-15.65***	-10.61***	-10.49***	-11.29***	-10.09***	-41.27***	-5.51***
Number of observations		219,086	*219,086*	270,160	193,405	262,722	219,086	219,086	219,086	229,240	229,240	219,086
Pseudo R2		0.586	-	0.312	0.192	0.319	0.563	0.569	0.576	0.478	0.564	0.579
Country fixed effects		yes	*yes*	no	yes	no	yes	yes	yes	no	yes	yes
Time fixed effects		yes	*yes*	no	yes	no	yes	yes	yes	no	yes	yes

Table 4: Bilateral Probability Matrix (in %)[5]

	AUT	BEL	BGR	HRV	CYP	CZE	DNK	EST	FIN	FRA	DEU	GRC	HUN	IRL	ITA	LVA	LTU	LUX	MLT	NLD	POL	PRT	SVK	SVN	ESP	SWE	GBR	EU
AUT	.	99,5	74,4	96,6	70,0	97,2	98,1	83,8	95,2	98,7	99,2	97,3	95,4	96,3	98,3	81,7	87,7	99,1	84,0	98,0	96,5	96,8	98,2	99,1	97,7	94,0	95,8	**93,4**
BEL	99,5	.	73,5	89,1	69,3	91,8	99,7	91,3	98,5	99,9	100,0	98,1	90,6	99,6	99,2	87,8	88,2	99,9	86,1	100,0	90,6	99,0	88,8	94,3	99,2	98,3	99,9	**93,8**
BGR	74,4	73,5	.	75,3	90,1	55,6	72,7	35,9	54,7	71,2	82,1	97,9	82,6	71,6	90,9	50,5	57,7	70,3	44,3	67,9	66,0	72,4	74,1	61,7	77,8	49,5	54,4	**71,5**
HRV	96,6	89,1	75,3	.	60,6	78,3	82,2	32,6	56,3	86,1	94,7	95,8	87,6	79,2	98,1	47,5	51,5	86,5	48,0	83,5	69,7	80,6	84,7	95,3	84,9	55,9	70,8	**82,6**
CYP	70,0	69,3	90,1	60,6	.	43,4	80,0	44,2	66,1	84,2	73,5	99,4	56,2	82,2	91,2	51,4	57,5	73,7	62,2	69,5	53,6	89,1	60,0	52,0	84,8	62,3	65,2	**73,6**
CZE	97,2	91,8	55,6	78,3	43,4	.	95,5	67,2	79,6	91,9	95,8	87,3	95,0	89,6	95,4	82,2	89,4	96,7	40,2	95,0	95,3	85,9	93,6	94,2	88,3	87,7	84,8	**88,0**
DNK	98,1	99,7	72,7	82,2	80,0	95,5	.	97,4	99,3	99,6	99,8	97,4	93,3	99,4	98,3	97,1	97,7	99,6	82,4	99,9	97,5	98,2	93,5	93,8	98,3	100,0	99,5	**95,2**
EST	83,8	91,3	35,9	32,6	44,2	67,2	97,4	.	99,9	87,7	94,3	89,9	71,1	91,4	88,3	97,8	97,2	90,5	32,5	90,9	83,0	87,9	69,9	87,2	88,5	98,2	84,8	**86,0**
FIN	95,2	98,5	54,7	56,3	66,1	79,6	99,3	99,9	.	97,5	98,1	93,9	76,4	97,7	97,4	98,6	97,2	97,7	86,4	98,1	92,0	95,1	77,1	78,8	97,5	99,3	97,4	**92,8**
FRA	98,7	99,9	71,2	86,1	84,2	91,9	99,6	87,7	97,5	.	99,2	97,6	89,4	99,5	98,9	85,8	87,6	99,8	93,8	99,9	90,5	99,8	92,9	96,4	99,2	97,8	99,8	**81,9**
DEU	99,2	100,0	82,1	94,7	73,5	95,8	99,8	94,3	98,1	99,2	.	98,6	96,2	99,3	99,2	94,9	94,8	99,8	84,7	99,9	92,6	98,2	94,6	97,3	98,7	99,7	99,6	**77,1**
GRC	97,3	98,1	97,9	95,8	99,4	87,3	97,4	89,9	93,9	97,6	98,6	.	96,6	98,8	99,7	88,8	89,7	97,2	97,0	96,9	90,5	98,7	93,4	97,0	99,5	92,9	94,9	**93,3**
HUN	95,4	90,6	82,6	87,6	56,2	95,0	93,3	71,1	76,4	89,4	96,2	96,6	.	87,6	96,3	87,5	91,0	91,0	48,8	90,1	92,7	85,2	98,6	90,8	88,2	79,2	79,1	**87,2**
IRL	96,3	99,6	71,6	79,2	82,2	89,6	99,4	91,4	97,7	99,5	99,3	98,8	87,6	.	99,5	90,3	90,2	99,5	95,6	99,8	91,6	99,6	85,2	92,3	99,8	98,7	99,9	**95,0**
ITA	98,3	99,2	90,9	98,1	91,2	95,4	98,3	88,3	97,4	98,9	99,2	99,7	96,3	99,5	.	87,6	89,1	99,6	99,0	99,1	94,7	99,4	95,7	98,4	99,9	96,8	98,3	**84,7**
LVA	81,7	87,8	50,5	47,5	51,4	82,2	97,1	97,8	98,6	85,8	94,9	88,8	87,5	90,3	87,6	.	99,3	88,7	30,3	90,6	92,1	85,3	74,2	74,1	84,4	97,3	82,9	**85,9**
LTU	87,7	88,2	57,7	51,5	57,5	89,4	97,7	97,2	97,2	87,6	94,8	89,7	91,0	90,2	89,1	99,3	.	89,9	32,3	90,9	88,3	86,1	83,0	77,4	85,4	96,2	82,5	**86,5**
LUX	99,1	99,9	70,3	86,5	73,7	96,7	99,6	90,5	97,7	99,8	99,8	97,2	91,0	99,5	99,6	88,7	89,9	.	91,8	100,0	96,4	99,4	93,0	97,2	99,5	98,8	99,8	**96,6**
MLT	84,0	86,1	44,3	48,0	62,2	40,2	82,4	32,5	86,4	93,8	84,7	97,0	48,8	95,6	99,0	30,3	32,3	91,8	.	85,6	45,3	93,7	41,2	67,1	97,4	76,6	96,4	**84,5**
NLD	98,0	100,0	67,9	83,5	69,5	95,0	99,9	90,9	98,1	99,9	99,9	96,9	90,1	99,8	99,1	90,6	90,9	100,0	85,6	.	94,7	98,7	89,1	94,3	99,2	99,5	99,9	**92,3**
POL	96,5	90,6	66,0	69,7	53,6	95,3	97,5	83,0	92,0	90,5	92,6	90,5	92,7	91,6	94,7	92,1	88,3	96,4	45,3	94,7	.	87,1	97,3	86,4	89,9	94,7	86,2	**84,8**
PRT	96,8	99,0	72,4	80,6	89,1	85,9	98,2	87,9	95,1	99,8	98,2	98,7	85,2	99,6	99,4	85,3	86,1	99,4	93,7	98,7	87,1	.	88,8	94,9	99,9	94,7	99,4	**93,8**
SVK	98,2	88,8	74,1	84,7	60,0	93,6	93,5	69,9	77,1	92,9	94,6	93,4	98,6	85,2	95,7	74,2	83,0	93,0	41,2	89,1	97,3	88,8	.	94,5	88,2	80,3	77,5	**87,6**
SVN	99,1	94,3	61,7	95,3	52,0	94,2	93,8	87,2	78,8	96,4	97,3	97,0	90,8	92,3	98,4	74,2	77,4	97,2	67,1	94,3	86,4	94,9	94,5	.	96,3	84,1	87,1	**91,5**
ESP	97,7	99,2	77,8	84,9	84,8	88,3	98,3	88,5	97,5	99,2	98,7	99,5	88,2	99,8	99,9	84,3	85,3	99,5	97,4	99,2	89,9	99,9	88,2	96,3	.	97,3	99,1	**87,0**
SWE	94,0	98,3	49,5	55,9	62,3	87,7	100,0	98,2	99,3	97,8	99,7	92,9	79,2	98,7	96,8	97,3	96,2	98,8	76,6	99,5	94,7	94,7	80,3	84,1	97,3	.	98,2	**92,4**
GBR	95,8	99,9	54,4	70,8	65,2	84,8	99,5	84,7	97,4	99,8	99,6	94,9	79,1	99,9	98,3	82,9	82,5	99,8	96,4	99,9	86,2	99,4	77,5	87,1	99,1	98,2	.	**82,1**
EU	**93,4**	**93,8**	**71,5**	**82,6**	**73,6**	**88,0**	**95,2**	**86,0**	**92,8**	**81,9**	**77,1**	**93,3**	**87,2**	**95,0**	**84,7**	**85,9**	**86,5**	**96,6**	**84,5**	**92,3**	**84,8**	**93,8**	**87,6**	**91,5**	**87,0**	**92,4**	**82,1**	**82,6**

5

AUT	Austria	BIH	Bosnia	DNK	Denmark	FIN	Finland	GRC	Greece	ITA	Italy	NLD	Netherlands	SVK	Slovakia
BEL	Belgium	CZE	Czech R	ESP	Spain	FRA	France	HRV	Croatia	LVA	Latvia	POL	Poland	SWE	Sweden
BGR	Bulgaria	DEU	German	EU	Europ. U.	GBR	Great Br.	HUN	Hungary	MLT	Malta	PRT	Portugal		

The results show that overall, the probability of establishing an economic integration in the EU is equal to 82.6%, which is quite significant. For some EU countries, this probability is much higher: 96.6% for Luxembourg, 95.2% for Denmark, 95% for Ireland, and more than 92% for many countries, namely Austria, Belgium, Finland, Greece, the Netherlands, Portugal and Sweden. These countries are of an intermediate size, i.e., of similar size to the main EU countries; they generally have an ideal location within the EU (small distance from their main partners); they also display small differences with their partners in terms of technology, factor rewards, productivity and human skills. The biggest EU countries still show a significant probability for EI, which is close to the average (Germany: 77%; France and Great Britain: 82%; Italy: 85%; Spain: 87%). This finding can be explained to a large extent by the presence of greater significant differences with other countries, notably in terms of size. A final group of countries includes those with a below-average probability, i.e., Bulgaria: 71.5% and Cyprus: 73.6%. These countries are disadvantaged in terms of distance, economic development and differences in size (small peripheral countries). However, their probability of having an EI in the EU is still significant. Consequently, these results clearly show that European Integration in the EU is "reasonable", and that there is not any economic rationale for leaving the EU.[6]

The results at the bilateral level are even more interesting. They show, for example, that the probability of economic integration between two big and/or close countries is very close to 100%. For instance, the probability for Great Britain to be integrated with Ireland, the Netherlands and Belgium is equal to 99.9%. This percentage is equal to 99.8% with France and 99.7% with Germany. It is greater than 80% for integration with all other concerned countries except the Slovak republic, Hungary, Cyprus and Bulgaria.

As another example, all bilateral probabilities for economic integration between the EU-15 country pairs (prior to the enlargement to Central and Eastern European countries in 2005) are very close to 100%, e.g. 99.2% between France and Germany.

The only bilateral probabilities below 50% involve generally distant, different and peripheral countries, i.e., Bulgaria-Sweden (49%); Bulgaria-Malta (44%); Croatia-Estonia (32%); Cyprus-Czech Republic (43%); Malta-Latvia (30%), etc. Overall, only 3.3% of all bilateral country pair probabilities are below 50%.

4. Conclusion and policy implications

This paper demonstrates that European integration is very relevant from an economic point of view. Estimating a logistic model and calculating the probability for economic integration in Europe shows that overall, this probability is equal to 82.6%. It is much higher for most Western EU countries with a probability for these country pairs being the highest of those examined (close to 100%).

These results may be explained by the small distance between countries and their similarities in terms of size, labor productivity and factor rewards, technology, infrastructures and human skills. As a consequence, the argument for leaving the EU cannot be supported by this economic analysis.

[6] As mentioned by one of the anonymous referees, these results do not exclude that a European country (like Great Britain or Italy) has other good partners elsewhere in the world (outside the EU). Our model has been estimated using a worldwide database (including 105 EU and non-EU countries). As a result, we expect that the estimated FTA probabilities for any country in the database includes already an implicit comparison of partners across the EU and non-EU blocs. However, we only presented the results for the EU countries as the title in this paper implies.

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