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A TEST OF ENDOGENOUS TRADE BLOC FORMATION THEORY ON EU DATA

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ABSTRACT

A Test of Endogenous Trade Bloc Formation Theory on EU Data*

This paper empirically confronts one explanation of spreading regionalism with the European experience. The domino theory asserts that forming a preferential trade area, or deepening an existing one, produces trade diversion that generates new political-economy forces in third nations as third-nation exporters seek to redress the new discrimination and profit from newly deepened preferences. The pressure increases with the bloc's size yet bloc size depends upon how many nations join, so a single incidence of regionalism may trigger several rounds of membership requests from nations that were previously happy to stay out. We estimate a time-series of EU trade creation and diversion over the last five decades and use these to estimate a model EU membership demands. The results provide broad support for the model and show that trade diversion has a more powerful impact on membership than trade creation.

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Keywords: domino theory of regionalism, endogenous trade bloc formation and EU enlargement

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A test of endogenous trade bloc formation theory on EU data

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Abstract

This paper empirically confronts one explanation of spreading regionalism with the European experience. The domino theory asserts that forming a preferential trade area, or deepening an existing one, produces trade diversion that generates new political-economy forces in third nations as third-nation exporters seek to redress the new discrimination and profit from newly deepened preferences. The pressure increases with the bloc's size yet bloc size depends upon how many nations join, so a single incidence of regionalism may trigger several rounds of membership requests from nations that were previously happy to stay out. We estimate a time-series of EU trade creation and diversion over the last five decades and use these to estimate a model EU membership demands. The results provide broad support for the model and show that trade diversion has a more powerful impact on membership than trade creation.

1. INTRODUCTION

Regional liberalization is sweeping the world trading system like wildfire while the multilateral WTO talks proceed at a glacial pace. This stark contrast between regional and multilateral liberalization raises the question: Why are countries eager to open markets regionally but reluctant to do so multilaterally? Trade policy scholars have proposed a number of explanations for rampant regionalism (Anderson and Blackhurst 1993, Krugman 1993, Bhagwati 1993, Whalley 1996, Lawrence 1996, Bergsten 1996, Panagariya 1996, inter alia). Some of these explanations have been formalized by theorists (Grossman and Helpman 1995, Yi 1996, Ethier 1996, Bond and Syropoulos 1996, Yi 1996, Winters 1996, Levy 1997, Fernandez and Portes 1998, Krishna 1998 Freund 2000, McLaren 2002, and Aghion, Antras and Helpman 2004.). On the empirical side, membership was typically taken as exogenous. Empirical researchers have recently begun to view RTA membership as endogenous and have begun to explore the determinants of membership (Bergstrand and Baier 2004).

The first attempt that empirically looks at factors influencing trade bloc formation seems to be Sapir (1997). He estimates year-by-year cross-section gravity models on European data and finds that trade diversion tends to spike in a time pattern that suggests that trade diversion is driving EU enlargements; he does not estimate a formal model of EU membership bids as we do in this paper. Our paper also differs from his in that we estimate the trade creation and diversion using panel data techniques. The first study on worldwide data is Baier and

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Bergstrand (2004), which looks at the determinants of the probability of two countries forming an RTA. They find that the likelihood of an RTA between a country pair is higher the smaller the distance between them and the farther away they are from the rest of the world. In addition, higher potential gains due to different capital-labour ratios (Heckscher-Ohlin trade) have a positive impact on RTA formation. Mansfield and Reinhardt (2003) offer a more political explanation for RTA formation, arguing that one of the main determinants of regional trade agreements are developments at the multilateral level. In their view, difficulties in GATT/WTO negotiations prompt countries to engage in regionalism. In another study, Wu (2004) shows that democracy and economic freedom have a significant impact and she also finds a positive relationship between trade uncertainty and RTA formation. She argues that globalisation has engendered greater trade uncertainty, which leads countries to conclude RTAs in an attempt to alleviate potential risks in a highly integrated global economy. After determining which of the 158 RTAs are effectively implemented, Holmes (2005) analyses a variety of potential factors influencing RTA formation. Convincing evidence is found that mercantile interests in assuring export market access are a key explanation. This is in line with the idea that RTAs are more likely between countries trading already to a considerable extent with each other.

Our empirical analysis focuses on the domino theory of regionalism using the European Union's five-decade expansion as the testing grounds.² Since the domino theory focuses on the impact of trade diversion and trade creation in determining a nation's decision to join a trade bloc, the first step is to estimate a time series of EU trade creation and trade from the blocs earliest days. The second step is to estimate a model of EU membership using these time series. In other words we try to establish that the size of the EU bloc and its degree of integration have a significant effect on the likelihood of accession. We control for a variety of other potentially significant determinants that were briefly presented above.

The rest of the paper is organized in five sections. The next section, Section 2, briefly reviews the domino theory and delineates a number of testable hypotheses. Section 3 presents the European data along with a historical narrative that asserts that there have been three waves of domino effects in Europe since 1958. Section 4 presents our estimation strategy that allows us to identify the extent of trade diversion and creation in Europe. Section 5 takes these estimates as data in our domino-theory model of EU membership. Section 6 presents our concluding remarks.

2. THEORY

The domino theory starts with a positive model of membership in a preferential trade arrangement (PTA) and proceeds in two stages – the immediate impact of an idiosyncratic deepening of integration in the PTA, and the knock-on impact implied by bloc-enlargement.

² The idea underlying the domino mechanism is an old one. A version can be distilled from Jacob Viner's account of how dozens of German principalities and city-states were cajoled and coerced into joining Prussia's Zollverein (Viner 1950 Chapter V.3). More recently, Whalley (1993) also views Western Hemispheric regionalism as largely defensive (rather than US-led). He, however, focuses on fears of US protectionism instead of trade diversion, and he does not posit a circular causality between bloc size and the strength of inclusionary pressures. Hufbauer (1989) uses the term "FTA magnetism" which captures the first step (idiosyncratic deepening sparks membership requests) but does not relate the strength of the magnetism to the bloc size. The formal model of the domino theory of regionalism was first presented in Baldwin (1993a) which was published as Baldwin (1995). See Baldwin (1994, 1997, 2002, 2006) for applications of it to European, Western Hemisphere and Asian domino effects. Winters (1996) and Lawrence (1996) surveys regionalism and multilateralism models, putting the domino theory in perspective. The first paragraph of this paper is taken verbatim from Baldwin (1993a).

To start with the positive model, the assertion is that a nation's decision to join a PTA is determined by its domestic political equilibrium that balances pro-membership and anti-membership forces. The theory associates the pro-joiners with the nation's exporters that gain from preferential access if the nation joins and suffer from discrimination if the nation stays out. The anti-membership political economy forces are associated with the import-competing industries that would lose from the liberalization that membership would imply as well as non-economic objections to membership that are not observable to the econometrician. Consumers and taxpayers are taken as interest groups of second-order importance for the usual "Olsen's asymmetry" reasons.³

For exporters located in non-members, the size of the trade discrimination and the size of the lost-opportunity trade creation grow with the bloc's size. Thus the pro-membership forces in excluded nations tend to grow as the bloc size expands. This is shown in Figure 1 as the rising EE curve. The model asserts that there are also important non-economic factors affecting a nation's interest in joining. The nations are ordered such that their intrinsic resistance to membership is rising as shown by the RR curve. The RR curve intersects the x-axis since we assume that bloc membership is viewed as having non-economic benefit (i.e. the negative of resistance) in some nations; these nations would join even if there were a mild political economic cost to doing so.

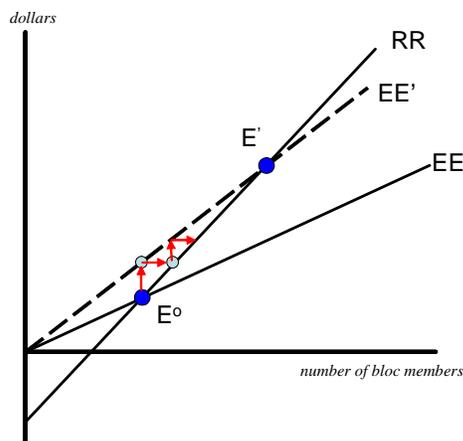


Figure 1: Equilibrium bloc membership

Source: Baldwin (1993a Figure 1).

Given an initial political equilibrium membership in the PTA, point E^0 , an idiosyncratic shock that deepens integration in the PTA generates new political economy forces in non-member nations as non-member exporters now have a greater stake in membership – they face more discrimination if their nation stays out and greater market access if it joins. Anti-membership forces are also strengthened in non-member nations as the liberalization implied by membership is heightened. If the industrial output of export sectors is systematically larger than the output of import-competing sectors (as is usually the case since the export sector produces for both domestic and foreign consumers) and sectors' political power is linked to their size, the shock raises the pro-membership forces more than the anti-membership forces. In the diagram this shows up as a rotation of the EE curve to EE' . For outsiders that were

³ Mancur Olsen argued that consumers were unorganized politically since they were geographically dispersed, many in number and the absolute dollar impact of protection on their well-being was small compared to organization costs.

previously close to indifferent to membership (politically), these changes shift the domestic political economy equilibrium to the pro-joiners camp.

The second stage starts, if one non-member actually does decide to join. The PTA enlargement implies that discrimination facing the remaining non-members expands and this again heightens the pro-membership political economy forces in outsiders, potentially producing a membership application from an outsider that previously found it politically optimal to stay out. The cycle repeats itself until a new political equilibrium membership in the PTA obtains.

If the world were marked by perfect information and synchronized political decision-making periodicity, PTA membership bids would be perfectly coordinated and bloc enlargement would happen in a step-like fashion. Uncertainty, imperfect information and mis-matches of decision timings suggest that the new political economy equilibrium may be reached only gradually with the transition marked by a rash of membership bids.

2.1. *The supply side of PTA membership*

There is no mention of the ‘supply side’ of membership in the domino theory. This is not an omission but rather a strategic choice of the theory, and thus a limitation. Many theorists since Krugman (1993) view the equilibrium bloc size as an exercise in terms-of-trade exploitation, in which case the pure economic interest of the incumbent PTA members must be a key issue on the determination of bloc size. While such considerations may play a role, the domino theory asserts that it is a secondary role that can be ignored for the sake of parsimony. The justification for this bold assumption lies in observation of real-world PTAs. For example, in the case of Europe, which is the focus of the testing in our paper, the European Union is explicitly open to all European nations that meet membership criteria (these have nothing to do with terms of trade effects). Plainly the supply-side of membership plays a more important role in other PTAs around the world. One reason for choosing Europe as the subject of our empirical test is that the demand-side is easily identified; in essence, the supply-curve is perfectly elastic so observed membership bids are naturally ascribed to the demand-side factors that are the domino theory’s focus. See Aghion, Antras and Helpman (2004) for a careful treatment of the supply and demand for membership in a cooperative game theory framework. For other game theoretic foundations, extensions and modifications of endogenous bloc membership, see Bond and Syropoulos (1996), Freund (2000), Yi (1996), McLaren (2002), Levy (1997), and Krishna (1998).

2.2. *Empirically testable implications*

Since this paper is essentially empirical, we do not lay out the formal theory (see Baldwin 1993 for a formal model). We do, however, wish to explicitly formulate implications that should – if the domino theory is right – show up in the data.

The first empirical implication concerns the correlation between deeper integration and membership applications. The domino theory asserts that deeper integration in the EU will trigger membership requests from nations that previously found it politically optimal to stay out. Thus we should observe a correlation between the degree of trade integration and EU enlargements, membership requests.

A second implication is that the initial size of the bloc should interact with the degree of integration in the determining membership. That is to say, a given marginal increase of within bloc integration will trigger more membership requests the larger is the bloc to start with.

The third empirical implication concerns the separate impact of trade diversion and trade creation in determining membership applications. Non-member exporters benefit from tighter economic integration if the nation joins and they lose from discriminatory integration if the nation stays out. Non-member import competing nations, however, will typically lose more from joining the tighter is the degree of integration within the trade bloc. As a consequence, the trade creation and trade diversion may have different effects on membership bids.

3. HISTORICAL NARRATIVE

Discussions on tighter European integration were held in the late 1940s and throughout the 1950s. Britain argued for a broad but shallow integration scheme while ‘the Six’ argued for deep integration whose ultimate aim was political integration. Empirically, European exports to all destinations grew rapidly in the 1950s and not particularly quickly to European destinations. By the end of the decade, trade among the Six was only slightly above its 1928 level.⁴ Thus the commercial logic behind the EEC’s customs union was not particularly compelling, especially for its big members France and Germany. In the year of its creation, the EEC6 did only about 30% of its trade with itself, although the three small Benelux members (Belgium, Netherlands and Luxembourg) sent about half their exports to EEC6 partners. The commercial logic behind the 1960 formation of EFTA was even weaker, as Table 1 shows. With the sole exception of Ireland, who was heavily dependent upon the British market, the EFTA7 sold less than 40% of their exports to other EFTAs; for EFTA’s dominant member – the UK – the figure was just 8%.

Table 1: West European trade dependencies, EEC & EFTA, 1960

	EEC6	EFTA	EEC & EFTA	RoW
Germany	30%	21%	51%	49%
France	30%	10%	40%	72%
Netherlands	46%	21%	67%	59%
Belgium-Lux.	51%	13%	64%	33%
Italy	30%	14%	44%	36%
UK	16%	8%	25%	56%
Sweden	33%	28%	61%	39%
Denmark	29%	39%	67%	33%
Austria	52%	7%	59%	41%
Finland	29%	32%	61%	38%
Ireland	6%	76%	81%	19%
Portugal	22%	19%	40%	60%

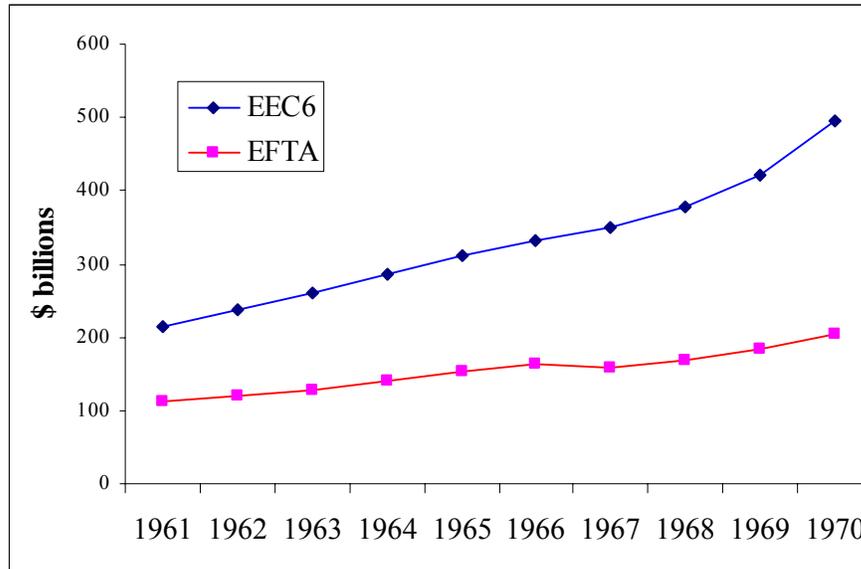
Source: Dorrucchi, E., S. Firpo, M. Fratzscher, and FP Mongelli (2003).

The two camps parted company in 1957 when the Six signed the Treaty of Rome (the EEC’s founding document). Britain led the remaining West European nations into an alternative trade bloc, the European Free Trade Association (EFTA). In the early 1960s, EFTA-based and EEC-based firms had roughly equal access to each others’ markets (the preferential liberalization had only just begun). However, as the barriers began to fall within the EEC and within EFTA, discriminatory effects appeared. Importantly, the relative economic weight and economic performance of the two ‘clubs’ was far from equal. The GDP of the six EEC

⁴ Neal and Barbezat (1998) Figure 3.6.

nations was more than twice that of the seven EFTA nations and it was growing faster (Figure 2). Thus the EEC club was far more attractive to exporters than the EFTA club. Accordingly, the progressive reduction of within-group barriers generated new political economy forces in favour of EEC enlargement.

Figure 2: Incomes EEC versus EFTA, 1960-70.



Source: Dorrucci, E., S. Firpo, M. Fratzscher, and FP Mongelli (2003).

In 1961, Great Britain applied for EEC membership. Britain’s unilateral decision tipped over more dominos. If the UK was to jump from EFTA to the EEC, the remaining EFTAs would face discrimination in an even larger market (since the EEC is a custom union, the UK would have had to re-impose tariffs on imports from other EFTAs). This possibility led other nations to change their attitude towards membership. In this case, Ireland, Denmark and Norway quickly followed Britain’s unilateral move. The other EFTAs did not apply for political reasons such as neutrality (Austria, Finland, Sweden and Switzerland), lack of democracy (Portugal), or because they were not heavily dependent on the EEC market (Iceland). In January 1963, French President Charles de Gaulle unilaterally vetoed British membership. The four EFTAs reapplied in 1967 and de Gaulle issued another famous ‘non’ but after he retired, the applications were reactivated and membership was offered to the four in 1973. Norway’s population voted down EEC membership so the Six became the Nine.

The impending departure of four EFTAs to the EEC was anticipated well in advance and triggered a secondary domino effect. The 1973 EEC enlargement meant a swelling of the EEC markets and a shrinking of the EFTA markets. Firms based in the remaining EFTA states would suffer expanded discrimination and enjoy an advantage in fewer markets. Accordingly, EFTA industries pushed their governments to redress this situation. The result was a set of bilateral free trade agreements (FTAs) between each remaining EFTAn and the EEC, which took effect when the UK and company acceded to the EEC.

The 1960s and especially the 1970s saw the rapid emergence of microregulation by governments in all industrialised nations, with this taking form as health, safety and environmental standards and regulations. Since the regulated industries were often the direct or indirect authors of the detailed regulation, it was inevitable that the regulations would, in addition to serving good governance goals, act as technical barriers to trade (TBTs). Thus in some sense the market integration achieved by tariff removal was offset by the creation of

new TBTs. Since industry in each European nation competes primarily with industries located in other European nations, and the protectionist intent was to alleviate this competition, it is natural to expect that the political economy forces would result in new TBTs that were crafted in a way that especially disfavoured intra-European trade. It is exactly these sorts of barriers that led to calls for completion of the internal market in the mid-1980s.⁵

The next wave of domino effects occurred in the mid-1980s with the completion of the Single Market. The triggering event, the 1986 Single European Act, promised much tighter economic integration among EU members. Non-EU nations again found themselves threatened by the discriminatory effects of integration in the EU. In the late 1980s, EFTA governments had decided that they must react to the Single Market. Several considered applying for EU membership (Austria actually did), while others considered bilateral negotiations. EU Commission President Jacques Delors forced the decision in January 1989 by proposing the European Economic Area (EEA) agreement. The final version of this agreement is highly complex, but it can be thought of as extending the Single Market to EFTA economies, apart from agriculture and the common external tariff.

It is easy to understand why the EFTAs would want to participate in the Single Market. There are, however, two aspects of the EEA that are truly extraordinary. First, the EEA seemed, from some perspectives, to be unbalanced in terms of the rights and obligations of EFTAs when it comes to future EEC legislation. In essence, it forces the EFTAs to accept future EU legislation concerning the Single Market, without formal input into the formation of these new laws. Second, the EEA created a good deal of supranationality among the EFTAs (the EU insisted upon this in order to simplify the task of keeping the Single Market homogeneous). The EFTAs had fiercely resisted such supranationality since the end of the war, so it is astounding that they now said they would accept it.

As it turned out, virtually none of the EFTAs were willing to live with the EEA. By the end of negotiations on the EEA, Austria, Finland, Sweden, Norway and Switzerland had put in EU membership applications. For these countries, the EEA was a transitional arrangement. Swiss voters rejected that EEA in December 1992, effectively freezing their EU application. Accession talks with the four EFTAs were successful, but Norwegian again voted down membership, so the EEA now consists of the EU15 on one hand, and with Norway, Liechtenstein and Iceland on the other; Switzerland has negotiated a bilateral EEA-like agreement. Of course, the membership bids of Sweden, Switzerland, Finland and Austria would have been unthinkable in the old Cold War environment, so it is important to note that the binding constraint hereto – the Iron Curtain – disappeared and this brought the political economy logic of EU membership to the forefront.

Table 2: Summary of EU, EFTA membership and FTA bids.

	EU membership	EU membership bids	EFTA membership bids	EU FTAs
First Wave, 1957-1968:	6= F, D, I, NL, L, B	1957: F, D, I, NL, L, B 1961: UK, then Ire, DK, N 1967: UK, Ire, DK, N	1959: UK, CH, A, S, P, N, Lie 1961: Fin 1968: Is	1960: Gr
Second Wave, 1973-1977:	9=6+UK, DK, Ire	1975: Gr		1973: CH, A, S, P, N, Lie

⁵ See Baldwin (2000), or Maskus and Wilson (2001) for a detailed account of European TBTs and various liberalisation efforts in the 1958-2000 period.

	1977: E,P		
Third Wave, 1989-94:	10=1981: 9+Gr	1989: A	1994: CH, N, Is,
	12=1986: 10+ E, P	1991: S	Lie
	15=1994: 12 + A, Fin, S	1992: Fin, N, CH	

Notes: Country abbreviations follow European license plate conventions: A=Austria, B=Belgium, CH=Switzerland, D=Germany, E=Spain, Fin=Finland, Gr=Greece, I=Italy, Is=Iceland, L=Luxembourg, Lie=Liechtenstein, N=Norway, P=Portugal, S=Sweden, UK=Britain.
Source: Chapter 1 (history) Baldwin and Wyplosz (2006).

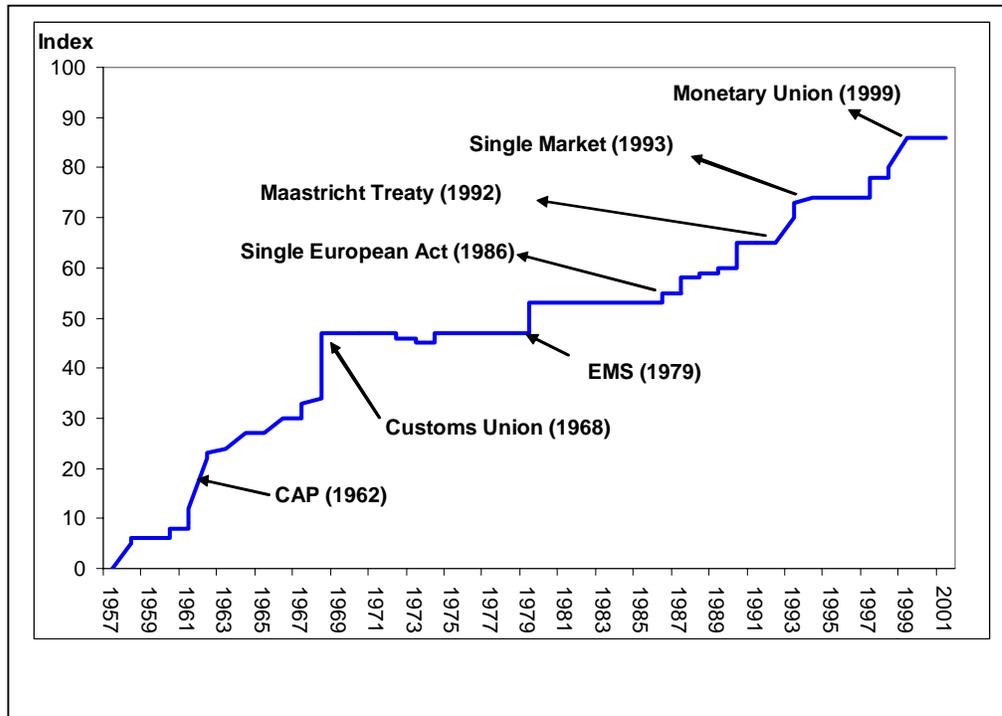


Figure 3: Deepening of EU integration, 1957-2001.

Sources: Dorrucchi, E., S. Firpo, M. Fratzscher, and FP Mongelli (2003).

The various steps towards the deepening of EU integration are summarised in Figure 3. The EU phased in its customs union (FTA intra-EU and common external tariff against the rest of the world) between 1958 and 1968, with integration of the agricultural markets coming in 1962 with the Common Agricultural Policy (CAP). Apart from some troubles with the early monetary arrangements set up after Bretton Woods' demise, integration stagnated until the European Monetary System started in 1979. The recent waves of deepening EU integration started with the 1986 Single European Act, which committed the EU to 'completing the internal market' by the end of 1992. Note that there was little new by way of commitments, most were already in the 1957 Treaty of Rome. The big change was a switch to majority voting on Single Market issues that ensured decision-making logjams would not hinder the adoption of measures necessary to ensure the free movement of goods, services, people and capital that have been promised in 1957. The main exception was the embrace of full capital mobility – a change that eventually led to the common currency. In the year the Single Market was due to be completed, the EU launched a new profound integration initiative in the form of the Maastricht Treaty. This committed the EU12 to a common currency by the year 1999. Note that measures to complete the Internal Market continued apace in the 1990s since a number of areas such as energy and autos had been excluded from the Single European Act,

and rapidly evolving information technology and globalisation more generally demand adoption of new pro-integration Directives.

4. DATA AND EMPIRICAL SPECIFICATIONS

The first empirical task is to identify trade creation and diversion in Europe for the 1960-2004 period; the gravity model is the tool we use. The gravity model is based on an expenditure equation. The value of exports of a single good from the ‘origin’ nation to the ‘destination’ nation depends upon the good’s expenditure share and the destination nation’s total expenditure on tradable goods. The expenditure share depends upon relative prices and the demand elasticity. Using a standard CES expenditure function, the total exports from the origin nation to the destination nation are:

$$(1) \quad V_{od} = n_o (p_{od})^{1-\sigma} \frac{E_d}{P_d^{1-\sigma}} P_d \equiv \left(\sum_{k=1}^R n_k (p_{kd})^{1-\sigma} \right)^{1/(1-\sigma)}, \sigma > 1$$

where V_{od} is the value of bilateral exports from the nation-o to nation-d, n_o is the number of nation-o goods, p_{od} is the price of the good inside nation-d measured in terms of the numeraire, E_d is the destination nation’s expenditure on goods that compete with imports, and P_d is the usual CES price index.

Assuming Dixit-Stiglitz pricing, p_{od} will equal p_o times τ_{od} , where p_o is the nation-o producer price and τ_{od} is the bilateral trade cost. Using this pass-through equation and (1) for all markets in which nation-o goods are sold (including its own), we can solve nation-o’s market clearing condition to get $n_o (p_{od})^{1-\sigma} = Y_o / \Omega_o$ where Ω is a measure of nation-o’s market potential, i.e. its market access. Using this in (1):

$$(2) \quad V_{od} = (\tau_{od})^{1-\sigma} \frac{Y_o}{\Omega_o} \frac{E_d}{P_d^{1-\sigma}}, \quad \text{where} \quad \Omega_o \equiv \sum_{i=1}^R (\tau_{oi})^{1-\sigma} \frac{E_i}{P_i^{1-\sigma}}.$$

Taking the GDP of nation-o as a proxy for its production of traded goods, nation-d’s GDP as a proxy for its expenditure on traded goods, and bilateral trade costs as a function of bilateral distance and various trade agreements, we get the basic gravity equation. To this we add GDP per capita to reflect the link between per capita income and the structure of the economy (on the exporting nation’s side) and a non-unitary income elasticity (on the importing nation’s side). Since GDP per capita involves GDP and population, we implement this augmentation of the basic gravity equation by including population of the sending and receiving nations.

4.1. Data

The 26 countries in our data compromise the EU15 nations, the three remaining EFTAs (except Liechtenstein), and eight non-European OECD nations.⁶ The sample starts in 1962 since this is earliest data available in our data source and continues up to 2004. The bilateral trade and GDP data are in current US dollars, while population is in millions. The trade data was extracted from the UN Comtrade database using WITS (World Integrated Trade Solutions). Data on GDP and population comes from the World Bank Development Indicators database.

⁶ EU15 = France, Germany, Italy, UK, Belgium, Netherlands, Luxembourg, Denmark, Ireland, Spain, Portugal, Austria, Finland and Sweden; EFTA3 = Iceland, Norway and Switzerland; non-European8 = US, Canada, Japan, Australia, New Zealand, Korea, Mexico, Turkey. .

We work with both uni-directional bilateral trade and the more common averaged bilateral trade. The unidirectional panel has 22,957 observations and distinguishes, for example, trade flows from Switzerland to Germany from flows from Germany to Switzerland. The averaged data (12,245 observations) consists of the average of the log of uni-directional bilateral flows as suggested by the theory.⁷ While we are primarily interested in the uni-directional data – this is what allows us to pick up the trade diversion effects that are so crucial to the domino theory – we also do the regressions with the averaged data as a check.

4.2. *Baseline results*

Since most gravity studies work with averaged bilateral trade, this is where we start. The actual regression model includes year dummies to convert the various current dollar values to a common numeraire across all years. To control for the omitted Ω and P terms in (2) we try the two standard fixed effects, nation dummies and pair dummies. The results are shown in Table 3.

Table 3: Baseline results, Averaged bilateral trade.

	Nation & year	Pair & year
Constant	94.9	-96.6
s.e.	4.594	2.765
$\ln \text{GDP}_o \text{GDP}_d$	1.18	1.18
s.e.	0.041	0.023
$\ln \text{POP}_o \text{POP}_d$	1.68	1.78
s.e.	0.131	0.078
EU11	0.78	0.41
s.e.	0.027	0.015
EFTA11	0.77	0.05
s.e.	0.04	0.024
R^2	0.88	0.97

Heteroskedasticity-robust standard errors below the point estimates; 12,245 observations, all coefficients significant at 5% level of confidence. 26 nations (18 Western European and 8 non-European OECD nations), 1962-2004. The time, pair and nation dummies were estimated but not reported. When using averaged trade flows, definition of origin and destination nation is arbitrary, so GDPs and population are estimated jointly. The estimator is OLS fixed effects.

Note: EU11 indicates both partners are in the EU, EFTA11 indicates that both are in EFTA, EU10 indicates that the exporter is in the EU but the importer is not, EU01 indicates that the exporter is outside the EU while the importer is inside; EFTA10 and EFTA01 indicate similar one-sided membership for EFTA.

The results in Table 3 are quite in line with typical findings in the literature. All coefficients are significant at the 5% level or better. The ‘economic mass’ variable (product of GDPs) have elasticities near unity. The product of population is also positive and larger than the point estimate on joint GDP, indicating the a rise in GDP per capita appears to dampen trade. The impact of EU and EFTA membership are estimated to be strongly pro-trade with both pair and nation dummies. The pair dummy results, however, suggest a much lower impact on trade. Comparing the first column to the second, the EU figure drops from 0.78 to 0.41. The first figure implies that common EU membership boosts trade by 118% while the second implies only 51%. The EFTA effect drops even more from 0.77 to 0.05, i.e. from 116% extra trade to just 5% extra trade. The likely reason for the big drop is that the pair dummy picks up all unobserved variation in each trading pair, things such as common language, common legal systems, special infrastructure and transport links, etc. A straight forward test shows that

⁷ Since the CES expenditure function is multiplicative, the theoretically founded averaging should involve the product of the uni-directional flows, not the sum.

More generally, the model estimated with nation dummies is a special case of the model estimated with pair (Cheng and Wall, 2005). This allows us to test the restriction using a likelihood ratio. The test strongly rejects the null hypothesis that the restrictions do not have a statistically significant effect on the estimation (i.e. that the nation and pair dummies regressions yield the same result). This leads us to prefer the pair dummy specification.

4.3. *Estimating trade diversion and creation*

The results reported above assume that EU and EFTA membership implied constant degrees of preference – an assertion that blatantly contradicts Europe’s reality, as described in Section 3. Moreover, by using averaged bilateral trade it is difficult to pick up the discriminatory impact of EU membership on the exports of non-member nations to the EU.

We turn now to estimating year-specific trade creation and trade diversion effects for both the EU and EFTA. We use uni-directional trade so we can identify the costs of non-members (in terms of lost exports) to EFTA-based firms. To this end, we estimate the basic gravity model with time and pair dummies but augment the regression to include 43 dummies – one for each year – for: (i) shared EU membership, EU11, (ii) shared EFTA membership, (iii) unidirectional sales from non-EU nations to the EU, (iv) unidirectional sales from non-EFTAs to EFTAs. Finally, we also include a time-varying dummy to pick up the impact of the EU-EFTA FTA that has been in operation since 1973. Since these regressions involve hundreds of coefficients and standard errors, we report the regression results in the appendix, displaying the main results graphically.

Part of the results are depicted in Figure 4. This plots the estimated pro-trade impact of EU and EFTA membership on intra-bloc trade, i.e. the coefficients on the EU11 and EFTA11 dummies; the thin lines show the 95% confidence bands.⁸

The figures show that both EU and EFTA were highly preferential in their early years. As the EEC’s customs union was phased in and intra-EFTA duties were removed, the degree of intra-bloc trade creation rises steadily into the late 1960s. By 1970, the EU and EFTA were equally preferential with intra-bloc trade flows estimated as being about 50% higher due to the preferences.

The fact that the EU was not much more preferential than was EFTA is perfectly in line with by 1970, the EU was little more than a free trade area with a common external tariff. The main difference between the blocs at the time – the inclusion of trade in agricultural goods in the EU – mattered little since the bulk of intra-West European trade was (and still is) in manufactured goods.

After 1970, however, the degree of intra-EFTA preference faded steadily, becoming statistically indistinguishable from zero-effect by the 1980s; in recent years, it turned negative and statistically significant. This negative effect is not totally out of line with priors since EFTA consists since 1994 of four nations (Iceland, Norway, Liechtenstein and Switzerland). Two of these do not report bilateral trade since they are in a customs on monetary union (Liechtenstein and Switzerland) and two of these rely heavily on primary goods exports (Norway, oil, and Iceland, fish and energy). In short, there is little intra-EFTA trade and what there is, is not substantially affected by tariffs on manufactured goods.

⁸ Coefficients are converted to % trade effect with the formula $\exp(\beta)-1$, where β is the coefficient.

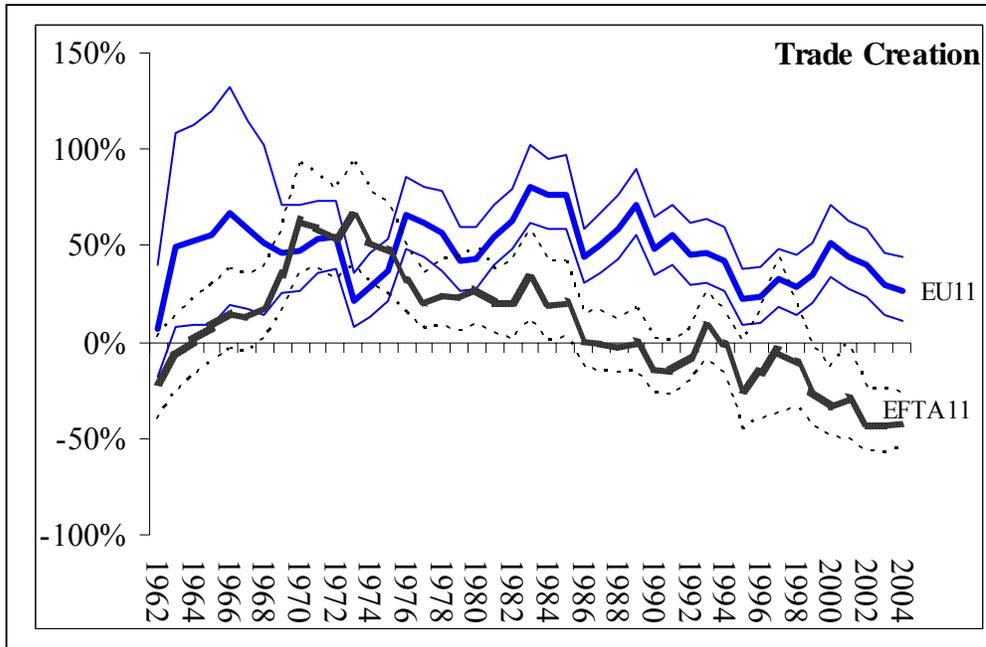


Figure 4: Trade creation in EU and EFTA, 1962-2004.

Source: RegressionResults300506.xls

By contrast, the degree of intra-EU preference seems to have remained high and even increased somewhat up the late 1980s, even though our estimates jump around from year to year. From 1990, the degree of intra-EU trade creation seems to have declined steadily, although it partially recovered during the late 1990s, before resuming its decline in the new century. The reasons for this decline may be related to the extensive WTO liberalisation begun in 1994 and to the fact that many deregulation aspects of the Single Market measures may have had their biggest impact on exporters located in non-EU members; by creating one large market, the EU's idiosyncratic TBTs become less of a problem for nonEU nations since they can export to all nations with one product rather than having to develop product variants that meet a dozen different standards.

Next we turn now to the trade diversion coefficients estimated in our regression, shown in Figure 5. The wide solid line shows the coefficient on exports from non-EU nations to EU markets, again converted to percentage trade impact to facilitate interpretation. The other wide line shows that coefficient on the EU-EFTA bilateral dummy intended to pick up the impact of the EC-EFTA FTAs. The line lines and the thin dotted lines indicated the 95% confidence bands.

The figure shows that trade-diversion coefficient becomes negative (as expected) as the EU's customs union is completed in 1968, but most of the yearly point estimates are only borderline significant. Here it should be noted that the pair-dummies we include soak up a great deal of the variation that might otherwise help us identify the trade diversion. In particular, it means that the trade diversion coefficients are identified only off of the time-series variation in market access. This combined with the fact that our data starts only in 1962 may explain the lack of significance.

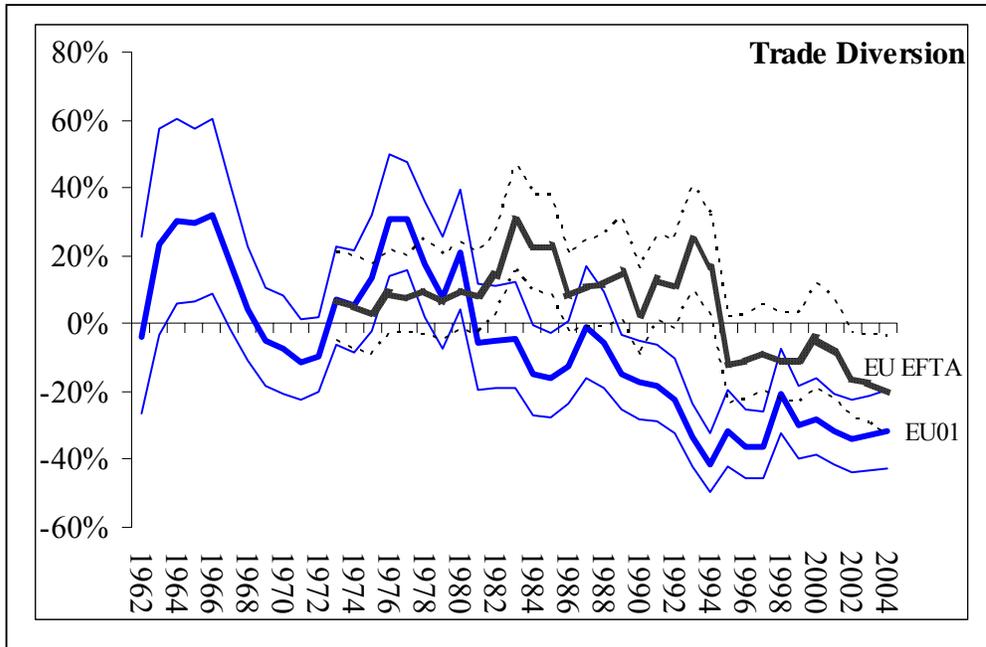


Figure 5: Trade diversion in EU and EFTA, 1962-2004.

Source: RegressionResults300506.xls

As described in Section 3, the UK, Danish, Irish and Norwegian membership quests were reactivated in the late 1960s and the first enlargement occurred in 1973. To avoid the imposition of the EU's Common External Tariff by the new EU members against their former EFTA colleagues, the EU and each remaining EFTA signed bilateral FTAs that took effect in 1973. As Figure 5 clearly shows, this new burst of regional tariff cutting lessened the overall extent of EU trade diversion. Indeed, the point estimate switches sign, becoming statistically positive from 1975 to 1979. Interestingly, our estimates suggest that even with the FTA, the EFTAs faced less favourable access to the EU market than did the non-European exporters in our sample (US, Canada, Japan, Australia, New Zealand, Korea, Mexico and Turkey). As discussed in Section 3 this may reflect TBTs that were aimed at curbing competition specifically from EU industry's closest competitors, namely the EFTA7 (at the time EFTA consisted of the four Nordics, Iceland, Norway, Sweden and Finland, and the three Alpines, Austria, Liechtenstein and Switzerland; the exports of Sweden, Austria, Switzerland and Finland were all dominated by manufactured goods sold in the EU market).

The ranking of the EU-EFTA versus non-European to EU coefficients reverses itself as the EU enlarged in the 1980s (Greece joined in 1981; Spain and Portugal in 1986). The EU's non-European trade diversion effect turns negative and grows especially with the implementation of the Single Market programme (1986-1992). The EU-EFTA effect, by contrast, remains positive until three of four main EFTAs joined the EU in 1994, at which point, EU-EFTA trade was distinctly unusual given the dependency of Norway and Iceland the export of primary goods.

4.4. *Estimating a model of EU membership*

In its simplest form, the domino theory is a positive model of membership demand. It asserts that once one controls for idiosyncratic national characteristics – such as Switzerland's non-involvement policy, or Soviet pressure on Finland to stay out of West European arrangements

– there are three key factors explain a nation’s desire to join: the fraction of the nation’s exports that go to the bloc, the degree of trade diversion, and the degree of trade creation.

To test whether these changes account for EU membership, we estimate a model of EU membership. The obvious empirical models in this context are probit and logit models; we work with logit since it offers ways of eliminating unobserved country variation, which are surely critical in EU membership decisions. Specifically, we use:

$$(3) \quad \Pr(y_{it} = 1 | x_{it}) = \frac{\exp(\alpha_i + x'_{it} \beta)}{1 + \exp(\alpha_i + x'_{it} \beta)} \equiv \Lambda(\alpha_i + x'_{it} \beta)$$

Where y_{it} is the observation on EU membership (1 = member, 0 = not member) for country i at time t ; the $x'_{it}\beta$ represents the explanatory variables and the corresponding coefficients; and α_i are the country-specific fixed effects.

When this fixed-effects model is estimated by maximising the unconditional likelihood function, the estimator of the country-specific effects α_i is consistent as T gets large for a fixed N , but inconsistent when N gets large for a fixed T . This so-called incidental parameters problem (Katz 2001) poses a challenge to the identification of the parameters of interest, namely the impact of the bloc size and trade creation/diversion variables on the likelihood of membership. The conditional likelihood function, in contrast to the unconditional likelihood function, does not include the incidental parameters α_i . As a consequence, using the conditional logit estimation method provides coefficient estimates that are consistent even in a panel data context. We thus prefer conditional to unconditional fixed effects logit estimates.

This is clearly a first-pass approach. For example, EU membership was taken as exogenous in the estimation of the trade diversion coefficients and now we are treating membership as endogenous. For detailed critique of the empirics, see the three referee reports we received from the Economic Journal in the appendix.

5. RESULTS

The basic regressors in our model of EU membership are twofold: the nation’s mercantile interest in the EU (%EU) interacted with the time-varying estimated trade creation dummies (TC), and %EU interacted with the estimated trade diversion dummies. These two variables capture the domino model in its simplest form, namely that non-members are more likely to join when trade diversion and trade creation are high, especially when a large fraction of their exports are affected by the trade creation and diversion.

Since there is no unambiguous way to measure the timing of a membership demand, the model is estimated on three membership demand criteria (i.e. left-hand side binary variables). The first panel (regressions 1 to 4) shows our preferred criterion which uses the year of the entry into force of the Accession Treaty. The second panel uses the year of the signature of the Accession Treaty (regressions 5-8). The third criterion uses the year of the membership application. For each membership criterion, we estimate a pooled logit regression (the first two columns in each panel) and a condition logit regression, i.e. logit with country dummies.

The results from Table 4 are broadly supportive of the model’s predictions. The first column shows the performance of the domino model with no other control variables. The trade creation variable interacted with mercantile interest is positive and significant, while the interacted trade diversion terms is negative and significant. Since both of these variables are measured in common units (share of trade to EU times percent impact on bilateral trade), their magnitudes can be compared directly. The fact that the trade diversion impact is much larger

suggests that the avoidance of trade diversion plays a more important role than the quest for trade creation opportunities.

Comparing regressions 1 to 3, we see that allowing for idiosyncratic country-specific effects (country fixed effects) raises the estimated importance of trade creation and trade diversion by several times. The point estimate on the interacted trade creation variable more than doubles and that on the interacted trade diversion variable rises threefold.

In regressions 2 and 4, we included other control variables suggested by the literature, specifically general openness and a ‘WTO Backlash’ variable suggested by Mansfield and Reinhardt (2003) who argue that when multilateral relations in the WTO become more complicated and less manageable, countries have an incentive to liberalise in a regional or bilateral manner. In other words, the probability of joining a bloc increases in proportion to difficulties in WTO negotiations, which of course are difficult to quantify. We proxy multilateral backlash by the number of WTO members times the dummy variable indicating that a GATT/WTO round is being negotiated. The idea is that the WTO membership size reflects the difficulty of the talks. In our preferred specification (condition logit) both factors are significant and have the expected sign. Openness is significant even in the pooled logit estimation but the backlash variable is not.

The basic pattern of results we obtain with the entry date criterion are echoed in the second two panels that use other measures of membership timing.

Table 4: Logit and condition logit estimation of domino effect

	Entry date criterion				Date of Signature criterion				Successful bid date criterion			
	Pooled Logit		Cond'l Logit		Pooled Logit		Cond'l Logit		Pooled Logit		Cond'l Logit	
	1	2	3	4	5	6	7	8	9	10	11	12
(EU%)TC	0.10	0.09	0.22	0.10	0.10	0.09	0.23	0.07	0.10	0.09	0.20	0.15
<i>std.err.</i>	0.01	0.01	0.03	0.04	0.01	0.01	0.04	0.04	0.01	0.01	0.03	0.03
<i>p-value</i>	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00
(EU%)TD	-0.17	-0.15	-0.53	-0.44	-0.18	-0.15	-0.54	-0.34	-0.13	-0.11	-0.41	-0.33
<i>std.err.</i>	0.02	0.02	0.07	0.07	0.02	0.02	0.07	0.07	0.01	0.01	0.05	0.06
<i>p-value</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Openness		0.02		0.30		0.02		0.34		0.02		0.24
<i>std.err.</i>		0.01		0.03		0.01		0.04		0.00		0.02
<i>p-value</i>		0.00		0.00		0.00		0.00		0.00		0.00
Backlash		0.00		0.02		0.00		0.02		0.00		0.02
<i>std.err.</i>		0.00		0.01		0.00		0.01		0.00		0.01
<i>p-value</i>		0.35		0.00		0.24		0.01		0.81		0.00
Constant	-3.73	-4.64			-3.88	-4.86			-3.13	-3.83		
<i>std.err.</i>	0.26	0.38			0.28	0.39			0.22	0.32		
<i>p-value</i>	0.00	0.00			0.00	0.00			0.00	0.00		
Number of obs.	810	810	373	373	810	810	373	373	810	810	373	373
Pseudo R2	0.31	0.33	0.67	0.87	0.32	0.34	0.68	0.88	0.26	0.27	0.57	0.73
% correctly predicted	0.82	0.80	n/a*	n/a*	0.82	0.81	n/a*	n/a*	0.78	0.78	n/a*	n/a*
Log-likelihood	-302	-294	-66	-267	-291	-282	-66	-25	-359	-352	-80	-51

value												
Akaike Criterion	609.9	597.3	136.8	61.0	587.4	573.6	136.0	58.2	724.5	714.8	164.3	109.3
Schwarz Criterion	624.0	620.8	144.6	76.7	601.5	597.1	143.9	73.9	738.6	738.3	172.1	125.0

*n/a: It is not possible to calculate the percent correctly predicted when using conditional logit.

Note: %EU = percent of the nation's exports that go to the EU, TC is the year-specific value of the estimated coefficient on EU11 that are shown in Figure 4, i.e. trade creation; TD is the corresponding coefficients from Figure 5, i.e. trade diversion, Openness is the World Bank's index of openness, and Backlash is meant to capture the idea that nations join FTAs when the GATT/WTO round is difficult (see text). Convergence not achieved after 50 iterations for models 4, 8 and 12. The third criterion, successful bids, does not include unsuccessful bids as they are not reflective of the true political economy consensus of the nation (governments such as Norway and Switzerland have used membership applications to strategically manipulate their voters)

5.1. Relaxing the specification

The next set of regressions allow the trade creation, trade diversion and mercantile interest to enter the regression separately (rather than interacting the mercantile interest with trade creation and diversion). The results are shown in Table 5.

Table 5: Conditional logit results, various membership demand criterion.

	Entry date criterion			Date of Signature criterion			Successful bid date criterion			
	1	2	3	3	4	5	6	7	8	9
EU%	0.42	0.51	0.40	0.53	0.54	0.41	0.38	0.43	0.31	0.45
<i>std.err.</i>	0.08	0.05	0.12	0.10	0.07	0.06	0.07	0.11	0.07	0.10
<i>p-value</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EU TC	2.23	3.69		1.84	1.86		5.99	9.51		8.49
<i>std.err.</i>	2.11	2.99		2.73	n/a		2.08	2.81		2.68
<i>p-value</i>	0.29	0.22		0.50	n/a		0.00	0.00		0.00
EU TD	-22.9	-27.2	-24.1	-26.6	-30.5	-21.0	-15.1	-17.1	-8.8	-15.4
<i>std.err.</i>	4.50	n/a	7.74	5.83	n/a	5.89	2.82	3.86	2.19	3.55
<i>p-value</i>	0.00	n/a	0.00	0.00	n/a	0.00	0.00	0.00	0.00	0.00
Openness		0.38	0.37		0.42	0.41		0.24	0.18	0.22
<i>std.err.</i>		0.07	0.11		0.08	0.07		0.06	0.05	0.06
<i>p-value</i>		0.00	0.00		0.00	0.00		0.00	0.00	0.00
Backlash		-0.01			-0.01			0.01		
<i>std.err.</i>		0.01			0.01			0.01		
<i>p-value</i>		0.44			0.37			0.14		
Number of obs.	384	373	373	384	373	373	384	373	373	373
Pseudo R2	0.84	0.94	0.93	0.89	0.99	0.98	0.74	0.81	0.77	0.81
% correctly predicted	n/a*	n/a*	n/a*	n/a*	n/a*	n/a*	n/a*	n/a*	n/a*	n/a*
Log-likelihood value	-33.1	-12.9	-14.4	-23.1	-1.4	-3.2	-49.9	-34.5	-42.3	-35.7
Akaike Criterion (AIC)	72.3	33.7	34.7	52.2	8.9	12.4	105.9	79.0	90.7	79.5
Schwarz Criterion (BIC)	84.1	49.4	46.5	64.1	20.7	24.2	117.7	98.6	102.4	95.2

*n/a: It is not possible to calculate the percent correctly predicted when using conditional logit.

Note: The conditional logit allows country specific fixed effects and so allows for country-specific non-economic resistance to membership, this however, makes it impossible to calculate the percent of correctly predicted switches. Convergence not achieved for model 2, 5 & 6 (50 iterations).

As before the three panels of the table correspond to three definitions of the decision-to-join criteria. For all specifications of the dependent variable, we see a strong and highly significant impact of the pure mercantilist variable, namely the nation's share of exports to the EU. The trade creation variable is likewise consistently positive, but its significance waivers. The key element in the domino logic – the impact of trade diversion on nation's decision to join – is always negative and significant. More interestingly, its magnitude is between 1.8 and 16 times the size of the trade creation variable (they are both measured in the same units, namely percentage impact on bilateral trade). This confirms the suggestion from above that the possibility of new discrimination plays a more powerful role than does the prospect of better market access. In other words, it seems that the 'defensive' motive for joining a bloc is particularly strong. The other variable that has a consistently strong and positive effect is the overall openness of the nation as measured by the World Bank's index. In this model specification, the backlash variable is never significant statistically, even at the 10% level.

6. CONCLUDING REMARKS

This paper tests the domino theory on European data from the 1962-2003 period. It first estimates the trade diversion and trade creation effects of the EU during this time. The year-specific estimates of trade diversion and creation (i.e. the coefficient on the annual trade creation and diversion dummies from a gravity model) are then used to estimate a model of nations' EU membership demands. The results are broadly supportive of the domino idea, but it also finds some support for alternative theories, such as the 'WTO backlash' idea of Mansfield and Reinhardt (2003). The paper finds that the threat of trade diversion seems to be much more influential on nations' decisions to join the EU than trade creation.

Appendix: Data Sources

Nominal exports	UN Comtrade database extracted through WITS (World Integrated Trade Solution, wits.worldbank.org)
Index of EU integration	Constructed by author using data from Mongelli, Dorrucchi and Agur (2005)
Trade openness	World Bank Development Indicators (WDI) database(devdata.worldbank.org/dataon)
WTO backlash	www.wto.org
Bilateral imports (nominal)	UN Comtrade database extracted through WITS (World Integrated Trade Solution, wits.worldbank.org)
Nominal GDP(current US\$)	World Bank Development Indicators (WDI) database(devdata.worldbank.org/dataon)
Total population	WDI (see above)

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APPENDIX: 3 ANONYMOUS REFEREE REPORTS

Referee #1

Comments on “A Test of Endogenous Trade Bloc Formation Theory on EU data” for Economic Journal

The empirical analysis in this paper is motivated by Baldwin’s theory of “domino regionalism,” which states that the deepening of integration within a preferential trade agreement will raise the cost to non-members of being out of the agreement and will induce some non-members to apply for membership. The empirical analysis is in two parts. The first involves obtaining estimates of the degree of trade creation and trade diversion associated with the EU and EFTA using data for 26 countries for the period 1962 - 2004. The second part uses a logit model for the decision of countries of whether to apply for membership in the EU, with the trade creation/trade diversion measures used to capture the benefits of membership.

The tests of the statistical significance of the trade creation and trade diversion effects can be taken as testing whether in fact the internal integration of the EU that occurred during the period had a statistically significant impact on trade patterns, and thus is sufficiently important to represent the exogenous change required to induce membership changes. This is a useful test, since there has also been multilateral liberalization going on at the same time that could reduce the effects of preferential liberalization. A second component of the theory is the fact that increased membership will expand the magnitude of the membership gains for the non-member countries. It seems to me that this is a crucial component of the “domino” aspect, in the sense that it provides the endogenous component to the dynamic theory. I would find it useful to have some summary statistics on how the magnitude of the benefit to membership changes over time in response to accessions. This variable is included in the regressions that are run, but it would be useful to have some decomposition of the benefits into exogenous trade changes and endogenous membership changes. (In particular, I would find this useful because I have reservations about the logit analysis - see below).

Specific Comments:

1. The summary statistics reported at the beginning for the gravity equations compare the income coefficients to those obtained in the literature, but make no reference to the comparison of the EU/EFTA effects to those in the literature. There is a huge empirical literature estimating gravity equations - I would imagine there must be some comparable estimates from other work that could be compared.
2. The theoretical model that is presented in the paper generates a gravity equation. However, there is no explicit link in the discussion of the theory from the trade creation/trade diversion effects that are measured to the national preference function that generates the entry

decision. I suspect that a politically weighted objective function that put primary weight on firm profits would generate something along these lines, and I believe that Baldwin's original paper had some discussion along these lines. Since the trade creation/trade diversion concepts do not generally translate directly into welfare measures in models where national welfare is maximized, I think that some more discussion of the underlying model here would be useful.

3) I have a several questions about the model of EU membership. Since this is in some sense the key part of the empirical testing, I would prefer to see a more comprehensive discussion of what is being estimated.

a) Is the logit equation in (3) estimated for each country in each year, or only for countries that are not currently EU members? The discussion immediately following (3) suggests all countries, whereas the discussion in the beginning of the results section seems to suggest that it is the latter. If all countries in all years are included, there should be approximately 1075 observations (25 countries for 43 years). The reported number of observations (810) seems too few if all countries are included, but too many if only current non-members are included. Are there a significant number of missing observations?

b) If the answer to a) is in that all countries are included, then I think that there should be some justification for the specification. Once a country has joined the EU the costs of leaving would be quite high, which would argue for treating the current membership status as a state variable.

c) I would like to see a bit more discussion of the difference between the unconditional and conditional logit specification. In particular, the use of the conditional logit results in a decline in the number of observations by more than one half as reported in Table The discussion of this method in Greene's econometrics text indicates that Chamberlain's method for treating fixed effects involves dropping observations which are all 1 or all 0 for the dependent variable. Is this the reason for the decline in the number of observations?

Referee #2

Comments on "A Test of Endogenous Trade Bloc Formation Theory on EU Data"
by Richard Baldwin and Roland Rieder

This paper attempts to provide some empirical support for Baldwin's "domino theory" of the endogenous expansion (not formation) of European Union (EU). First, this is an important issue as understanding the factors behind the expansion of the EU can help economists and policy makers better understand the role of "regionalism" in trade policy. It should be noted that the original EEC formation is exogenous in this approach, looking instead for evidence on the roles of trade creation and trade diversion in expanding the EU. Second, Baldwin's domino theory of regionalism is one of the few theories of competitive liberalisation, and his theory has never quite been subjected to rigorous empirical evaluation. So this is one of the few attempts empirically to evaluate the increased regionalism of the world economy.

General Comments

First, Baldwin's domino theory is a useful one. It highlights the tension between political-economy forces that induced non-member countries to attempt to join the EU over time. Figure 1 in this paper, from Baldwin (1993), captures this tension. In fact, one beneficial aspect of this paper is the emphasis on this tension when it states on page 3, following Figure 1, that an idiosyncratic shock (in the model, the fall in τ) "generates new political-economy forces in non-member nations." The authors note explicitly the tension: "non-member exporters now have a greater stake in membership – they face more discrimination if their nation stays out and greater market access if it joins" – which tends to have a

positive effect on non-members joining – and “Anti-membership forces are also strengthened in non-member nations as the liberalization implied by membership is heightened” – which should have a negative effect on non-members joining. I liked this paragraph because it reflects the “political-economy” decision of governments that must weigh these two forces. As Baldwin (1993) states: “The government of the typical country chooses whether to join the EC or not. ... The choice is taken to maximize political support, which in turn depends positively upon the level of donations by industry, the level of social welfare net of donations, and on a third term R which reflects the support of groups that oppose EC membership on non-economic grounds” (p. 41) Baldwin (1993) then proceeds to determine the condition under which the typical government decides to join the EC, summarized in equations (14) and (15) in Baldwin (1993).

The primary purpose of the present paper is to “estimate a formal model of EU membership bids” (page 1), which is the domino theory. The secondary purpose is that the authors use panel data techniques (which is a minor contribution). Initially I thought this would be a very useful endeavor, to try to capture empirical estimates of the tension between these two political-economy forces, in the spirit of how Goldberg and Maggi (1999) and others provided empirical estimation of the sophisticated Grossman and Helpman model. However, here I was somewhat disappointed. In the end, the authors estimate using gravity equations with dummy variables measures of trade creation and trade diversion, and then use these estimates (along with relative EU membership size) to explain empirically accession of non-members to the EU. The trade diversion effect, however, only captures one of the two opposing political-economy forces addressed in Baldwin (1993) and in page 3 of this paper. There is no modeling of donations, industry interests, or determinants of R ; the econometric evaluation is not nearly as rich as, say, Goldberg and Maggi (1999). So, while motivated by the domino theory, the main empirical contribution is to argue that a measure of trade diversion explains statistically EU membership bids using a panel, and economically is more important than the tradecreation variable. That the trade-diversion measure is economically and statistically significant is still a very useful finding. The limitation of the paper is that a reduced form estimate of a measure of trade diversion does not seem to effectively “estimate the formal (domino theory) model,” the stated primary goal of the paper.

Specific Comments

1. Section 4, Data and Empirical Specifications.

Theory

The theoretical foundation for the gravity model run in Section 4 is based upon Baldwin’s (2006) “Gravity for Dummies” article. However, as in Baldwin (2006), the TC (dummy) estimates and TD (dummy) estimates are estimated using panel data. In the context of this theoretical foundation (the panel extension of Anderson and van Wincoop, 2003), both origin and destination countries’ GDPs and multilateral resistance terms are time varying. Baldwin (2006) points this out as well. Consequently, the estimates in Table 3 likely suffer from omitted-variables bias by not including country-time effects; the authors include either a time dummy alongside nation dummies (Nation & year) or a time dummy alongside bilateral pair effects (Pair & year). Neither of these specifications captures appropriately the γ_{ot} and ρ_{dt} terms in equation (2), as Baldwin (2006) notes.

Section 4.2. Baseline Results

A related problem is that the large and positive coefficient estimates for $\ln \text{POP}_{ot}$ or POP_{dt} are highly unusual with respect to virtually the entire gravity equation empirical literature. In most instances, the coefficient estimates for this variable are either small negative values that are sometimes statistically significant, or in many cases they are small values and statistically insignificant. I felt the

estimates here lacked credibility and the authors failed to discuss these highly unusual population elasticity estimates, even though one of the authors knows this literature well (cf., Baldwin, 1994). The unusual population elasticity estimates may be related to the earlier point about potential omitted-variables bias owing to the absence of controls for the time-varying γ_{ot} and P_{dt} terms.

Section 4.3. Estimating trade diversion and creation

The same problems surface for the results discussed in section 4.3 (Estimating trade diversion and creation). Without control for the time-varying γ_{ot} and P_{dt} terms, one cannot put strong confidence in the coefficient estimates for the year-specific TC and TD effects. (The authors should note that they refer in this section to an appendix with the regressions results, but no such appendix was provided.) In the absence of this appendix, referees have to rely upon Figures 4 and 5, which provide the only information about the estimated TC and TD effects. There are three problems with the results reported in Figures 4 and 5; the first has already been noted above (no control a priori for the time-varying γ_{ot} and P_{dt} terms). The second problem is the high degree of instability of the estimated TC and TD effects. The authors mention this only in passing (“even though our estimates jump around from year to year”). However, I have much more concern about the instability of these estimates over time. By contrast, Sapir (1997), running similar year-specific estimates of TC and TD, has much more stable and plausible TC and TD estimates (even though Sapir’s specification ignores controlling for the time-varying γ_{ot} and P_{dt} terms, an issue that was not as widely acknowledged at that time).

The third problem is that the estimated TD effects are not just unstable (like the TC effects), but there are several unexplained anomalies (again using Figure 5, due to the absence of the appendix). First, the authors never explain the *positive* TD effects found in the mid-1960s. Since UK, Danish and Ireland eventual accession was likely due to the potential TD, these results are surprising and inconsistent with the index of deepening of EU integration in Figure 3. These issues are not addressed. Second, the authors do not discuss the anomalous positive and statistically significant TD effects in the mid-to-late 1970s. One would expect negative TD effects with the accession of Ireland, Denmark, and especially the UK to the EU. Third, the only systematic, economically plausible and statistically significant negative TD effects are post-1989. As the accessions of Greece, Spain and Portugal in the 1980s were likely of little empirical importance, the likely instigators (as the authors note) are the Single European Act and then later in 1992 the Maastricht Treaty. Thus, while post 1989 there was significant estimated TD effects, the only subsequent enlargement (in the data set going to 2004) was from the EU12 to the EU15, the accessions of Austria, Finland and Sweden.

2. Section 4.4. Estimating a model of EU membership

While the overall approach is an interesting one, I have two reservations. First, the logit coefficient estimates are estimated using generated statistics from the earlier stages. And as just discussed, many of the estimated TD effects are anomalous and unexplained, and both the TC and TD effects are much more unstable than earlier estimates in Sapir (1997), which generates concern. Second, I have reservations over including the fraction of nation i ’s exports that go to the EU as an explanatory variable in the logit specifications. That variable is constructed using the bilateral trade flow from country i to the EU, which is partially explained in the first stage using the TC and TD dummies.

3. Section 5, Results

I have no major concerns over the results presented in Table 4. A minor issue in Table 5 is the authors report n/a for the standard errors and p-values for some EU TC and EU TD variables’ coefficient estimates (columns 2 and 4), and they never address this.

Minor Comments

1. Section 3, Historical Narrative

In Table 1, there are numerous errors. For instance, France's share of trade to the EEC & EFTA countries is 40% in 1960, and yet 72% of its trade is with the RoW, which is impossible. Same for several other countries.

2. Section 4, Data and Empirical Specifications

Section 2 of the paper discusses the formal EU accession model in Baldwin (1993). Now section 4 introduces Baldwin's (2006) framework for determination of bilateral trade flows. A more coherent framework, integrating these concepts, would be more useful.

References (not in the paper)

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Referee #3

Report on MS 2007144, "A Test of Endogenous Trade Bloc Formation Theory on EU Data"
June 4, 2007

In this paper the authors offer an informal discussion of the "domino theory" of choices by countries to join a trade bloc. The basic argument is that as the bloc size gets larger and the trade shares of non-member countries the blocs are larger, the gains from joining rise compared to the gains from staying out. Regressions from a basic gravity model provide some empirical support for this proposition.

As the authors note, there is no new theory offered in this paper. A basic diagram, quite unnecessary to make the basic point above, is in the paper but it serves a heuristic purpose only. And the simple model referred to really is pretty simplistic; it does not take into account impacts of price changes, dynamics, inter-industry effects, or potential for FDI impacts (positive or negative). The prediction from the informal theorizing is also not novel: bigger trade blocs and those with higher trade shares for non-members attract entry applications because there are large trade diversion losses from staying out. Since this idea has been in the literature for decades it cannot be the reason for publishing the paper.

In that sense, the paper's potential strength rests on the empirical work. There is some interest in finding that the probability of joining rises with the amount of intra-EU trade creation (TC) and falls with the amount of non-EU trade diversion (TD). Again, however, this result is not particularly novel and certainly offers no surprises. More fundamentally, the econometric approach can be criticized on the following grounds.

1. TC and TD effects are identified from gravity-equation coefficients on dummy variables involving joint EU (or EFTA) membership and one-partner non-membership, respectively. The gravity model has been used in this way many times in the past, attracting the usual criticisms. In particular, it is a shorthand description of economic interests, rather than one based on actual optimization behavior. However, since its use is ubiquitous it can't really be criticized here.

2. More significant, the authors use the gravity model (with an appropriate set of controls for country pairs and year effects) to estimate first the TC and TD effects of EU and EFTA by year. That is, they consider EU and EFTA membership to be exogenous in the TC/TD regressions. Then they immediately use these results to estimate the probability of joining,

thereby treating EU membership as a choice variable. At a minimum, this flipping between exogeneity and endogeneity requires a significant attempt at justification, but it also requires some structural approach so that real identification is possible. Further, the variables of interest (interaction of trade shares with TC/TD) are clearly endogenous since the trade shares vary over time in part due to membership. This identification strategy simply is not credible.

3. Even more deeply, it seems that non-European countries (US, Canada, Japan, etc.) are in the sample. This is OK for the TC/TD regressions, but how can they be in the membership-choice regressions? Surely it was never possible for them to join the EU (perhaps I am unaware of such a possibility but since no non-European country ever joined surely there is a large implicit, if not explicit, bar against membership). So these countries never opted to join. But they are precisely the countries against which the TD impacts would be largest as EU expanded. It is no surprise, then, that there seems to be a large negative TD impact on the application choice.

4. Finally, the underlying story is implicitly dynamic but no dynamics are permitted in the regressions.

Some smaller points follow.

1. Sec. 2.1: it is an overstatement that supply curve is perfectly elastic; there are surely costs of achieving membership in terms of reorganizing domestic policies. The assertion is itself refuted by the authors in section 3 where they discuss deGaulle telling the UK and others it can't join, while Norway's populace refused to pay the costs. 2. Sec. 3. Why, in Table 1, do several trade shares (last 2 columns) not add up to 100%? 3. What is the "index" on the vertical axis of Figure 3?

4. TC and TD are inevitably industry-level or product-level concerns, particularly in terms of the political economy involved.

5. Reference is made to an appendix with all of the regression results but that was not included in the paper I read. Since the identification itself rests on the TC and TD coefficients, these at least should be in the text and discussed.

6. The "backlash" variable leaves much to be desired. It is probably true that a larger number of WTO members raises negotiation costs but why should it matter for this variable whether or not there is a WTO round underway?