1. INTRODUCTION

Figure 2: Geographic pattern of FTAs: Region-specific waves

This paper improve previous studies on the determinants of FTA introducing empirical techniques similar to the used to identify the transmission channels of financial crisis contagion, finding that there is evidence of "contagion effect" in the proliferation of FTA in recent years.

The rest of the paper is organized in three sections. The next section, Section 2, briefly reviews the theoretical frameworks that inform our empn

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)[1]. Winters (1996) and Lawrence (1996) surveys regionalism and multilateralism models, putting the domino theory in perspective.

The main alternate hypotheses are: 1) the FTA-vs-MTN hypothesis; 2) the bandwagon effect; and 3) the spread of democracy. The first suggests a complementarity between progress in multilateral trade talks and progress in regional trade agreements. The second suggests a very general 'demonstration effect' whereby nations sign FTAs because they see other nations signing them. The third stated that democratic countries are prone to sign FTA. These hypotheses could explain the wave like spread of regionalism. The key empirical lever that allows us to distinguish them from the contagion hypothesis is the extent to which trade ties connect the new FTA signers. The contagion hypothesis works on trade diversion, so the spread of FTAs should follow a pattern that is clearly related to the new signers' trade patterns. In particular, a pair of nations should be more likely to sign a new FTA, if either of them has recently signed FTAs with third nations that in which the pair's exporters are rivals.

2.2. Literature: Empirical analysis of FTA formation

Even the discussion about the determinants of FTA can be track back to Viner's contributions in the mid XX century, is in the early 1990s when become an important issue in International Trade. The focal question in this literature is: Why are countries eager to open markets bilaterally or regionally but reluctant to do so multilaterally? While trade policy scholars have proposed a number of explanations[2], and some of these explanations have been formalized by theorists[3], in the empirical side there is just few contributions. The Membership to FTA was typically taken as exogenous in empirical specifications, but recently researchers have started to view it as an endogenous phenomenon and have begun to explore its determinants.

The first systematic empirical study on the determinants of a FTA is Baier and Bergstrand (2004), which use worldwide data to estimate cross sectional linear probability models, stressing that economic factors seems to be enough to predict must of the agreements. In particular, they find that the likelihood of an FTA between a country pair is higher the closer they are, the more distant from the rest of the world, the larger and more similar their economic size are and the more different their labour ratios are (Heckscher-Ohlin trade).

Some previous empirical studies have already put emphasis in the "domino effect" as determinant of FTA, focusing in trade diversion as a key determinant in the willingness of membership to the European Union. A first attempt is Sapir (1997), which estimates year-by-year cross-section gravity models and finds that trade diversion tends to spike in a time pattern that explains tend to EU enlargements.

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[1] See Baldwin (1994, 1997, 2002, 2006) for applications of it to European, Western Hemisphere and Asian domino effects.

[2] Anderson and Blackhurst (1993), Krugman (1993), Bhagwati (1993), Whalley (1996), Lawrence (1996), Bergsten (1996), Panagariya (1996), inter alia.

[3] 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).

Baldwin and Rieder (2007) follow a similar strategy but estimating trade creation and diversion in a panel setting to then use the results for calculate the likelihood to become a EU member.

Some studies have focused in aspects beyond the economic determinants. Mansfield and Reinhardt (2003) offer a more political explanation, arguing that one of the main determinants of regional trade agreements are developments at the multilateral level, with difficulties in GATT/WTO negotiations

Table 1 summarises the FTAs. Europe dominates the FTAs with a total of 224, almost half of them signed in the 90s. The source of Europe's dominance in these figures is well known. Starting from the formation of the EEC in the 1950s and EFTA in 1960, the engagement between these groups and the enlargement of the former created a large number of FTA as has the external FTA engagement of the

(the closest to the infected, the most exposed to contagion). Considering this, we propose the following "Contagion Index":

$$Contagion_{i,j,t} = \sum_{s=1}^{t} \sum_{\substack{k=1 \\ k \neq i,j}}^{n} Export\ share_{ik,s} * FTA_{jk,s}$$

where:

$Export\_share_{ik,s}$ = share of exports of country i to country k the year the FTA was signed.

and

$FTA_{jk,s}$ = 1 the year an FTA between j and k was signed, 0 otherwise.

So in a given year *t* the index for country *i* with respect to *j* is the accumulated sum of the FTAs signed by

Up to 2005, Malaysia has signed three FTAs with countries in our sample: ASEAN Preferential Trading Arrangements with Indonesia, Philippines, Singapore and Thailand in 1978[5]; ASEAN expansion including Burma, Cambodia, Laos, and Vietnam in 1992; ASEAN-China Agreement on Trade in Goods in 2005. On the other hand, in the year the FTAs were established the export shares of Australia to the signers were 6%, 0.1% and 4%, respectively. Then, the Contagion Index of Australia from Malaysia is the accumulation over the time of the shares, as shown in Figure 4.

Figure 4: Contagion Index of Australia from Malaysia

Of course, it takes two to dance, when it comes to signing FTAs, so we must also consider the

4. RESULTS

4.1. Cross-Section

Our first approach is to study the cross sectional properties of the contagion indicators, that have to thought as the long-term or cumulative effect. Here we will start following the literature in the static determinants of the formation of FTAs between pairs of countries. The most important contribution in the area is the study by Baier and Bergstrand (2004, B&B henceforth) that amply a qualitative choice

all the parameters, with the exception of the one related with the capital/labour ratio[10]. In column 3 we explore some shared cultural characteristics between the countries in the pair that could be important to determinant the existence FTAs, namely common language, a past colonial relationship and common colonizer (dropped by colinearity in this specification). B&B disregard this type of determinants, but, in opposition, we find that common language has a positive and significant effect, and that slightly improve the efficiency of the model, a result confirmed in later exercises.

In the last columns of the first panel the values for the three contagion indicators for 2005 are included. In order to follow B&B original specification, undirected dyads (one observation per dyad) are estimated, and the symmetric contagion indicators are used. Column 4 shows that the indicator that averages the country-pair contagion indexes has a positive and significant impact in the probability to sign a FTA, with an improvement of five percentage points in the pseudo-R^2. The coefficients for cont1be(r)nicie ics bns i-1.4012,839C1.8(.9(8f cons)th1no01&4.2(i-1.40(8f con(e),n(cie)-p8.59ai)-1.-4.od25.l8f cou.od25.

Table 2: Cross Section Results

4.2. Robustness checks for cross section

In the estimations presented in the last section, the contagion indexes are defined in the way showed

sample contains only 72 countries (for which we have data in the initial year) and 2180 pairs. The basic results hold.

We can even go more back in time, trying to eliminate any doubt due to possible endogeneity related with trade diversion of the FTAs of before 1976. We rebuild the indicators using the trade shares in the first year we could get data of exports, 1962, where the only agreement was the EU6, which pairings are eliminated of the specification. Column 3 of Table 3 shows the results of estimations that now get reduced to just 46 countries and 1578 observations. All main results hold.

A different approach to deal with the endogeneity is to estimate "potential" export shares instead of the observed in reality, so the weights is the latent trade relevance of the partner due to geographical, cultural and economic characteristics. The methodology to estimate the potential export shares is in two stages[13]: we first estimate a gravity equation where the dependent variable is the log of the actual exports volumes (measured in real US dollars) regressed against the log of the product of GDPs of the trade partners in a given year, including the dummy for FTA between them, country-pair fixed effects (that account for all common time invariant characteristics as distance, language, border, etc.) and year fixed effects (capturing common shocks). The second stage is to estimate the fitted export values to build the potential shares. Column 4 of Table 3 shows the results, with a no significant change in the value of the Contagion Index. Even this approach has several advantages in term of removing sources of endogeneity, like controlling for the change in trade shares due to agreements, we think that the real variable observed by the policy makers, actual trade shares, is a better weight to account for contagion effect.

A final robustness is related with the definition of FTA. In all the later calculations we use the broader definition of trade agreement available in our database, which include every kind of deals. But it's possible that the contagion just happen when the agreement is actually implemented and implies real concessions. In Column 5 of Table 3 we present re-estimates that use the contagion index built just with FTA in force and defined explicitly as Free Trade Agreements in the database, same thing for the dependent variable. 35% of the agreements are eliminated in these estimates, but the basic results hold.

4.3. Panel specification

$$P(PTA_{ijt} = 1 | PTA_{ijt-1} = 0) = G(\beta_0 + \beta Z_{ijt-1} + \gamma Contiguity_{ijt-1})$$

With the dependent variable been now the probability that a pair of countries sign a trade agreement in period t, conditional to the fact that such agreement did not exist in the previous period. This implies

detrended number of GATT/WTO members; a dummy equal 1 if a trade round is ongoing in a given year; a dummy equal 1 if one country in the pair lost a dispute and a dummy equal 1 if the country was in a dispute.

Table 4: Dynamic Determinants of FTA in M&R Dataset

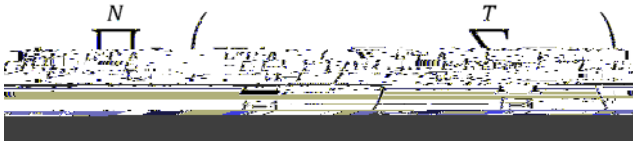
	(1) m&r fta 1950-98	(2) m&r fta 1950-75	(3) m&r fta 1976-98	(4) m&r fta 1976-98	(5) fta wti 1976-98	(6) fta wti 1976-98
Contagion Index (t-1)				0.0289***		0.0104***
				(0.0032)		(0.0025)
WTO Members (t-1, detrended)	0.138***	-0.0974***	-0.134***	-0.0724**	-0.143***	-0.144***
	(0.0109)	(0.0269)	(0.0459)	(0.0351)	(0.0438)	(0.0454)
WTO Round (t-1)	1.691***	0.0351	-1.196**	-0.971**	-2.053***	-2.119***
	(0.1577)	(0.1915)	(0.5808)	(0.4936)	(0.5447)	(0.5687)
WTO Dispute Lost (t-3)	1.438***	1.944***	1.218***	1.198***	0.380**	0.407**
	(0.1210)	(0.1621)	(0.2155)	(0.2137)	(0.1752)	(0.1768)
WTO Dispute With Third Party (t-1)	0.769***	0.345**	0.704***	0.287	-0.304	-0.295
	(0.1331)	(0.1595)	(0.2016)	(0.2029)	(0.1900)	(0.1897)
Democracy (t-1)	0.0491***	0.0562***	0.205***	0.168***	0.0278**	0.0299***
	(0.0053)	(0.0060)	(0.0254)	(0.0197)	(0.0114)	(0.0116)
Distance	-0.674***	-0.650***	-1.039***	-0.982***	-1.155***	-1.166***
	(0.0272)	(0.0349)	(0.0870)	(0.0827)	(0.0840)	(0.0844)
GDP (t-1)	-0.148***	0.0170	-0.0944	-0.240**	-0.0292	-0.0380
	(0.0559)	(0.0794)	(0.0635)	(0.1051)	(0.0712)	(0.0704)
GDP per capita (t-1)	0.0185***	-0.0121**	0.0514***	0.0353***	0.00862	0.00879
	(0.0042)	(0.0056)	(0.0076)	(0.0067)	(0.0055)	(0.0054)
GDP growth (t-1)	-0.0339***	0.00515	-0.0599***	-0.0735***	-0.0517***	-0.0497***
	(0.0091)	(0.0101)	(0.0146)	(0.0138)	(0.0105)	(0.0105)
FTA density (t-1, centered)	-21.58***	-127.5***	-114.5	-105.0	-60.26***	-61.16***
	(2.2825)	(10.9597)	(103.3323)	(87.3383)	(13.6951)	(13.8966)
FTA density² (t-1, centered)	-511.1***	-64.44	-1803	-1528	425.3*	466.8**
	(67.0399)	(66.0358)	(3826.5012)	(3478.6977)	(226.3410)	(228.7370)
Trade Partner Coverage (t-1)	3.073***	2.889***	4.319***		0.944***	
	(0.1445)	(0.2061)	(0.3129)		(0.2053)	

economic downturns is backed by the negative sign in the parameter for GDP growth. Bandwagon effect is incorporated by M&R using the proportion of the 10 main trade partners that already have an FTA ("Trade Partner Coverage" in Table 4), a variable that appear with a positive and significative sign. More than a simple "monkeys see, monkeys do" we think that this variable represents preliminary evidence of the contagion effect. Finally, FTA density (proportion of dyads with and FTA in a given year) and its squared value are incorporated, showing a decreasing return of the gains related to the agreements (the negative sign is because the variable is centered in 0).

In columns 2 and 3 of Table 4 we split the sample of the first column in two sub-periods: 1950-1975 and 1976-1998, in order to study if the results are not dependent to the chosen time span. The main changes are that now the parameter associated to

related with sample composition (countries like Algeria, Jordan and Syria, that are classified as autocracies at the moment of sign various FTA are not in M&R database); the lack of information in

thousand dummies). One solution to alleviate the bias problem in panels with limited dependent variable is to estimate conditional likelihood functions with minimal sufficient statistics for the fixed effects. Chamberlain (1980) proposed a conditional logit model that in our case will take the following form:



When the conditional probability is different than 1, the logit function do not involve the fixed effects parameters and conventional Maximum Likelihood estimation can be perform. Then conditional logits will provide unbiased estimations of the parameters, but just for the sub-sample of dyads that switch status during the observed period, that is those that subscribe an FTA between 1977 and 2005.

Table 6: Dynamic Determinants of FTA, Conditional Logit Estimates (Dyads Fixed Effects)

	(1) All FTA	(2) All FTA	(3) All FTA	(4) All FTA	(5) All FTA	(6) Pure FTA
Contagion (average, t-1)	0.257**					
	(0.1027)					
Contagion (max, t-1)		0.265***				
		(0.0383)				
Contagion (min, t-1)			0.102			
			(0.0657)			
Contagion exports '76 (average, t-1)				0.198*		
				(0.1154)		
Contagion gravity (average, t-1)					0.353**	
					(0.1755)	
Contagion pure FTA (average, t-1)						0.222***
						(0.0316)
WTO Members (t-1, detrended)	-0.0498**	-0.0374	-0.0322	-0.0675**	-0.0518**	0.0246
	(0.0250)	(0.0257)	(0.0248)	(0.0281)	(0.0247)	(0.0162)
WTO Round (t-1)	-0.468**	-0.273*	-0.110	-0.812***	-0.347**	-0.0597
	(0.1950)	(0.1537)	(0.1368)	(0.1857)	(0.1675)	(0.1767)
Political Distance (t-1)	-0.0178	-0.0743	-0.0553	0.0130	-0.0403	0.0566
	(0.0523)	(0.0543)	(0.0632)	(0.0771)	(0.0567)	(0.0547)
GDP product (t-1)	0.0121*	0.0143*	0.0224**	0.0200**	0.0104*	0.00196*
	(0.0067)	(0.0083)	(0.0093)	(0.0092)	(0.0059)	(0.0010)
Observations	7332	7332	7332	5847	7268	8580
Dyads	401	401	401	255	397	456
Pseudo R2	0.769	0.750	0.731	0.809	0.744	0.770

Standard errors clustered over dyads in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Six duration dependence splines and a time trend are included but no showed in the table.

The dependent variable is now again the FTA status binary variable, with value 0 before the agreement was registered and 1 afterwards, so some of the economic variables in the previous specification are endogenous and will not be included. Here we will prefer a undirected dyads specification, so the symmetric measures of contagion will be tested.

In the three first columns of Table 6 we show the results of the conditional logit estimates for the undirected dyads for the symmetric indicators of contagion. Of those, the average and maximum indicator are positive and significative, but the one for minimum contagion is not significative. We control for the multilateral variables, that again have the opposite sign that predicted; for political distance, that in this case have the right sign but is not statically relevant; and for the product of the GDP of countries in the dyad, that is positive and significative (at 5%).

The last three columns of Table 6 perform the same previous robustness checks -now just for the averaged contagion indicator- and the basic results supporting contagion effect hold.

CONCLUDING REMARKS

This preliminary draft presents evidence that contagion may be important in explaining the spread of

Baldwin, Richard E. (1995), 'The domino theory of regionalism', in Baldwin, Haaparanta and Kiander (eds.), Expanding membership of the European Union (Cambridge: CambridgeUniversity Press).

Fafchamps, Marcel and Gubert, Flore (2007). "The formation of risk sharing networks," Journal of Development Economics, Elsevier, vol. 83(2), pages 326-350, July.

Fernandez, Raquel and Portes, Jonathan, 1998. "Returns to Regionalism: An Analysis of Nontraditional Gains from Regional Trade Agreements," World Bank Economic Review, Oxford University Press, vol. 12(2), pages 197-220, May.

Frankel, Jeffrey and David Romer (*1999*), "Does trade cause growth?" American Economic Review vol 89, 3, 379-399

Freund, C. (2000) Different Paths to Free Trade: The Gains from Regionalism*. Quarterly Journal of Economics 115:4, 1317-1341.

Grossman, G. and E. Helpman (1995). “The Politics of Free-Trade Agreements,” American Economic Review 85 (1995b):667-690.

Holmes, Tammy (2005). What Drives Regional Trade Agreements that Work? HEI Working Paper, No. 07/2005, Graduate Institute of International Studies, Geneva.

Hufbauer, G. (1989). Background Paper for The Free Trade Debate, Reports of the 20th Century Fund Task Force on the Future of American Trade Policy, Priority Press, New York.

Katz, E. (2001). Bias in Conditional and Unconditional Fixed Effects Logit Estimation. Political Analysis, vol. 9, pp. 379-384.

King, Gary, and Langche Zeng (2001). Explaining Rare Events in International Relations. International Organization 55 (3):693–715.

Krishna, P. (1998). “Regionalism and Multilateralism: A Political Economy Approach,” Quarterly Journal of Economics, February 1998, Vol. 113, No. 1, Pages 227-250.

Krugman, P. (1991a). "The move toward free trade zones," Economic Review, Federal Reserve Bank of Kansas City, issue Nov, pages 5-25.

Krugman P. (1991b). “Is Bilateralism Bad?,” in Helpman and Razin.(eds) International Trade and Trade Policy, Cambridge MA, MIT Press.

Krugman, Paul (1993), 'Regionalism versus multilateralism: Analytic notes', in De Melo, J. and Panagariya, A. (eds), New dimensions in regional integration, (Cambridge: CambridgeUniversity Press for CEPR).

L. Neal, D. Barbezat (1998). "The Economics of European Union and the Economies of Europe." Oxford University Press, 1998.

Lawrence, R. (1996), Regionalism, multilateralism and 14 -2.3(erp7si)4tfpeoersivDe8(Ba)6.,3lti1Wc.009shi(ic)1gt(ic)1onan C3

Panagariya (1996), 'APEC and the United States,' CIES DP, (University of Adelaide).

Rieder, R. (2006). Playing Dominoes in Europe: An Empirical Analysis of the Domino Theory for the EU, 1962-2004. HEI Working Paper, No. 11/2006, Graduate Institute of International Studies, Geneva.

Sapir, A. (1997),'Domino effects in Western European Trade, 1960-1992,' CEPR DP (London). Published as 'Domino effects in Western European regional trade, 1960-92', European Journal of Political Economy, Vol 17: 386, 2001.

Viner, J. (1950). The Customs Union Issue. Carnegie Endowment for International Peace, New York.

Whalley, J. (1993), 'Regional trade arrangements in North America: CUSTA and NAFTA,' in De Melo, J. and Panagariya, A. (eds), New dimensions in regional integration, (Cambridge: CambridgeUniversity Press for CEPR).

Whalley, J. (1996), 'Why do countries seek regional trade agreements?', NBER WP 5552 (Cambridge MA)

Winters, A. (1996), 'Regionalism versus multilateralism,' World Bank PolicyResearch Working Paper 1687, (Washington).

Wu, J.P. (2004). Measuring and Explaining Levels of Regional Economic Integration. ZEI Working Paper B12/2004, Centre for European Integration Studies, Bonn.

APPENDIX 1: COUNTRIES IN THE SAMPLE

Country	Obs. (2005)	Obs. (panel)	First Obs.	FTAs (2005)	Contagion Indicators (mean 2005)		
					Average	Max	Min
TOTAL	**4661**	**134733**		**782**			
Albania	57	484	1998	3	18.03	45.07	1.27
Algeria*	83	2492	1976	27	19.44	53.46	23.05
Argentina*	102	3287	1976	10	6.36	22.67	2.87
Armenia	55	723	1993	9	11.54	27.37	9.12
Australia*	106	3823	1976	7	11.27	25.76	6.82
Austria	111	3774	1976	34	26.69	57.65	22.23
Azerbaijan	68	585	1998	13	13.47	32.32	10.07
Bangladesh	98	3110	1976	6	7.81	21.83	2.2
Belarus	88	909	1997	11	11.44	31.18	7.85
Belgium*	111	1258	1997	36	23.56	50.36	1.94
Bolivia*	72	2147	1976	10	4.99	19.9	3.54
Brazil*	110	3794	1976	11	4.9	18.64	1.75
Bulgaria*	95	2386	1980	23	14.05	48.66	22.39
Burkina Faso	49	1637	1976	4	13.21	30.98	0.89
Cambodia	54	453	1998	6	8.98	23.16	3.53
Canada*	110	3775	1976	7	9.08	22.68	4.01
CAF	44	1563	1976	1	21.42	50.92	0.04
Chad	37	1083	1976	1	15.25	41.23	0.04
Chile*	92	2738	1976	30	27	65.29	20.59
China	111	3795	1976	12	4.15	15.33	3.18
Colombia*	92	3161	1976	19	6.6	21.25	3.21
Costa Rica*	73	2574	1976	12	6.23	22.51	3.27
Cyprus	94	2974	1976	22	20.71	49.22	24.2
Czech R.*	110	1551	1993	24	13.06	49.77	20.77
Denmark*	111	3921	1976	36	27.78	58.65	22.71
Ecuador*	79	2319	1976	10	4.37	16.05	3.55
Egypt*	100	3136	1976	33	21.57	51.23	20.81
El Salvador*	70	2060	1976	9	5.56	18.38	2.49
Estonia	87	1349	1993	22	20.44	55.33	3.18

	Greece*	109	3693	1976	8	21.13	49.38	18.95
	Guatemala*	71	2323	1976	8	5.64	17.93	2.1

Pakistan	108	3554	1976	13	6.87	19.67	3.05
Panama*	79	2491	1976	7	5.19	20.72	1.06
Papua N. G.	48	1793	1976	3	10.32	22.89	1.81
Paraguay*	62	1969	1976	10	9.7	25.65	3.96
Peru*	86	2818	1976	10	5.91	20.44	2.71
Philippines*	95	3312	1976	6	5.94	16.7	2.69
Poland*	109	3342	1976	24	13.19	51.51	23.17
Portugal*	111	3719	1976	34	26.69	58.19	22.57
Romania	99	1534	1976	23	13.27	48.97	23.2
Russia	104	977	1998	11	8.99	22.89	2.49
Sierra Leone	47	1696	1976	3	15.53	38.85	0.42
Singapore*	98	3308	1976	14	8.22	33.59	9.31

APPENDIX 2: DATA DESCRIPTION