Evaluating The Symmetry of Trade Policy: Evidence From Liberalization Reversals

By Youssef A. Benasser *

Is trade policy symmetric? Using a dataset of trade agreements from 1986 to 2016, I identify 126 instances of trade liberalization reversals where standing agreements are revoked and barriers to trade are reinstated. I study the impact of these reversals on import volumes to understand whether trade flows responses to positive and negative liberalization shocks are symmetric. Some weak evidence of positive trade policy asymmetry emerges : trade volumes appear to respond more to favorable shocks, whereas reversals do not erase the gains achieved under liberalization. However, the hypothesis of perfect policy symmetry cannot be rejected at credible confidence levels.
JEL: F02, F13, F14, F15

I. Introduction

Trade policy reversals, understood as back and forth changes in trade openness, are characteristic of the competing tides of protectionism and liberalization. This tension was recently put on full display in the context of the most important trade relation : China-US trade. Bound by the rules of indiscriminate treatment under the WTO agreement since 2001, the two countries have restored significant trade barriers in the form of tariffs and ad-hoc restrictions over the past few years. Some have been since removed. Most stand to be reversed by the new US administration. This invites a policy conversation about whether the cost of these policy reversals, and their symmetry.

Policy reversals are not specific to US-China trade, or circumscribed to a context of weakening global trade regulation. Within the multilateral trade system, countries exercise much of their trade policy flexibility through bilateral trade agreements. The 164 member governments of the World Trade Organization benefit from non-discriminatory treatment from peers – shielding their trading firms from targeted tariff and regulatory shocks. In return they accept to treat all partners equally, losing the ability to adjust their policy at the margins towards different trading partners. Trade policy flexibility is significantly limited

* University of Oregon, 1585 E 13th Ave, Eugene, OR 97403, youssefa@uoregon.edu.
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by this arrangement, but not entirely lost. Indeed, the WTO agreement allows countries to grant more favorable treatment to targeted partners via preferential systems, free trade agreements, and custom unions, all indiscriminately referred to in this paper as trade agreements. As a result, for all the growth in WTO membership, the number of country pairs operating under trade agreements has grown much faster (see figure 1). This stresses the degree to which, within the global trade system, trade agreements have become an essential tool to extract and exercise trade policy flexibility within an otherwise restrictive environment. Countries exercise trade policy flexibility through trade agreements by entering into them. They also exercise that flexibility by reviewing and revising them, suspending or leaving them, and even at times, reentering them after periods of retraction. Policy flexibility entails policy reversal, and from policy reversal arises the question of policy symmetry.

In this paper I ask: is trade policy symmetric? Since the inception of the General Agreement on Tariffs and Trade (GATT) in 1947, the dominating trend in global trade has been towards increased liberalization. While global trade liberalization is unlikely to become undone, protectionist discourse and policies are creating more frequent exceptions to the norm. Fluctuating political discourse promotes policy reversals. And new crises, such as the Covid pandemic, bring traditional policy choices into focus, promising possible departures from the trend. The goal of this paper is to study one of the core properties of the policy reversals that we have and might still witness - their symmetry.

Policy asymmetry has been the topic of a large literature within monetary economics. This extensive literature looking into the asymmetry of monetary policy shocks distinguishes three dimensions: asymmetry related to the direction of the shock, the size of the shocks, and asymmetry related to the phase of the business cycle (Stockwell, 2020). This paper focuses exclusively on directional asymmetry. It answers the question of symmetry by leveraging liberalization agreement reversals as policy shocks and comparatively studying the response of trade volumes to positive and negative policy shocks. In this context, perfect trade policy symmetry would require that the response of trade flows to a positive shock is equal in absolute value but has the opposite sign from the response to a negative shock.

The identifying trade policy shocks in my analysis are shocks to trade agreements. These include two pairs: entry and exit and, upgrading and downgrading. Testing the symmetry hypothesis is achieved by jointly estimating and subsequently comparing country pairs' trade volume response to positive and negative shocks, respectively. The treatment group is constructed from an exhaustive dataset collected for agreements from 1950 to 2016 for all currently existing countries. Within this dataset, I identify and isolate all instances of trade liberalization reversals and document several of their key characteristics. The control group is a larger set of country pairs that do not experience any policy reversals during the study period. Using a panel data generalization of the gravity equation I measure trade volume response to entry and to exit for treated units against the control group. The point estimates of the treatment parameters and the associated confidence intervals allow me to compare the trade responses to trade agreement shocks across direction.

The paper presents results from three main estimations: a pooled regression, an analysis of deep trade shocks, proxied by free trade agreements, and a focus on shocks to the less comprehensive preferential trade agreements. In all three cases, point estimates display signs of positive asymmetry: negative liberalization shocks do not erase the gains achieved following positive shocks. However, at the 95% confidence level, perfect symmetry of trade policy cannot be rejected.

The paper that is closest to this work is a recent study by USITC affiliates Daigle et al. (2019) which surveys agreement exits and describes some common patterns, and subsequently focuses on 6 case studies to illustrate geographic and situational diversity of reversal decisions. This paper goes further by quantifying the impacts of exits using econometric methods and firmly placing the analysis in the context of policy symmetry. While the analysis of symmetry in the context of trade policy and trade agreements is a new question, this exercise borrows from and builds on two trade literatures. Identifying the impact of trade agreements, specifically free trade agreements (FTAs) has been a ubiquitous research agenda for many years. This has allowed for a constant improvement of the econometric techniques required for accurate impact measurement. Earlier research reached contradictory and "fragile" results (Ghosh and Yamarik, 2004). Baier and Bergstrand seminal 2007 paper developed a framework that adequately handles the issue of trade agreement endogeneity using panel methods. The specification is anchored in theory and derived from the trade gravity equation. This workhorse model is the starting point for my estimation equation. My approach will also reflect a recurrent concern in recent contributions to this literature, namely the heterogeneity in trade response to policy shocks. Geographic, regulatory and economic characteristics have been found to drive this heterogeneity (Eicher and Henn 2011, Kohl 2014, Kohl et al. 2016). The study of symmetry conducted in this paper sheds light on the trade costs of policy reversals and volatility. As such, it also contributes to a reemerging literature about protectionism and liberalization reversals. Recent swings in trade policy have supplied multiple negative shocks that have been measured and analyzed. Auer et al. (2018) estimate that revoking NAFTA would have reduced US welfare by 0.2%. Faigelbaum et al. (2020) find that US and retaliatory tariff introduced in 2018 generate a loss to US consumers and firms of 0.27% of GDP. Oberhofer and Pfaffermayr (2018) expect UK exports to the common market to shrink by up to 45.7% following an exit from the common market. Negative shocks to non-tariff measures have also received increased attention (Miromanova 2019, Haidar 2017).

The rest of the paper is organized as follows. Section 2 presents the data, sample construction and the stylized facts surrounding policy reversals. Section 3 lays out the empirical strategy and identification framework. The section then describes a set of theoretical underpinnings and candidate hypotheses and predictions to clarify what is meant by symmetry and parse out the possible cases. I subsequently present baseline results. Section 4 slices the sample along heterogeneity dimensions to reveal context-specific results. Section 5 concludes.

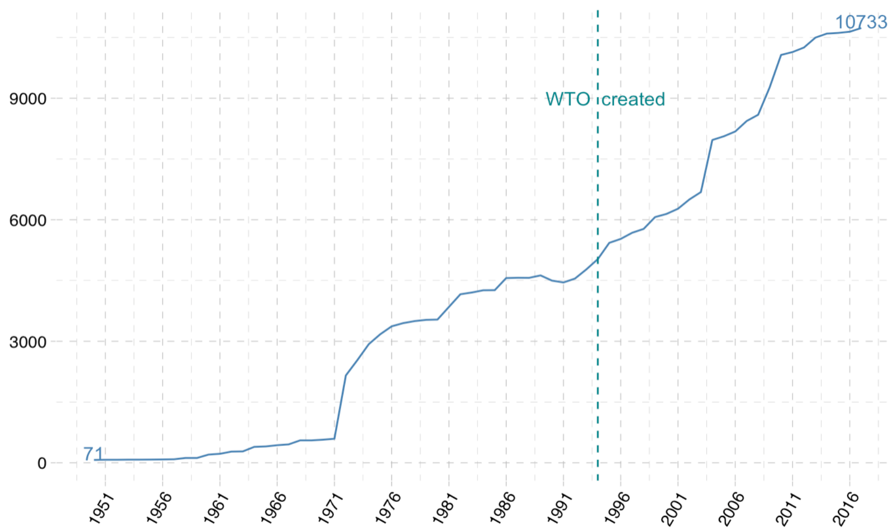

Figure 1: Country-pairs sharing a trade agreement, frequency 1950-2016
Source: NSF-Kellogg's Database on Economic Integration and WTO RTA database

II. Data

A. Agreements data

Data on trade agreements is derived primarily from the NSF-Kellogg Institute Data Base on Economic Integration Agreements (EIA). This dataset distinguishes six types of trade agreements, based on depth of economic integration going from less to most integrated. These are: asymmetric preferential agreements, bi-directional preferential agreements, free trade agreements, customs unions, common markets, and economic unions. The latest release of the EIA covers all country pairs from 1953 to 2014.

To ensure that the study is as current as possible, I supplement the EIA data with 2 additional years of observations using the World Trade Organization's (WTO) database on regional trade agreements. This extends the time series dimension of the data until 2016 and allows me to expand the treatment group.

Symmetry is evaluated by comparing the response of trade volumes to a positive shock and to a negative shock *among those country pairs* that have experienced a shock reversal. A trade policy shock reversal is defined as an initial positive shock that is later followed by a negative shock. Positive shocks are proxied by entry into a trade agreement. Negative shocks are withdrawals from existing agreements – regardless of whether the withdrawal is towards the default state of no agreement, or towards a less integrated arrangement. This generalization is dictated by the limited number of treated pairs. Identifying exit and agreement downgrading (resp. entry and upgrading) as separate negative (resp. positive shocks) results in loss of explanatory power. Therefore the initial analysis will adopt a more general definition of shocks. Subsequent heterogeneity analysis will allow for differentiation, with the caveat that statistical power will be reduced.

Appendix table A-6 lists all country pairs that I consider to be treated. There are 159 observed reversals. 33 of these have to be removed from the treatment sample due to unavailable data on the response variable, trade volumes. The 72 treated countries span a wide geography, including African, European, American and Asian countries. There is also a diversity of income levels, trade openness, and trade volume levels. Figure 2 captures the diversity of the treated sample by focusing on the varying levels of wealth and trade openness. Panel A represents the distribution of GDP per capita for treated countries, and reveals that the treated sample spans the whole income distribution spectrum. It also shows that poorer countries concentrate . Panel B plots the distribution of treated countries' trade-to-GDP ratios, a measure of their trade openness. Again, the distribution is wide, ranging from one of the world's most closed countries, Erithrea, to one of the most open to trade, Hong-Kong.

There are different margins of treatment heterogeneity in the constructed data, and these margins are coded in my dataset for later analysis. The first source of heterogeneity is the variation in the length of the agreement's enforcement period. Another source of heterogeneity is that a few country-pairs experience more than one reversal. For example, over the period of study, Romania and Bulgaria experience an alternation of three shocks: they start the period within an agreement, suspend it in 1991, and later enter into a new agreement in 1999. A third and final source of treatment heterogeneity is the size of the reversal. The trade barrier restoration that is implied by an exit from an FTA to an MFN regime is larger than a downgrading from an FTA to a bilateral preferential agreement. Coding these dimensions in the data allows me to account for them in subsequent heterogeneity analysis.

B. Trade data

I use import volumes as the response variable to agreement reversals. The empirical literature favors import over export flows as they are generally believed to be

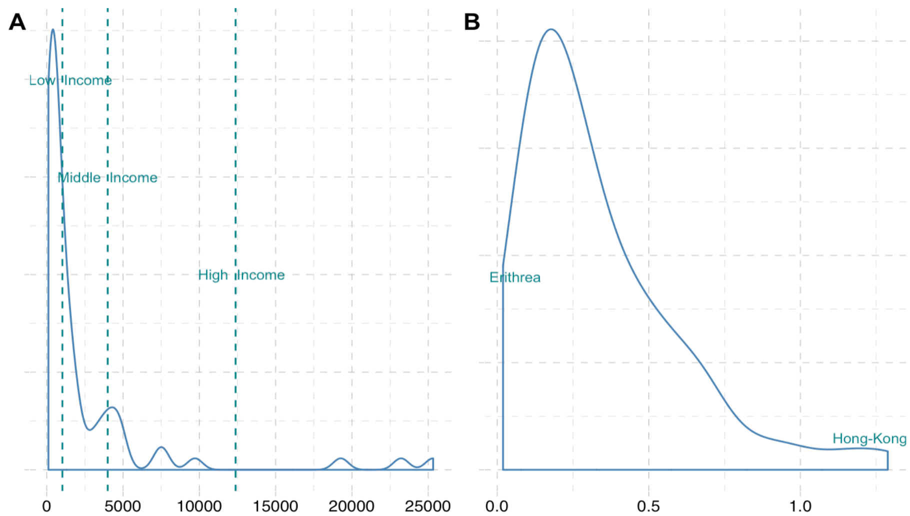

Figure 2: Distributions for GDP per capita, and trade to GDP ratios for treated countries
Source: CEPII Gravity Data, 2000

more precisely measured by reporting countries. Import volumes are extracted from the UN's Commission on Trade's database (COMTRADE). Analysis with exports yields very similar results.

I choose to focus the analysis on the 31 years extending from 1986 to 2016. Starting the sample in 1986, instead of an earlier date, serves two purposes. First, it minimizes the multiplicity of time breaks that would exist if the data started earlier. The empirical strategy, described in the next section, assumes that unobserved bilateral characteristics are constant overtime. This assumption becomes increasingly questionable as the time window expands, and the possibility for structural breaks increases. Second, withdrawals, as observed in the data, are very rare prior to the 1990s. For these two reasons, extending the time horizon before 1986 is more likely to generate noise than to support identification in the subsequent analysis.

COMTRADE collects data in a way that has potential implications for empirical analysis. On the one hand, it receives data from member countries, making it a reporting-based database. On the other hand, it applies a filter to reported data, and drops 0- and negligible trade flows. This approach creates some data ambiguity: missing values can indicate either truly missing reports, or a zero-trade flow. Leaving this ambiguity unaddressed can generate bias through measurement errors. To resolve this ambiguity, I proceed as follows. A country that reports a total of 0 imports with all partner countries in year t is considered to have failed to report, and all of its import flows for year t are treated as missing. Conversely, if a country reports a strictly positive total value of imports, its unreported flows with other countries are treated as zeroes. This approach relies on the assumption that a country that reports any flow in year t will report all flows in that year. This is a strong but necessary assumption to extract additional information from a dataset that would be lost with indiscriminate treatment. Table 1 shows the structure of the data, and the result of this filtering algorithm.

In addition to the 72 countries that experience shock reversals at some point in time, I include 11 additional countries. These are chosen randomly among a list of countries that have not experienced any shock reversals over the time period of the study. The complete data consists therefore of a panel of 83 countries, or 6806 pairs, over 31 years.

Table 1—Summary trade data

	1990	1995	2000	2005	2010	2015
Reporting countries	40	58	76	74	73	60
Missing flows	4262	4184	2930	2566	2261	2878
Treated as na	2388	1581	526	540	514	1040
Treated as zero	1874	2603	2404	2026	1747	1838

Sources: NSF-Kellogg Institute & WTO, adjusted by author

C. Stylized facts

Next, I present some of the stylized facts observed in the constructed dataset. Within this sample, the disappointing track-record of multilateral trade liberalization is reflected (and perhaps reinforced) by the proliferation of bilateral and regional agreements, as captured in table 2. From 1996 when the Uruguay round of tariff reductions (the latest negotiation round to date) had been finalized, until 2016, the number of enforced agreements amongst our sample of 83 countries went up by a staggering 70%. By 2016, about 18% of the pairs in the sample operated under a negotiated preferential trade regime. Over the same period, the number of FTAs increased 17-fold. This trend points to the importance of bilateral arrangements in regulating global trade, and in shaping up the geography of trade flows, making the unravelling of these arrangements important to track and evaluate.

In my sample, 72 countries were involved in an exit from an existing agreement between 1986 and 2016. Exits add up to 126 cases, which are summarized in table 3. 93% of exits are not immediately replaced by an interim agreement, and are complete reversals to the default trade regime. The default trade regime is WTO's *Most Favored Nations* (MFN) for most of the country pairs. African countries are over represented in the sample due to (a) significant volatility in trade policy choices as countries have historically chosen to leave regional trading blocs either to join an alternative region, or to later on return into the original

Table 2—Summary agreement data

	1986	1996	2006	2016
Number of countries	83	83	83	83
Number of possible pairs	6889	6889	6889	6889
Number of agreements	576	700	974	1194
Of which				
PTAs	566	644	740	818
FTAs	2	16	170	297
CUs	7	40	65	80

Sources: NSF-Kellogg Institute & WTO, adjusted by author

one (b) their status as beneficiaries of asymmetric preferential trade agreements that come with expiration criteria. The average length of an exit in our sample is 13 years, after which some exits are reversed and renegotiated agreements are introduced. We refer to these reintroductions as "reentries".

Table 3—Trade liberalization reversals

Number of exits	126
Of which	
from FTA	12
to nothing	117
African Pairs	68
EU accession	17
Reversed	42
Average length of exit (years)	13
Maximum	28
Minimum	1

Sources: NSF-Kellogg Institute & WTO, adjusted by author

It is worth noting that the trade liberalization shock reversals span the whole time dimension of the panel (figure 4). Peaks are registered around globally or regionally relevant dates. The 1990-1991 peak reflects a string of preferential trade agreements amongst the Socialist Bloc countries that unravelled upon the collapse of the Soviet Union. The peak around 1998 reflects a series of realignments between different African trade blocs. A third peak in 2004 is the consequence of the EU's most significant enlargement to date, when 10 Eastern European countries joined the common market and consequently relinquished some of their existing agreement with third parties. Each of these three different episodes are controlled for separately in the rest of this study.

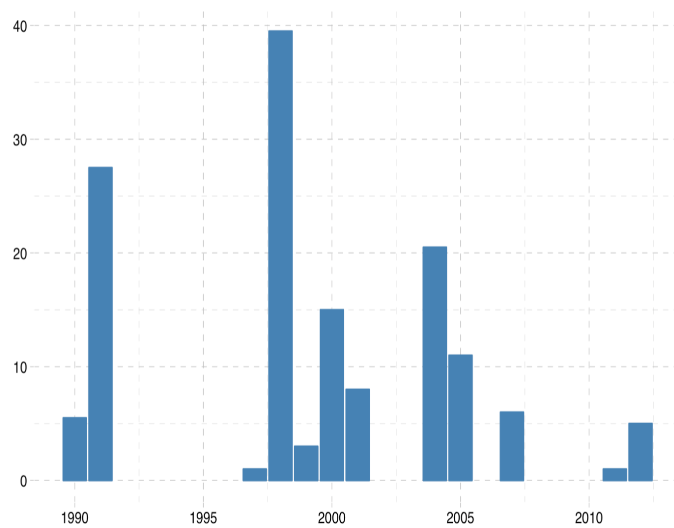

Figure 3: Exits by year

Source: NSF-Kellogg Institute & WTO, adjusted by author

III. Methodology and Baseline Results

A. Main specification

I follow the framework laid down in Baier and Bergstrand (2007) for estimating the trade effect of FTAs using the gravity equation. The full derivation is presented in the appendix. It starts with the gravity equation proposed by Anderson (1979) and popularized by Anderson and van Wincoop (2003) and refined by Baier and Bergstrand (2007) :

$$X_{ij} = \frac{A_i \omega_i^{-\theta} \tau_{ij}^{-\theta}}{\sum_l A_l \omega_l^{-\theta} \tau_{lj}^{-\theta}} E_j \tag{1}$$

where E_j is total expenditure by country j on all goods. A_i is a measure of quality of goods in country i, ω_i is the wage in i; and τ_{ij} is the iceberg trade cost between i and j. Origin characteristics are weighted against characteristics from competing import sources, which are captured by the aggregator in the denominator. θ is the constant trade elasticity.

Trade frictions $\tau_{ij,t}$ are assumed to have an observable and an unobversable component such that:

$$\tau_{ij,t} = \text{Trade regime}_{ij,t} + \psi_{ij} + \nu_{ij,t} \tag{2}$$

Where ν_{ij_t} is a measure of time-varying costs and frictions not related directly to the trading regime, and ψ_{ij}. An identifying assumptions is that the unobserved time-varying frictions are uncorrelated with the trade regime.

For the purpose of this study, the trade regime has two components: a base component that captures whether the pair is operating under a trade agreement, and an additional component that describes whether the ongoing trade regime is a result of a policy reversal (i.e. agreement exit, or reentry into an agreement). To the extent that these components do not have to contribute equal shares to trade frictions, we can rewrite equation (2) as :

$$\tau_{ij,t} = \alpha_1 \text{Agreement}_{ij,t} + \alpha_2 \text{Exit}_{ij,t} + \alpha_3 \text{Agr}_{ij,t} \times \text{Reentered}_{ij,t} + \nu_{ij_t} \tag{3}$$

Where $Agr_{ij,t}$ is an indicator variable that takes value 1 when the pair ij shares a trade agreement (preferential trade agreements, free trade agreements, or more integrated trading regimes). $Exit_{ij,t}$ takes value 1 when the two countries are trading outside of an agreement they previously shared. Note that because the sample includes ij pairs that never share an agreement, $Exit_{ij} \neq (1 - agreement_{ij})$ $Reentry_{ij,t}$ takes value 1 if the pair operates under an agreement that was previously exited and then restored.

By combining (1) and (3), allowing for time variation, rewriting in exponential form and replacing the endogeneous and non-observable variables with country time, and pair fixed effects, we obtain the following specification:

$$\begin{aligned} X_{ij,t} = exp(&\eta_{i,t} + \psi_{j,t} + \gamma_{ij} + \beta_1 \text{Agr}_{ij,t} + \beta_2 \text{Exit}_{ij,t} \\ &+ \beta_3 \text{Agr}_{ij,t} \times \text{Reentered}_{ij,t}) + \varepsilon_{ij,t} \end{aligned} \tag{4}$$

The full derivation of equation (4) is presented in the appendix.

Under this specification, the identifying assumption is that once we account for time-varying import market characteristics (such as country size, market competition, and total spending), time varying exporter characteristics (product quality and price), and time-invariant pair characteristics (distance, and other proximity measures), the only remaining source of variation among trade volume predictors is the bilateral cost of trade $\tau_{ij,t}$. Additionally, my derivation assumes that bilateral costs of trade are predicted by the trade regime.

Finally, the specification is augmented with an additional term. The impact of exited agreements, prior to exit, can be different from unexited agreements'. I augment the specification with a dummy that takes value 1 while an agreement that is subsequently dismantled is enforced. I denote this variable as $Agr \times Pre-Exit$ control. Note that this specification controls for individual and pairwise characteristics based on which selection into agreements, exits and reentries happens. To account for phase-in and phase-out periods of trade agreements, I also incorporate lagged terms of each variable.

The final estimating equation is :

$$\begin{aligned} X_{ij,t} = exp(&\eta_{i,t} + \psi_{j,t} + \gamma_{ij} + \beta_1 \text{Agr}_{ij,t} + \beta_2 \text{Agr}_{ij,t} \times \text{Pre-Exit}_{ij,t} \\ &+ \beta_3 \text{Exit}_{ij,t} + \beta_4 \text{Agr}_{ij,t} \times \text{Reentered}_{ij,t} + \gamma_1 \text{Agr}_{ij,t-l} \\ &+ \gamma_2 \text{Agr}_{ij,t-l} \times \text{Pre-Exit}_{ij,t-l} + \gamma_3 \text{Exit}_{ij,t-l} \\ &+ \gamma_4 \text{Agr}_{ij,t-l} \times \text{Reentered}_{ij,t}) + \varepsilon_{ij,t} \end{aligned} \tag{5}$$

where l is the time lag in years.

B. Hypotheses

Table 5 summarizes the possible cases of symmetry using notation from equation (5), in the limiting case where $l = 0$.

TABLE 4—SYMMETRY CASES

	Coefficients		
Scenario	$\beta_1 + \beta_2$	β_3	β_4
Negative Asymmetry	$+$	$-$	$> \beta_2$
Perfect Symmetry	$+$	0	$\approx \beta_2$
Positive Asymmetry	$+$	$+$	$< \beta_2$

$\beta_1 + \beta_2$ is expected to assumed to take on positive values

Under this specification, if shocks to trade regime policies are *perfectly symmetric*, we would expect the gains materialized over the period of the agreement ($\beta_1+\beta_2 > 0$) to disappear following an exit ($\beta_3 = 0$), whereas, assuming identical scope across initial and renegotiated agreements, reentry should restore trade to volumes close to those observed under the original agreement ($\beta_1 + \beta_4 = \beta_1 + \beta_2$).

I refer to *positive asymmetry* as the case where gains are persistent, meaning that exit does not completely reverse the gains but maintains the pair's trading volumes above baseline, and where reentry not only restores the full gains but further builds on them. A scenario where exits generate losses beyond a return to baseline, and where reentry does not suffice to restore gains is a case of *negative asymmetry.* Remaining cases are a combination of gain persistence and loss on one hand, and varying levels of reentry performance on the other.

What factors would drive each of these theoretical scenarios?

Half the treated pairs are members of the WTO at the time of exit. This implies that following exit, tariffs are restored to their *most favored nation* levels, thus eroding the targeted comparative advantage that was extended to the partner country. Some of the non-tariff barriers can also be restored, as the end of a trade regime can facilitate regulatory divergence among the pair of countries. All else being equal, exiting an agreement should therefore return flows to their no-agreement baseline, leading to symmetry in the impact on the trade volume of entry and exit from agreements.

This channel ignores the possible persistence of trade gains. The direct impact of trade agreements might be tariff reduction, which are reversed upon exit. But much of the progress achieved under an agreement might not be immediately reversed. Improved knowledge of the partner's market, new relations between suppliers and importers, and value chain connections between the pair are likely to outlast the immediate return to pre-agreement tariffs. If the contribution of these factors to trade creation is large enough, we should expect to see some persistence that would support positive asymmetry, ie. a case where an exit keeps trade flows above baseline. Positive asymmetry is a hypothesis that matches our knowledge of gains from trade and from liberalization. Indeed, the literature demonstrates that positive shocks to liberalization cause significant reallocations and changes to market structures, which are likely to resist to a negative shock of similar magnitude. Industry-wide and within firm productivity gains (Pavcnik, 2002) as well as changing competitive pressures and exit dynamics (Melitz, 2003), durably alter the production base. Sticky investment decision generated by the positive shock, such as FDI and vertical integration might not be entirely reversed by a negative shock. Additionally, trade agreements introduce significant regulatory overhauls (Rodrik, 2018). The undoing of the regulatory convergence created by a negative shock might not result in straightforward divergence if the transition costs for firms has already been incurred and market access benefits already achieved.

Conversely, a less intuitive hypothesis, is that trade liberalization policies might be negatively asymmetric. Targeted trade liberalization increases flows by giving the targeted partner a competitive edge. From the gravity equation (1) we know that the import volume of country i from country j is increasing in quality and decreasing in price and trade costs. The diversion potential of trade agreements is well documented in the literature (Dai et al. 2014). An upgrade of the trade regime will therefore increase trade at the expense of partners who produce at better quality and equal cost. This distortion might be entirely reversed when the price-competition advantage is removed. Could this effect be as large as to depress trade volumes below baseline? Trade agreements also confer other benefits on partners, including credibility, signaling and insurance (Fernandez and Portes, 1998). It is possible that the perceived uncertainty caused by the policy reversals hinder credibility and reliability and lead market participant to divest from the affected trade relationship.

A similar logic applies to reentries into exited agreements. In the symmetric case, the coefficient on the reentry dummy should be equal in magnitude and significance to the coefficient on the original agreements. However, if repeated changes of trade regimes increases the perception of uncertainty by economic agents, the elasticity of the their decisions to liberalize might be lower, leading to negative asymmetry. If, on the other hand, reentry builds up on the remaining network and supply chain gains from the previous agreement, the differential impact of reentry might exceed that of the original agreement, translating into positive asymmetry.

C. Results

I estimate specification (5) using OLS and Poisson Pseudo-Maximum Likelihood (PPML). OLS forces us to log linearize the estimating equation, with the obvious shortfall of information loss due to 0 flows being discarded. PPML, originally proposed by Silva and Terneyro (2006, 2011) and since adopted in gravity equation estimations, allows us to estimate the exponential version of the estimating equation. PPML does not require that the dependent variable be poisson-distributed, but only that the model be correctly specified. It is well behaved in a wide range of situations and is resilient to the presence of many zeros in the dataset. For these reasons, PPML is my preferred estimation throughout this paper. Additional detail on the mathematical derivation of the PPML estimator is included in the appendix.

Tables 5-6 present the results of the estimation, and figure 4 visualizes the results when the equation is estimated using PPML. The blue lines represent the 95% confidence interval around the point estimate of the trade flow's response to the initial shock ($\beta_1 + \beta_2$). The green light gives the same confidence interval for the response to the exit shock (β_3). And the turquoise line shows the cumulative response to reentry ($\beta_1 + \beta_4$). To account for standard error correlation between groups, the model is multi-way clustered along importer, exporter, and year. This method of clustering controls for correlation in the error term within 6 clusters i, j, t, ij, it, jt. This is the most conservative approach to clustering, and will support me in making the most conservative inference (Larch et al. 2017). Results are given at three different lags : 0, 3 and 5.

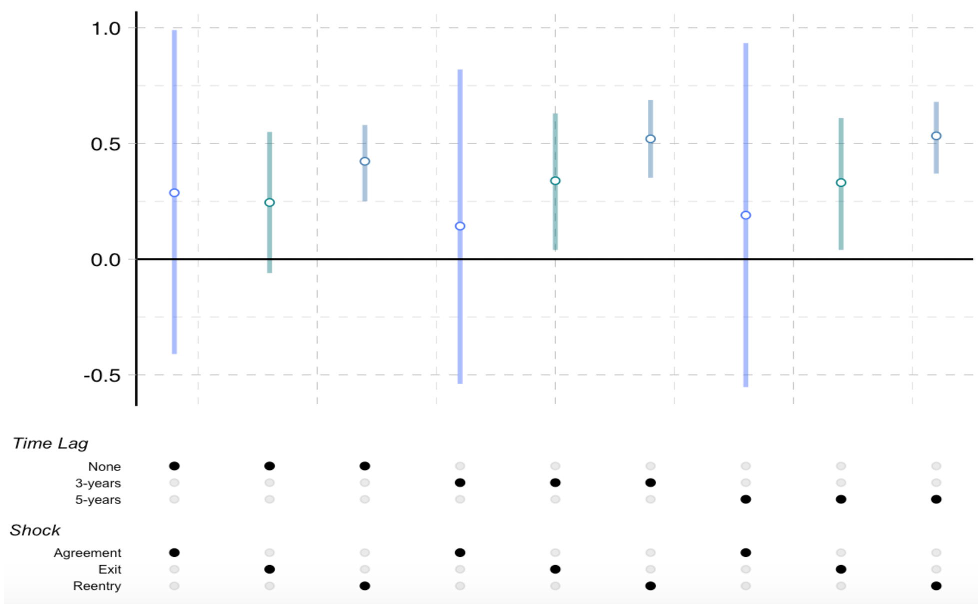

Figure 4: Estimates and confidence intervals of shock responses from equation (5)

In figure 4, we see some weak signs of **positive directional asymmetry**. Initial positive liberalization shocks appear to have a positive but statistically insignif-

Table 5—Pooled Estimation of Exit Symmetry

	OLS			PPML		
	(1) log(flow)	(2) log(flow)	(3) log(flow)	(4) flow	(5) flow	(6) flow
$(Agreement)_t$	0.209**	0.143*	0.184*	0.218***	0.154**	0.189**
	(0.0716)	(0.0697)	(0.0714)	(0.0646)	(0.0580)	(0.0627)
$(Agreement \times Pre-Exit)_t$		0.0815	0.0389	0.0695	-0.126	0.0329
		(0.289)	(0.265)	(0.366)	(0.361)	(0.333)
$Exit$	0.114	0.116	0.0553	0.246	-0.426	-0.00342
	(0.148)	(0.307)	(0.292)	(0.156)	(0.297)	(0.178)
$(Agreement \times Reentred)_t$	0.402	0.0738	0.0293	0.205***	-0.445	-0.0881
	(0.336)	(0.423)	(0.438)	(0.0564)	(0.301)	(0.173)
$Agreement_{t-3}$		0.120			0.128***	
		(0.0797)			(0.0379)	
$(Agreement \times Pre-Exit)_{t-3}$		-0.0543			-0.0134	
		(0.172)			(0.332)	
$Exit_{t-3}$		0.0765			0.765*	
		(0.203)			(0.325)	
$(Agreement \times Reentered)_{t-3}$		0.521			0.682*	
		(0.269)			(0.298)	
$Agreement_{t-5}$			0.0909			0.0996*
			(0.0811)			(0.0503)
$(Agreement \times Pre-Exit)_{t-5}$			0.00914			-0.132
			(0.128)			(0.265)
$Exit_{t-5}$			0.216			0.335
			(0.190)			(0.215)
$(Agreement \times Reentered)_{t-5}$			0.692**			0.333*
			(0.244)			(0.158)
Constant	15.67***	15.65***	15.65***			
	(0.0223)	(0.0275)	(0.0290)			
Observations	80121	80121	80121	103600	103600	103600

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Reference group is country pairs not currently or previously bound by a trade agreement. All regressions include exporter-time, importer-time, and pair fixed effects. Fixed-effects results not reported. Standard errors (in parentheses) are multi-way clustered at importer, exporter, and year

Table 6—Joint significance test of cumulative effects

	OLS		PPML	
	Lag = 3	Lag = 5	Lag = 3	Lag = 5
***Agreements* Impact Pre-exit**				
Joint significance Test P-value	0.143	0.092	0.681	0.616
***Exit* Impact**				
Joint significance Test P-value	0.556	0.419	0.022	0.024
***Reentry* Impact**				
Joint significance Test P-value	0.109	0.071	0.000	0.000

P-values for chi-square joint-significance tests

icant impact on trade flows. A pair that exits an agreement maintains a trade volume that is statistically greater than the baseline. A secondary positive shock has a larger positive impact than the initial shock, on average. This can be interpreted as country-pairs retaining some of the gains from liberalization, beyond the enforcement period of the agreement.

The robust takeaway from figure 4 is, however, that trade policy symmetry is a hypothesis that cannot be rejected at the 95% confidence level. Indeed, at that level, the repeated liberalization shocks have statistically indistinguishable impacts on trade flows, regardless of the direction of the shock.

IV. Heterogeneity analysis

The results presented in figure 4 can hide significant heterogeneity along many dimensions. The exit variable does not discriminate between downgrades and complete exits, it does not distinguish between different magnitudes of trade liberalization reversals: an exit from an FTA signifies a larger reversal than the expiration of an asymmetric trade agreement. The depth of the exited agreement therefore matters, as well as its length. Longer agreements, upon dismantlement, could have longer lasting effects - and therefore, lead to less detrimental exits. These and other margins of heterogeneity are explored in this section.

A. *Agreement Depth*

Do large trade policy shocks have different symmetry properties than smaller ones?

To evaluate this proposition I estimate equation (5), for too groups separately : pairs who experience shocks relating to comprehensive agreements such as FTAs or custom unions, and pairs who experience smaller shocks to preferential trade agreements only. Preferential trade agreements are usually unilateral discriminatory trade preferences. Most PTAs are extended under North-South development programs, such as the Generalized System of Preferences (GPS), the US's African Growth and Opportunity Act. PTAs can be reciprocal. In this case, they are distinguishable from FTAs in that they do not aim to eliminate trade barriers - but merely lower them. Figures 5 and 6 visualise the results of these estimations.

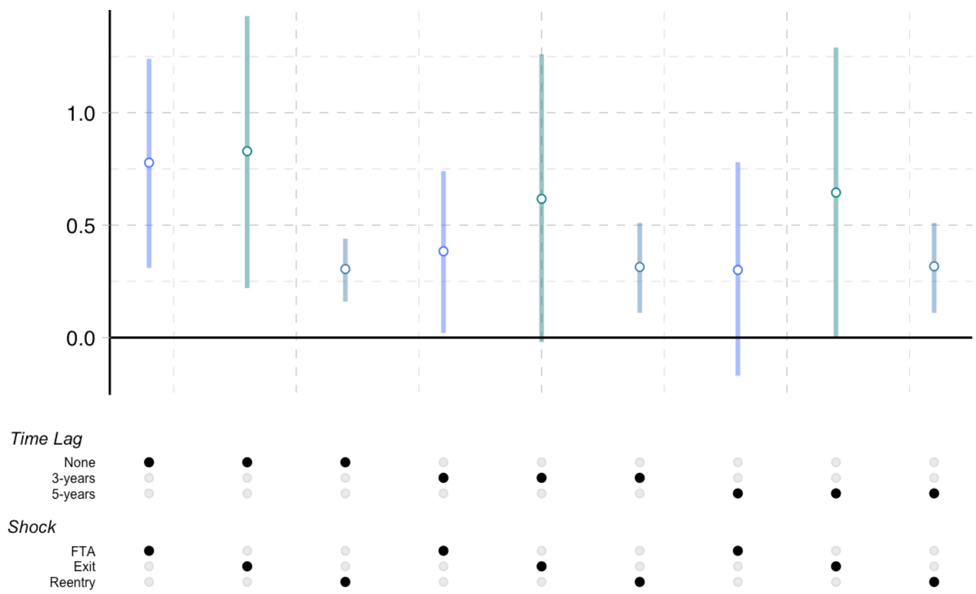

Figure 5: Trade flow response to deep liberalization shocks, proxied by FTAs

Full Table: See appendix Table A1

Large trade policy shocks show stronger signs of positive asymmetry. The positive shocks have a large and significant impact on trade flows, and these gains persist, and continue to grow beyond the negative exit shock. Secondary shocks appear to be somewhat symmetric to initial shocks. PTAs present weak evidence of positive directional asymmetry. In both cases, however, and similarly to the baseline analysis, the hypothesis of trade policy symmetry cannot be rejected at the 95% confidence level.

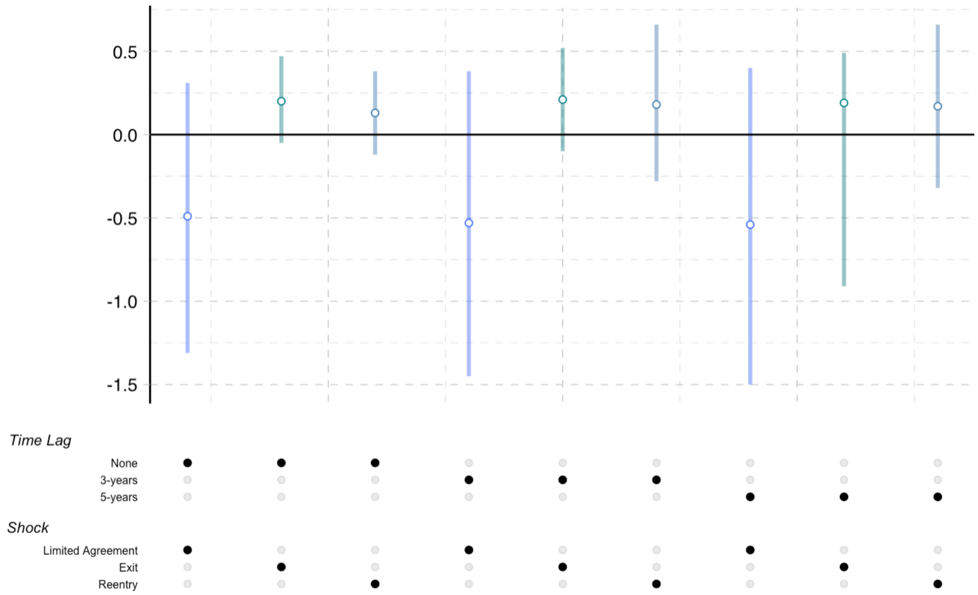

Figure 7: Trade flow response to weak liberalization shocks, proxied by PTAs
Full Table: See appendix Table A2

B. *Geographic and political contexts*

To account for geographic disparities, I perform three exercises.

The Common European Market offers an appealing case study. Upon joining the common market, a new member must align its trade policy with the bloc. This creates a series of agreement exits that fall within the purview of this study. There are 16 such cases comprising the 2004 and 2007 Common Market expansion to Central and Eastern European Countries (PECO). For instance, upon entering the European Union in 2004, Estonia left a free-trade agreement with Ukraine that had been enforced since 1998.

I also slice the data sample to focus on African trade. African trade is documented to be less responsive to liberalization policy shocks. The African continent is divided into 6 different trading blocs with different levels of trade liberalization and barrier removal. Some of these areas, mainly the South African Development Community (SADC) and the Economic Community of West African States (ECOWAS) have experienced a set of member exits and suspensions, mostly, due to political reasons. The regional economic areas (REC) model of trade policies in Africa has failed to deliver growth in flows. In 2013, formal intra-Africa trade made up about 10% of total annual trade of each REC (Geda and Seid, 2015). Numerous studies confirm the disappointing performance of intra-regional trade within RECs (Geda and Kibret, 2008, Longo and Sekkat, 2001 Yeats, 1999). This is generally attributed to export supply constraints that hamper trade development : weak infrastructure, productivity and trade facilitation. The applicability of the gravity model to African trade is therefore itself a point of contention (Foroutan and Pritchett, 1993).

Finally, I look at the trade policy reversals that surrounded the collapse of the Soviet Union. Several socialist countries were bound by preferential trade agreements, many of which were dismantled in a large wave of exits in or around 1991.

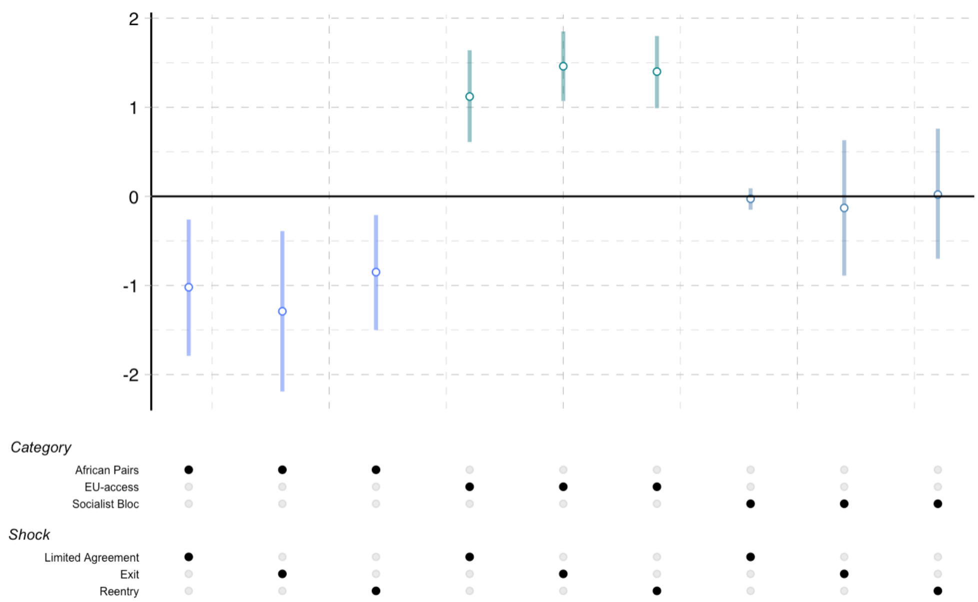

Figure 6: Trade flow response to liberalization shocks in different contexts
Full Table: See appendix Table A3

The results are presented in figure 6. The behavior of African trade flows in response to liberalization shocks is unusual but not surprising in light of the above mentioned literature. The statistical insignificance of policy liberalization shocks between members of the Socialist Bloc is also commensurate with the particular structure of their economies. Once again, there are signs of positive asymmetry among European countries and their partners. Still, the hypothesis of perfect trade policy symmetry cannot be ruled out.

V. Conclusion

This paper contributes to the evaluation of the cost of reversals in trade policy. It does so by investigating whether trade response to positive and negative shocks is symmetric. Evaluating the symmetry of trade policy is important in the context of economic retrenchment and resurgent protectionism after what had seemed like an irreversible march towards increased liberalization. Using an exhaustive sample of agreement exits between 1986-2016, I find weak evidence of positive asymmetry in liberalization impact : leaving an agreement with no immediate replacement - and reintroducing trade barriers - does not appear to obliterate all liberalization gains, and trade between the treated pairs can remain significantly above baseline. Furthermore, reentries - following period of exits - can also be positively asymmetrical and exceed the gains from the initial liberalization shock.

The weak evidence of positive asymmetry does not preclude the hypothesis of perfect policy symmetry. At the 95% confidence level the response of trade flows to positive liberalization shocks is statistically indistinguishable from their response to negative shocks. This paper looked at different geographical and economic contexts, and analyzed the role of agreement depth in determining symmetry outcomes. In all considered cases, the hypothesis of perfect policy symmetry was not rejected.

The issue of policy symmetry deserves increased attention. While very widely hailed amongst economists, trade policy liberalization has become a very polarizing theme in political discourse. In this context, shock reversals are likely to materialize frequently. I see three possible extensions to this research agenda. This paper reveals significant heterogeneity in treatment effects. Baier et al (2019) developped an approach for estimating the trade impact of FTAs heterogenously, and obtain individual estimates by agreement, pair and direction. Applying this framework to estimating exit impacts would elicit more specific - if less precise - estimates. A second empirical extension, is to narrow the focus on tariff shocks. A large part of the liberalization reversals that we observe in the recent years centered around tariff increases. Estimating tariff elasticities of trade on the way up and on the way down can shed further light on tariff policy symmetry specifically. Finally, to enrich the theoretical framework that lacks for the question at hand, the findings elicited in this paper can be integrated into a gravity model of trade by adjusting the trade cost parameters to reflect persistence and dynamics suggested by this study and move away from the symmetric elasticity generally imposed on trade costs.

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***Do Trade Agreements Stimulate International Trade Differently? Evidence from 296 Trade Agreements**, WORLD ECONOMY, jan 2016, 39 (1), 97–131.*

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Appendix

A1. Derivation of the estimation equation[1]

We begin with the gravity model of trade as specified by Anderson (1979) and refined by Baier and Bergstrand (2007) :

$$X_{ij} = \frac{A_i w_i^{-\theta} \tau_{ij}^{-\theta}}{\sum_l A_l w_l^{-\theta} \tau_{lj}^{-\theta}} E_j \tag{A1}$$

E_j is total expenditure by country j on all goods. A_i is a measure of quality of goods in country i, wi is the wage in i; and ij is the iceberg trade cost between i and j. Origin characteristics are weighted against characteristics from competing import sources, captured in the denominator. θ is the constant trade elasticity . Letting $P_{j,t}^{-\tau}$ the overall degree of competition in j's import market, we can rewrite (A1) as :

$$X_{ij,t} = exp(lnA_{i,t}w_{i,t}^{-\theta} + ln\frac{E_{j,t}}{P_{j,t}^{-\theta}} + ln\tau_{ij,t}^{-\theta}) + \varepsilon_{ij,t} \tag{A2}$$

Assuming the following functional form of trade costs :

$$ln\tau_{ij,t}^{-\theta} = Z_{ij}\delta + \beta_1 Agr_{ij,t} + \beta_2 Agr_{ij,t-l} + u_{ij,t} \tag{A3}$$

Leads to the estimation equation :

$$X_{ij,t} = exp(\eta_{i,t} + \psi_{j,t} + \gamma_{ij} + \beta_1 \text{Agr}_{ij,t} + \beta_2 \text{Agr}_{ij,t-l}) + \varepsilon_{ij,t} \tag{A4}$$

Where the residual term $\varepsilon_{ij,t}$ now measures the error in trade values as well as the error in $\ln\tau_i j, t^{-\theta}$

A2. PPML derivation[2]

The goal here is to derive an non-linear estimator that is consistent and reasonably efficient under a wide range of heteroskedasticity patterns and is also simple to implement. See Silva and Tenreyro for a discussion of why OLS fails.

Let the estimation equation be such that :

[1]Adapted from Baier et al (2019)
[2]Adapted from Silva and Tenreyro (2006)

$$y_i = exp(x_i\beta)\eta_i \tag{A5}$$

Assuming that the conditional variance $V[y_i|x]$ is constant, the non-linear least square estimator is given by :

$$\hat{\beta} = argmin_b \sum_{i=1}^{n}[y_i - exp(x_i b)]^2 \tag{A6}$$

The NLS estimator solves the first order conditions :

$$\sum_{i=1}^{n}[y_i - exp(x_i\hat{\beta})]^2 exp(x_i\hat{\beta})x_i = 0 \tag{A7}$$

This solution puts more weight on observations with large values of $exp(x_i\hat{\beta})$, which are also the observations with the larger variance. Under heterogeneity, this would lead to an amplification of the noise and an inefficient estimator.

The proposed alternative is to follow McCullaugh and Nelder (1989) and estimate the parameters using a poisson-maximum likelihood. Specifically, assuming a general form of heteroskedasticity where the conditional variance is proportional to the conditional mean ($V[y_i|x] \propto E[y_i|x] = exp(x_i\beta)$) the Pseudo-Poisson Maximum Likelihood (PPML) estimator solves the first order condition:

$$\sum_{i=1}^{n}[y_i - exp(x_i\hat{\beta})]x_i = 0 \tag{A8}$$

This estimator allocates equal weights to all observation, which is more in line with set-ups where the dimensions and form of heteroskedasticity are unknown.

A3. Regression result tables

A4. List of treated pairs

A5. List of Rest of the World, never treated countries

Cameroon, Hong-Kong, India, Sri Lanka, Morocco, Chile, Jordan, Nepal, Tunisia, Gabon, Bangladesh, Canada, Jamaica, Philipines, Tadjikistan, Honduras

Table A1—Estimation of FTA exit symmetry

	OLS				PPML	
	(1) log(flow)	(2) log(flow)	(3) log(flow)	(4) flow	(5) flow	(6) flow
FTA	0.264** (0.0957)	0.0716 (0.0616)	0.159 (0.0806)	0.100** (0.0352)	0.205* (0.0851)	0.0974 (0.0499)
$(FTA \times Pre-Exit)_t$	0.226 (0.212)	0.706** (0.234)	0.146 (0.248)	0.768** (0.261)	0.150 (0.230)	0.727** (0.247)
$Exit_t$	0.237 (0.226)	0.830** (0.309)	0.184 (0.286)	1.054** (0.379)	0.189 (0.280)	1.019** (0.372)
$(FTA \times Reentered)_t$	0.529* (0.241)	0.234*** (0.0474)	0.0573 (0.178)	-0.104 (0.139)	0.223 (0.165)	-0.0618 (0.110)
FTA_{t-3}			0.169* (0.0721)	-0.0353 (0.0569)		
$(FTA \times Pre-Exit)_{t-3}$			0.0214 (0.238)	-0.448 (0.348)		
$Exit_{t-3}$			-0.207 (0.263)	-0.436 (0.334)		
$(FTA \times Reentered)_{t-3}$			0.886*** (0.241)	0.354* (0.163)		
FTA_{t-5}					0.139 (0.0908)	-0.0412 (0.0507)
$(FTA \times Pre-Exit)_{t-5}$					0.0486 (0.240)	-0.482 (0.362)
$Exit_{t-5}$					-0.272 (0.247)	-0.374 (0.279)
$(FTA \times Reentered)_{t-5}$					0.826** (0.259)	0.324* (0.139)
Constant	15.70*** (0.00950)		15.70*** (0.00986)		15.70*** (0.0101)	
Observations	80121	103600	80121	103600	80121	103600

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Reference group is country pairs not currently or previously bound by a trade agreement. All regressions include exporter-time, importer-time, and pair fixed effects. Fixed-effects results not reported. Standard errors (in parentheses) are multi-way clustered at importer, exporter, and year

Table A2—Estimation of SPA exit symmetry

	OLS			PPML		
	(1) log(flow)	(2) log(flow)	(3) log(flow)	(4) flow	(5) flow	(6) flow
PTA_t	0.245	0.200	0.235	0.159	0.116	0.168
	(0.122)	(0.137)	(0.133)	(0.0817)	(0.103)	(0.102)
$(PTA \times Pre-Exit)_t$	0.386	0.0758	0.581	-0.661	1.199	0.126
	(0.759)	(0.717)	(0.701)	(0.434)	(0.880)	(0.796)
$Exit_t$	0.597	0.0000273	0.642	0.207	1.999*	1.017
	(0.850)	(0.774)	(0.797)	(0.170)	(0.890)	(0.775)
$(PTA \times Reentry)_t$	0.561	0.0806	0.756	0.005	2.019*	0.822
	(0.812)	(0.813)	(0.849)	(0.223)	(0.917)	(0.790)
PTA_{t-3}		0.0790			0.0528	
		(0.145)			(0.0592)	
$(PTA \times Pre-Exit)_{t-3}$		0.395**			-1.900*	
		(0.136)			(0.826)	
$Exit_{t-3}$		0.765*			-1.786*	
		(0.291)			(0.865)	
$(PTA \times Reentry)_{t-3}$		0.494			-2.001*	
		(0.288)			(0.865)	
PTA_{t-5}			0.0234			-0.0255
			(0.154)			(0.0568)
$(PTA \times Pre-Exit)_{t-5}$			-0.291			-0.818
			(0.260)			(0.745)
$Exit_{t-3}$			0.0122			-0.817
			(0.345)			(0.723)
$(PTA \times Reentry)_{t-3}$			-0.412			-0.795
			(0.393)			(0.763)
Constant	15.21***	15.20***	15.21***			
	(0.0336)	(0.0368)	(0.0367)			
Observations	66637	66637	66637	89099	89099	89099

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Reference group is country pairs not currently or previously bound by a trade agreement. All regressions include exporter-time, importer-time, and pair fixed effects. Fixed-effects results not reported. Standard errors (in parentheses) are multi-way clustered at importer, exporter, and year

Table A3—Exit and Reentry Impact: Geographies

	African Pairs		EU access		Socialist Bloc	
	OLS	PPML	OLS	PPML	OLS	PPML
$Agreement_t$	0.0892	-0.126	0.230**	0.255***	0.223**	0.259***
	(0.198)	(0.0967)	(0.0770)	(0.0638)	(0.0743)	(0.0633)
$(Agreement \times Pre - Exit)_t$	-0.971*	-0.903*	-0.196	0.874**	-0.712	-0.286
	(0.475)	(0.431)	(0.459)	(0.271)	(0.478)	(.)
$Exit_t$	-0.717*	-1.295**	0.153	1.462***	-0.656	-0.132
	(0.335)	(0.457)	(0.509)	(0.198)	(0.368)	(0.390)
$(Agreement \times Reentry)_t$	-0.466	-0.730	0.0814	1.148***	0	-0.231
	(0.558)	(0.419)	(0.674)	(0.211)	(.)	(0.355)
Constant	14.44***		15.61***		15.64***	
	(0.0523)		(0.0199)		(0.0192)	
Observations	21063	28185	76799	99785	77181	100183

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Reference group is country pairs not currently or previously bound by a trade agreement. All regressions include exporter-time, importer-time, and pair fixed effects. Fixed-effects results not reported. Standard errors (in parentheses) are multi-way clustered at importer, exporter, and year

Table A4—Sample of treated units

i	j	Year	Exited Regime	New regime	Agr. length	Exit length	Reentry
41	HUN-ITA	1990	1	0	2	1	1992
42	HUN-MNG	1991	2	0	27	10	None
43	HUN-POL	1991	2	0	1	10	1992
44	HUN-ROU	1991	2	0	6	10	1997
45	HUN-RUS	1991	2	0	13	10	2004
46	HUN-VNM	1991	2	0	27	10	None
47	KEN-LSO	1998	2	0	20	17	None
48	KEN-MOZ	1998	2	0	20	17	None
49	KEN-NAM	2005	2	0	13	10	None
50	KNA-POL	1999	1	0	5	10	2004
51	LKA-BGR	2007	1	0	11	8	None
52	LKA-HUN	2004	1	0	14	23	None
53	LKA-ITA	1990	1	0	28	9	None
54	LKA-POL	2004	1	0	14	23	None
55	MDA-ROU	2007	3	1	11	12	None
56	MDG-LSO	1998	2	0	3	17	2001
57	MDG-MOZ	1998	2	0	3	17	2001
58	MDG-SYC	2004	2	0	4	23	2008
59	MLI-MRT	2000	2	0	18	19	None
60	MOZ-ZAF	1997	2	0	4	3	2001
61	MRT-GNB	2000	2	0	18	19	None
62	MRT-LBR	2000	2	0	18	19	None
63	MRT-NER	2000	2	0	18	19	None
64	MRT-NGA	2000	2	0	18	19	None
65	MRT-SEN	2000	2	0	18	19	None
66	MRT-SLE	2000	2	0	18	19	None
67	MRT-TGO	2000	2	0	18	19	None
68	MUS-LSO	1998	2	0	3	17	2001
69	MUS-MOZ	1998	2	0	3	17	2001
70	MUS-POL	1999	1	0	5	18	2004
71	MUS-SYC	2004	2	0	4	23	2008
72	MWI-SYC	2004	2	0	4	23	2008
73	NAM-DJI	2005	2	0	13	10	None
74	NAM-ERI	2005	2	0	13	10	None
75	NAM-RWA	2005	2	0	13	10	None
76	NAM-SDN	2005	2	0	13	10	None
77	NAM-SOM	2005	2	0	13	10	None
78	NAM-SYC	2004	2	0	4	9	2008
79	NAM-UGA	2005	2	0	13	10	None
80	PER-VEN	2012	4	3	6	17	None

i	j	Year	Exited Regime	New regime	Agr. length	Exit length	Reentry
81	PHL-BGR	2007	1	0	11	8	None
82	PHL-HUN	2004	1	0	14	23	None
83	PHL-ITA	1990	1	0	28	9	None
84	PHL-POL	2004	1	0	14	23	None
85	POL-BGR	1991	2	0	8	10	1999
86	POL-CUB	1991	2	0	27	10	None
87	POL-ITA	1990	1	0	2	1	1992
88	POL-MNG	1991	2	0	27	10	None
89	POL-ROU	1991	2	0	6	10	1997
90	POL-RUS	1991	2	0	13	10	2004
91	POL-VNM	1991	2	0	27	10	None
92	ROU-BGR	1991	2	0	8	10	1999
93	ROU-CAN	2007	1	0	11	26	None
94	ROU-CUB	1991	2	0	27	10	None
95	ROU-ITA	1990	1	0	3	9	1993
96	ROU-MNG	1991	2	0	27	10	None
97	ROU-RUS	1991	2	0	27	10	None
98	ROU-VNM	1991	2	0	27	10	None
99	RWA-LSO	1998	2	0	20	17	None
100	RWA-MOZ	1998	2	0	20	17	None
101	RWA-TZA	2001	2	0	17	6	None
102	SDN-LSO	1998	2	0	20	3	None
103	SDN-MOZ	1998	2	0	20	17	None
104	SDN-TZA	2001	2	0	17	6	None
105	SVN-CAN	2004	1	0	13	12	None
106	SWZ-SYC	2004	2	0	4	23	2008
107	SYC-AGO	2004	2	0	4	23	2008
108	SYC-COD	2004	2	0	4	9	2008
109	SYC-POL	1999	1	0	5	18	2004
110	SYC-TZA	2004	2	0	4	9	2008
111	SYC-ZAF	2004	2	0	4	3	2008
112	SYC-ZMB	2004	2	0	4	9	2008
113	SYC-ZWE	2004	2	0	4	9	2008
114	SYR-POL	1999	1	0	5	18	2004
115	TUR-POL	1990	1	0	10	9	2000
116	TUR-SYR	2012	3	0	6	5	None
117	TZA-DJI	2001	2	0	17	6	None
118	TZA-LSO	1998	2	0	3	3	2001
119	TZA-MOZ	1998	2	0	3	3	2001
120	TZA-SOM	2001	2	0	17	6	None
121	UGA-LSO	1998	2	0	20	3	None
122	UGA-MOZ	1998	2	0	20	17	None
123	VEN-HTI	2004	2	0	14	2	None
124	VEN-POL	1990	1	0	14	9	2004
125	ZMB-LSO	1998	2	0	3	3	2001
126	ZMB-MOZ	1998	2	0	3	17	2001

Rest of the World : CMR, IND, MAR, JOR, NPL, TUN, GAB, BGD, JAM, TJK, HND
Regimes : 0. No agreement, 1. APA, 2. SPA, 3. FTA, 4. FTA + CU