

Appendix for ‘Renegotiating in Good Faith: How International Treaty Revisions Can Deepen Cooperation’

This appendix presents additional regression tables and further details about the data and method used in the paper.

Data generation approach

As described in the paper, I use the DESTA dataset as a guide to identify agreements. I included agreements appearing in the March 2017 version of DESTA that were signed from the year 2000 onwards. This resulted in 310 agreements at risk of being renegotiated.

I searched government webpages and other official repositories of information on trade agreements to find evidence of PTA revisions. Because not all PTAs (and not all PTA revisions) are well publicised officially, I also searched for evidence of renegotiations in ProQuest, reasoning that revisions would leave a trace in news media.

For each agreement I used a separate search string. For instance, for the 2004 Agadir Agreement, I searched:

(“Agadir” AND “trade” AND (amend OR amendment OR revise OR revision OR review OR renegotiate OR renegotiation)) AND stype.exact(“Newspapers” OR “Trade Journals”).

These search terms were developed inductively by first searching for agreements that I knew had been revised, in order to identify the language commonly used. The inclusion of the word ‘review’ was problematic because it is used in many other contexts besides treaty revisions, including in the name of some journals or newspapers. However, it was an essential search term because it was also commonly used to indicate that a given agreement had been subjected to a review (and therefore a possible revision). As such, its inclusion represented a relatively conservative approach in which I erred on the side of too many, rather than too few, search results.

Because I was only interested in revisions to existing agreements, I limited the possible date range to between the year of signature and the end of the year 2017. For most agreements, this approach returned between around 15 and 100 results of news and trade journal articles. I manually scanned these results in order to identify instances of a treaty revision. In most cases, a revision was sufficiently news-worthy that it was clear from the title of an article whether it referenced a revision. However the search was also facilitated by the fact that in the search results, ProQuest represented snippets of the article with highlighted search terms.

I further supplemented this search procedure with a general search for all trade agreement revisions, using the search string:

(“trade agreement” AND (amend OR amendment OR revise OR revision OR review)) AND stype.exact(“Newspapers” OR “Trade Journals”).

This returned around 55,000 search results for all years, which I scanned manually for the period from 2005 to 2017 (resulting in a sample of around 12,000 news entries). I selected this date range primarily for reasons of salience: the revision of the EU-Canada Comprehensive Economic Partnership Agreement (CETA) took place during this time, the NAFTA renegotiation was proposed during 2016, and several other agreements were either revised

(Australia-Thailand; Australia-Singapore; several of ASEAN’s agreements), or their renegotiation was announced (China-New Zealand). Moreover, it is during this period that trade agreements have become particularly politicized due to the negotiation of ‘mega-regional’ agreements like CETA, the Trans-Pacific Partnership (TPP), and the EU-US Trans-Atlantic Trade and Investment Partnership (TTIP). The same criteria for data coverage were used as described above (agreements signed after 2000).

Description of revision timing

Here, I illustrate the different times at which revisions to agreements may be made.

Pre-ratification

The earliest way a completed agreement can be revised is if this happens after an agreement is signed, but before it is ratified. In this case, revisions are likely to be driven by domestic changes between signature and ratification. Examples of this sort of revision include CETA and the Korea-US FTA (KORUS). In the case of CETA, revisions appear to have been prompted by wide-scale demonstrations in the EU. Concern stemmed not only from perceived problems with the CETA agreement, but also with the Trans-Atlantic Trade and Investment Partnership (TTIP) between the EU and the US. There was some suggestion that CETA would set a precedent for TTIP, and that therefore any concern about what to include in TTIP should also be reflected in CETA.¹ Revision of CETA appeared to have been helped by the fact that there had been a change in government in Canada. CETA was signed by the Conservative Harper government, and a review was accepted by the incoming Liberal Trudeau government. Review of CETA resulted in substantial changes to the investment chapter.

The KORUS review appears to have been driven by the change in the US Presidency. The agreement had been negotiated under George W. Bush (during the latter’s second term), but had not been ratified by the time he left office. Revision of KORUS under the incoming President Obama was consistent with a stated wider re-evaluation of US trade policy. Revisions to KORUS took several years, during which time both the United States and Korea pushed for more favorable terms. Changes were made to the tariff phase-out periods, and the US gained better access for beef and autos.

Amendments to agreements in the pre-ratification stage appear politically sensitive. On the one hand, if there is impetus for an amendment it is important that substantial changes can be identified. Thus, members of the US Congress who had been opposed to the original KORUS wanted to satisfy themselves (and their constituents) that the administration had sufficiently amended the agreement in a way that would meet their concerns. Because President Obama did not have Trade Promotion Authority (TPA), which would have allowed him to put the amended KORUS FTA to Congress for a simple up- or down-vote, changes were ultimately made in side-agreements so as not to re-litigate the entire deal.

With CETA, amendments took place during the ‘legal scrubbing’ phase, after signature but prior to ratification. Once again, a balance was sought between satisfying original critics

¹See Castle (2022); *Inside US Trade*, 6 December 2013, <https://insidetrade.com/daily-news/inta-chair-demands-same-access-ttip-documents-eu-member-states>.

of the agreement that it had been appropriately amended, and downplaying the extent of changes. Thus, the European Commission attempted simultaneously to promote the updated model for the regulation of foreign investment (which included the EU's new 'investment court' system, also found in the EU-Vietnam agreement), and to cast the amended agreement as little more than a tweaked version of the original, despite the fact that the text of the new version of CETA differed by around 19% from the original.² Note that changes to agreements made during the pre-ratification phase are also routinely used as a way of addressing legal inconsistencies, and not as responding to political demand for amendments.

Scheduled review

Many agreements now schedule a review after a set time period. Such agreements are sometimes referred to as 'living agreements', meaning that their evolution is anticipated.³ Revisions in this case are often relatively minor, technical and de-politicized. For instance, tariff classification systems like the commonly-used Harmonized System (HS) occasionally change the classification of particular products. When this happens, a revision may merely incorporate such changes. In other cases, a scheduled review may produce more substantive changes. Revisions to the Australia-Singapore FTA, which were launched in June 2015 under the third ministerial review of the deal, ultimately brought the agreement into line with the original TPP, which was then under negotiation and anticipated to be implemented. For instance, Australian negotiators agreed to raise the screening threshold for private Singaporean investment in non-sensitive sectors to AU\$1,094 million from AU\$252, in line with TPP commitments.⁴

Similarly, China and New Zealand launched in November 2016 the renegotiation of their 2008 FTA. Like the Australia-Singapore case, these revisions took place under the auspice of a scheduled review of the agreement. The 'upgrade' expanded the scope of the agreement to new issue-areas (such as e-commerce). It also sought to deepen current commitments; New Zealand dairy exporters in particular had hoped to improve on existing access to the Chinese market, although they ultimately accepted the status-quo access.

Although scheduled reviews may generally result in greater cooperation, this cannot be taken as a given. The 'losers' from trade may sometimes better surmount the collective action problems required to successfully lobby governments,⁵ and so we might sometimes expect review processes to attract relatively more attention from economic actors seeking greater protection from foreign competition. This may ultimately depend on the economic, political and social context in which reviews take place.

²Alschner and Skougarevskiy 2016.

³The New Zealand Ministry of Foreign Affairs and Trade (MFAT) refers to a number of its agreements in this way, for instance the ASEAN-Australia-New Zealand FTA (AANZFTA). As Allee and Lugg 2016 note, the Trans-Pacific Partnership (TPP) is also referred to as a 'living agreement', although this refers to the fact that future expansions of the agreement to new members will involve those members signing up to the existing treaty base.

⁴Australian Department of Foreign Affairs and Trade, 'Singapore Australia FTA', <https://dfat.gov.au/trade/agreements/in-force/safta/Pages/singapore-australia-fta.aspx>.

⁵Olson 1965.

Unscheduled amendment

Unscheduled revisions are a final form of agreement amendment. These are cases where one or more agreement members seek to amend the existing agreement outside of the context of a mandated review. Such a revision may reflect domestic changes, for instance if changes in domestic production patterns are sufficient that an existing agreement no longer reflects economic realities, or if the benefits of an agreement come to be perceived as overly skewed in favor of some member(s) and not others.⁶ Such a revision may also reflect broader changes in the global economy, for example if the perceived best practice for the regulation of a particular issue-area shifts.

The EU offers clear cases of the first motivation for an unscheduled amendment. In the European Commission's *Trade for All* document, the Commission indicates that the trade pillar of the EU-Mexico Global Agreement, which entered into force in 2000, "has been mutually beneficial but ... is now outdated", and that a 'modernization' of the agreement would allow both parties to "reap all the untapped benefits for [their] economies."⁷ A similar comment was made regarding the EU-Chile 'modernization', and indeed the Commission went on to note that the updated agreements "should be comparable to, and compatible with, our FTA with Canada and the future agreement with the United States".⁸ In these cases, amended agreements seem likely to be of increased scope, expanding the commitments made by both sides.

The renegotiation of NAFTA proposed by Trump on the other hand has been cast as an opportunity to scale back commitments made. A NAFTA renegotiation responds to supposed imbalance in the benefits of the agreement, whereby Mexico (in particular) would have benefited at the cost of the United States. While the new US Mexico Canada Agreement (USMCA) contains some measures that liberalize beyond the initial deal—for instance by partially opening Canadian dairy markets—a major outcome on goods trade for the agreement is tighter rules of origin and labour provisions in trade in autos, which ultimately reduce market access.⁹ Like the EU's renegotiated agreement with Mexico, however, the proposed NAFTA renegotiation is prompted by domestic economic and political changes. In sum, while unscheduled amendments may 'ratchet' existing agreements, they may also seek to limit their scope. Tellingly, while moves to expand existing agreements have attracted relatively little political attention and may thereby have escaped opposing mobilization, Trump's more 'defensive' efforts seemed to rely on garnering as much public attention as possible.

Amendment outcomes

In the paper I distinguish between different types of revision outcomes. I describe those that are *administrative*; those that *increase access*; those that *increase scope*; those that *upgrade* an agreement more comprehensively by updating chapters and potentially adding

⁶Note that Koremenos 2005 also raises this possibility as an explanation for countries' inclusion of time limitations ('sunset clauses') to international agreements.

⁷European Commission 2015, 33.

⁸European Commission 2015, 33.

⁹The Economist, Oct 4th 2018 'The renegotiation of NAFTA is a relief. But it is not a success' <https://www.economist.com/leaders/2018/10/04/the-renegotiation-of-nafta-is-a-relief-but-it-is-not-a-success>.

new ones; those that are *limiting* (through reductions in access or loosening of commitments); those that are *mixed* revisions, containing both liberalising and de-liberalising aspects; and *protocols*, which add an additional element of cooperation but which might not be directly liberalizing. It also bears discussing the extent of PTA revisions. As I describe in the paper, most liberalising moves entail the gradual extension of liberalisation to products not previously covered by the agreement. Most limiting moves were infrequent and typically minor in nature (such as removal of select products from a liberalisation schedule). Revisions to increase scope typically added a new chapter to an existing agreement.

For instance, the 2006 agreement between the Association of Southeast Asian Nations (ASEAN) and Korea has been revised four times (2007, 2009, 2010, 2011, 2015). The first two revisions *increased the scope* of the agreement (adding services and investment respectively). The 2010 revision however reduced goods liberalization by adding a list of products to ‘highly sensitive list’ of the agreement, thereby limiting liberalization into Lao PDR (a *limiting* revision). Following this, the 2011 revision added a clause into the agreement allowing for easier unilateral liberalization on the part of agreement parties (*increasing access*), while the 2015 revision was *administrative*, aiming at clarifying the process of information retrieval and dissemination about tariff liberalization on the part of customs authorities and processes for calculating adherence to rules of origin (inter alia).

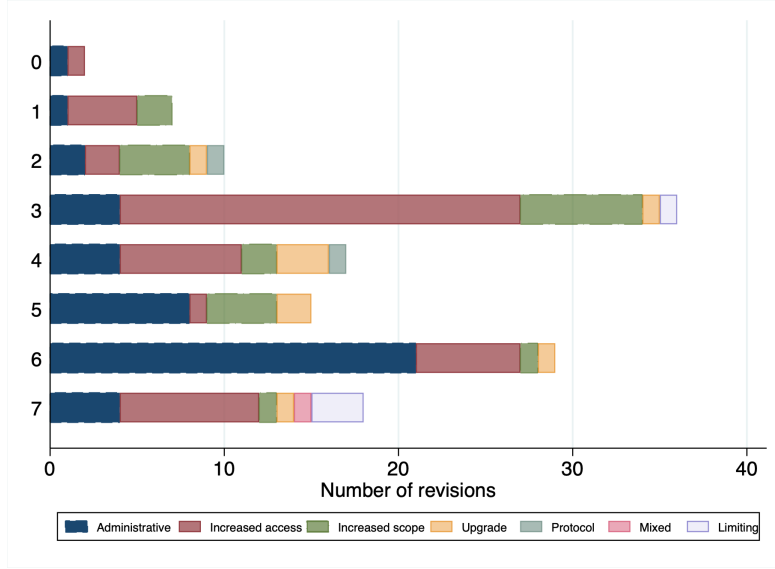
A more extreme example of a limiting revision uncovered during the research (though not covered in the analysis as it is out of the date range) is that of the changes to the 1994 Bolivia-Mexico agreement. A change in Bolivian government resulted in a new 2009 constitution, and chapters in the previous agreement covering investment, services trade, intellectual property rights, and government procurement were deemed to be unconstitutional. These chapters were removed (an *limiting revision* in the updated agreement (2010), although market access commitments were maintained.

Revision type by agreement depth

Revision-type varies at all levels of agreement depth. Figure 1 illustrates this point by breaking down revision-type across PTAs of different depths, using DESTA’s ‘Index’ measure of depth.¹⁰ This measure of depth places PTAs on a scale of 0-7, with agreements at lower depth corresponding to fewer issue-areas covered. Administrative revisions are relatively common for across the board, though most evident at higher depth (5 and 6). Building on existing market access appears to be the motivation for revisions across the spectrum of depth, although this is disproportionately the case for agreements dealing with just a few issue-areas (notably depth of 3 or 4). As one would expect, expanding to new issue-areas is most likely in agreements of low- to middle-depth, which do not already deal with many issue-areas. Meanwhile, limiting and ‘mixed’ (limiting and liberalizing) revisions appear relatively concentrated in high-depth agreements, although given the low number of these it is difficult to make any general claims about why this may be.

¹⁰Dür, Baccini, and Elsig 2014.

Figure 1: Revision-type by agreement depth index (0 - 7)



Model choice

Using the main model (1) I first fit a Cox proportional hazard model (see Table 2). I use Schoenfeld residuals to check the proportional hazards assumption; this assumption is violated as the test is statistically significant for several variables, as well as globally ($\text{Prob} > \chi^2 = 0.0001$). I then also fit exponential, Weibull, Gompertz, log-normal and log-logistic models (based on model 1, Table 2). The Akaike information criterion (AIC) and Bayesian information criterion (BIC) confirm that a lognormal distribution is most appropriate, as shown in Table 1.

Table 1: Comparison of model fit for survival analysis

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
Cox	15,492	-3754.105	-3688.892	9	7395.785	7464.618
Exponential	15,492	-1474.772	-1412.446	10	2844.892	2921.373
Weibul	15,492	-1473.793	-1411.704	11	2845.408	2929.537
Gompertz	15,492	-1472.755	-1409.415	11	2840.829	2924.958
Loglogistic	15,492	-1461.867	-1395.545	11	2813.09	2897.219
Lognormal	15,492	-1444.173	-1378.476	11	2778.953	2863.082

Robustness checks and full regression output

Predicting revisions

Table 2 presents models predicting treaty revisions, with various robustness checks. I retain the same general specification as in model 1 of Table 2 in the main paper. In models 1 and

2, I introduce the Change in UNGA ideal-point and Common language variables separately. Both remain significant and signed negatively. This indicates that countries who vote more similarly at the UN General Assembly following their PTA tend to have a shorter time to a PTA revision. Similarly, countries with a common official or primary language tend to have a shorter time to PTA revision.

In model 3, I include as an alternative measure of ideological affinity a variable (Sum of dyadic PTAs) that is a count of the other PTAs in which countries A and B are members, besides the one at risk of revision. Ideologically similar countries may be more likely to share membership in many international institutions.¹¹ The negative coefficient indicates that increasing shared PTA membership reduces time to revision, as expected.

In model 4 I include a binary variable (Services review clause) from DESTA, capturing whether a services chapter in the agreement has a general review clause.¹² I include this variable as a proxy for whether the agreement as a whole is likely to have a general review clause, as I do not have data on the latter. While imperfect, I expect the presence of a services review clause to be negatively signed. It is, and the effects of the main independent variables (Change in UNGA ideal-point distance and Common language) are now more significant and their effect on time-to-revision has increased in magnitude. This result allays potential concern that more ideologically similar countries would simply select into PTAs that provide more opportunities for revision, and that the UNGA and common language variables are therefore simply capturing some feature of likely institutional design.

In model 5 I exclude the small number of ‘pre-ratification’ revisions such as that to the Canada–European Union agreement (CETA) or the first amendment to the Korea–United States agreement (KORUS). Such revisions take place following agreement signature, but before countries have ratified them. While pre-ratification revisions fit the definition of a revision as one occurring following signature of a PTA, one nevertheless might worry that they drive the results. The results indicate that this is not cause for concern, since the effects remain substantively the same.

In model 6 I use the annual UNGA ideal-distance measure rather than the change measure. I expect this variable to be positively signed since larger UNGA ideal-distances mean more divergent country positions within the UN. The results are consistent with this expectation.

In model 7 I run a Cox regression (with Efron measure for ties) instead of a log-normal survival model. The coefficients on the variables indicate the effect of a unit change on the change in logged hazard ratios, rather than on the logged time-to-revision as in the log-normal model. Thus, the coefficients should be the opposite sign from in models 1-6. We can see that this is the case, and the effects are similar: having a common official or primary language is associated with a roughly 47% increase ($\exp(.387) = 1.473$) in the likelihood of a PTA revision.

In model 8 I run a logistic regression using Stata’s `-xtlogit-` command. The outcome is the binary ‘PTA revised’ variable. The coefficients indicate the effect of a unit change on the logged odds ratio of a PTA revision, and so like for the Cox regression, positive coefficients indicate that a unit increase in a variable is associated with an increased likelihood of a

¹¹Voeten 2021.

¹²Dür, Baccini, and Elsig 2014.

revision. The results are robust to this alternative specification as well.

Table 2: Predicting treaty revisions: survival analysis

	DV: Time to PTA revision							
	(1) <i>UNGA</i>	(2) <i>Common language</i>	(3) <i>Joint PTAs</i>	(4) <i>Services review</i>	(5) <i>No pre- ratification</i>	(6) <i>Annual ideal-dist</i>	(7) <i>Cox</i>	(8) <i>logistic</i>
Change in UNGA ideal-point distance	-0.835*** (0.172)			-0.913*** (0.161)	-0.870*** (0.170)		0.767*** (0.164)	0.960*** (0.172)
Common official or primary language		-0.493*** (0.149)		-0.506*** (0.142)	-0.475*** (0.143)		0.387*** (0.129)	0.637*** (0.138)
Sum of dyadic PTAs			-0.407*** (0.076)					
Services review clause				-0.691*** (0.124)				
UNGA ideal-point distance						0.159** (0.080)		
Change in trade since PTA entry (%)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Bilateral trade imbalance	0.089*** (0.031)	0.081*** (0.029)	0.074*** (0.028)	0.074** (0.029)	0.091*** (0.032)	0.085*** (0.030)	-0.098*** (0.032)	-0.094*** (0.033)
Annual GDP growth (Country A)	-0.018 (0.014)	-0.031** (0.015)	-0.032** (0.015)	-0.017 (0.013)	-0.021 (0.014)	-0.017 (0.013)	0.021 (0.014)	0.015 (0.015)
Annual GDP growth (Country B)	-0.042*** (0.015)	-0.039*** (0.013)	-0.042*** (0.013)	-0.041*** (0.015)	-0.041*** (0.015)	-0.042*** (0.014)	0.027** (0.012)	0.043*** (0.013)
PTA depth (Rasch score)	-0.144** (0.061)	-0.224*** (0.063)	-0.177*** (0.058)	-0.210*** (0.066)	-0.255*** (0.067)	-0.140** (0.060)	0.144** (0.064)	0.431*** (0.069)
Sum of dyadic renegotiations, t-1	-0.026*** (0.006)	-0.022*** (0.006)	-0.022*** (0.006)	-0.016** (0.006)	-0.020*** (0.006)	-0.027*** (0.006)	0.026*** (0.005)	-0.003 (0.007)
Mean non-dyad renegotiations in PTA, t-1	-0.014 (0.013)	-0.012 (0.012)	0.000 (0.012)	-0.019 (0.013)	-0.022* (0.013)	-0.011 (0.013)	0.009 (0.010)	0.010 (0.010)
Constant	3.490*** (0.124)	3.585*** (0.132)	3.976*** (0.167)	3.798*** (0.128)	3.644*** (0.137)	3.325*** (0.127)		-4.383*** (0.142)
/								
lnsigma	0.332*** (0.025)	0.305*** (0.026)	0.315*** (0.025)	0.291*** (0.027)	0.323*** (0.026)	0.325*** (0.025)		
lnsig2u								0.046 (0.172)
Observations	15969	15690	16169	15492	15300	16079	15492	16797

Effect on trade

The following tables present the full error correction model output from tables presented in the main paper, as well as results with additional controls. Table 3 presents the full output from error correction models (ECM) that examine the effects of PTA revisions on exports between PTA partners. These results are the same as in Table 3 in the main paper, but here all variables are presented. The dependent variable is change in trade (logged imports plus logged exports). In Table 3, the short-run effects of revisions on exports are given by the coefficients on the differenced explanatory variables. The long-run effect is not as readily interpreted. The long-run multiplier effect (the extent of the increase or decrease) is calculated as the product of the lagged explanatory variable of interest divided by the (negative) coefficient of the lagged dependent variable.¹³ Thus we see that the substantive long-run effect of a revision on lagged and logged trade is roughly

$$0.060 / -0.090 \times -1 = 0.667 \quad (\text{model 1})$$

¹³De Boef and Keele 2008.

and for a liberalizing revision $0.167 / -0.090 \times -1 = 1.856$ (model 4)

Yet we cannot directly determine the statistical significance of this result. For this we use Bewley's (1979) transformation. To do this we regress the un-differenced dependent variable (trade) on the linear prediction of the differenced dependent variable (obtained from the regression discussed above and included in the models as 'fitted values'), the differenced independent variables, and the lagged independent variables. The result of this procedure is presented in Table 4.

Table 3: PTA Revisions and trade flows: error correction model

<i>Type of revision</i>	DV: D.Bilateral trade (logged)			
	Error correction model			
	(1)	(2)	(3)	(4)
<i>All</i>	<i>Administrative</i>	<i>Expansionary</i>	<i>Increase access</i>	
<i>First differences (short-term effects)</i>				
D.PTA revision	0.112**	-0.023	0.158**	0.228***
	(0.050)	(0.095)	(0.064)	(0.053)
D.Logged sum of GDPs	2.953***	2.980***	2.952***	2.956***
	(0.442)	(0.441)	(0.442)	(0.441)
D.Logged Difference in GDPs	-0.133**	-0.132**	-0.132**	-0.133**
	(0.057)	(0.057)	(0.057)	(0.057)
<i>Lags</i>				
L.PTA revision	0.060	-0.018	0.042	0.167***
	(0.049)	(0.077)	(0.067)	(0.062)
L.Bilateral trade (logged)	-0.090***	-0.090***	-0.090***	-0.090***
	(0.007)	(0.007)	(0.007)	(0.007)
L.Simple distance, most-populated cities (logged)	-0.216***	-0.216***	-0.215***	-0.215***
	(0.024)	(0.024)	(0.024)	(0.024)
L.Logged sum of GDPs	0.484***	0.485***	0.484***	0.484***
	(0.048)	(0.048)	(0.048)	(0.048)
L.Logged Difference in GDPs	-0.153***	-0.152***	-0.153***	-0.152***
	(0.022)	(0.022)	(0.022)	(0.022)
Constant	-4.047***	-4.069***	-4.051***	-4.050***
	(0.450)	(0.451)	(0.451)	(0.451)
Observations	15532	15532	15532	15532
R^2	0.055	0.055	0.055	0.055

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

We can see that the substantive effects of revisions on exports are equivalent whether calculated manually or provided by Bewley's (1979) transformation. Thus the long-run effect of a revision in model (1) that we calculated manually was 0.667, and in model (4) it was 1.856. We can see that the results as given in Table 4 are equivalent at 0.664 and 1.855 respectively (there is a difference due to rounding error). Bewley's transformation allows us to see that these effects are significant at the 99% confidence level ($p < 0.01$). In the paper these models are truncated and combined such that the long-run effects from the Bewley's transformation models are given directly in place of the lagged variables from the first stage of the ECM.

In Table 5 I add a host of additional control variables. I control for whether or not

Table 4: PTA Revisions and trade flows: error correction model (long-run effects)

<i>Type of revision</i>	DV: D.Bilateral trade (logged)			
	Error correction model (Bewley's transformation)			
	(1) <i>All</i>	(2) <i>Administrative</i>	(3) <i>Expansionary</i>	(4) <i>Increase access</i>
<i>First differences</i>				
D.PTA revision	1.248*** (0.050)	-0.256*** (0.095)	1.758*** (0.064)	2.538*** (0.053)
D.Logged sum of GDPs	32.848*** (0.492)	33.236*** (0.491)	32.862*** (0.492)	32.861*** (0.491)
D.Logged Difference in GDPs	-1.474*** (0.057)	-1.473*** (0.057)	-1.474*** (0.057)	-1.474*** (0.057)
<i>Lags (long-term effects)</i>				
L.PTA revision	0.664*** (0.048)	-0.196** (0.077)	0.467*** (0.066)	1.855*** (0.061)
L.Simple distance, most-populated cities (logged)	-2.402*** (0.016)	-2.409*** (0.016)	-2.398*** (0.016)	-2.395*** (0.016)
L.Logged sum of GDPs	5.387*** (0.026)	5.407*** (0.026)	5.391*** (0.026)	5.382*** (0.026)
L.Logged Difference in GDPs	-1.698*** (0.018)	-1.699*** (0.018)	-1.700*** (0.018)	-1.694*** (0.018)
Fitted values	-10.123*** (0.075)	-10.154*** (0.075)	-10.133*** (0.075)	-10.118*** (0.075)
Constant	-45.014*** (0.286)	-45.388*** (0.285)	-45.096*** (0.286)	-45.026*** (0.286)
Observations	15532	15532	15532	15532
R^2	0.936	0.936	0.936	0.936

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

countries are in a military alliance, since allies may have higher trade levels.¹⁴ In addition to logged distance (included in the previous models) I control for geographical contiguity. I control for entry into an additional PTA, since if revisions to an existing PTA reflect a decision to align old rules with new ones, any increase in trade might owe to the new institution rather than the revised one. I control for United Nations General Assembly ideal-point distance as a measure of international political affinity (larger values equate to less similar voting patterns),¹⁵ since countries with greater foreign policy alignment and ideological commitments may have higher trade cooperation even beside the effect of any institutions. I also control for regime-type (using the latest release of Polity, Polity5),¹⁶ for WTO membership of both countries, and for global business cycles (annual global GDP growth), since global economic downturns may correlate with lower trade values.¹⁷

Even accounting for these additional factors, PTA revisions remain clearly associated with a positive and statistically significant increase in bilateral trade. The effect in the short-term is slightly moderated: the effect of a revision (without discriminating revision type) is now not statistically significant, and the effect of non-limiting and of liberalizing revisions has been very slightly reduced as compared to the more parsimonious model.

Yet the long-term effects have only been sharpened by the inclusion of the additional controls. The long-term effect of any revision (model 1) is now estimated to be more than twice as large at 1.476 (significant at the 99% confidence level) versus 0.664 previously. Meanwhile, the long-term effect of a liberalizing revision on trade is now estimated at 3.008 (significant at the 99% confidence level) versus 1.855 previously. Importantly, the expected difference between the different types of revision remains: liberalizing revisions have the largest positive effect on bilateral trade, followed by non-limiting revisions and administrative revisions respectively.

How large are these effects in substantive terms? The logged trade variable has a mean of 34.0 and a standard deviation of 8.3. Looking to the results from the full model, the long-term effect of a PTA revision is around one fifth of a standard deviation for any revision, and around one third of a standard deviation for a liberalizing revision. Administrative revisions have a smaller long-term effect, but with the inclusion of all controls that effect is now positive.

We can also get a sense of the substantive importance of revisions by comparing their effects to those of key control variables. The most notable effect is for entry into an additional PTA. Depending on the model specification, the long-run effect is estimated at between around 3.7 (model 1) to around 4.0 (model 4). Revising an existing PTA can therefore have around three-quarters of the impact on bilateral trade as signing an entirely new agreement, depending on the type of revision. This is all the more striking given that the same PTA can be revised more than once.

The other controls are all as expected, save for global GDP growth. After controlling for all other factors, there is no short-term effect of global GDP growth, and the long-term effect appears to be negative. As differencing and lagging the sum and difference of countries' GDPs accounts for their own economic growth, it is perhaps not surprising that

¹⁴Gowa 1994; Gowa and Mansfield 1993.

¹⁵Voeten 2021.

¹⁶Marshall and Gurr 2020.

¹⁷Freund 2009.

global economic growth would have no additional positive effect, although the negative effect is not theoretically predicted.

In sum, when controlling for a wide range of additional variables that might relate to trade flows, revisions to countries' PTAs is associated with a meaningful increase in trade flows.

Table 5: PTA Revisions and trade flows: error correction model (additional controls)

<i>Type of revision</i>	DV: D.Bilateral trade (logged)			
	Error correction model			
	(1)	(2)	(3)	(4)
<i>First differences (short-term effects)</i>	<i>All</i>	<i>Administrative</i>	<i>Expansionary</i>	<i>Increase access</i>
D.PTA revision	0.052	-0.053	0.100**	0.226***
	(0.047)	(0.100)	(0.049)	(0.049)
D.Any COW military alliance	0.461***	0.459***	0.467***	0.459***
	(0.075)	(0.074)	(0.075)	(0.074)
D.PTA entry	0.223**	0.233**	0.230**	0.235**
	(0.107)	(0.105)	(0.105)	(0.105)
D.UNGA ideal-point distance	-0.105	-0.104	-0.106	-0.102
	(0.116)	(0.116)	(0.116)	(0.116)
D.Polity 2 score, A (P5 2018)	-0.031	-0.031	-0.031	-0.031
	(0.021)	(0.021)	(0.021)	(0.021)
D.Polity 2 score, B (P5 2018)	-0.014	-0.014	-0.014	-0.013
	(0.014)	(0.014)	(0.014)	(0.014)
D.WTO membership, country A	-0.029	-0.033	-0.027	-0.026
	(0.255)	(0.255)	(0.255)	(0.255)
D.WTO membership, country B	0.160	0.160	0.162	0.162
	(0.148)	(0.147)	(0.148)	(0.148)
D.Logged sum of GDPs	2.727***	2.751***	2.702***	2.733***
	(0.597)	(0.597)	(0.597)	(0.597)
D.Logged Difference in GDPs	-0.138**	-0.137**	-0.137**	-0.138**
	(0.062)	(0.061)	(0.062)	(0.061)
D.Global GDP growth (annual %)	0.000	0.000	0.001	0.000
	(0.010)	(0.010)	(0.010)	(0.010)
<i>Lags</i>				
L.PTA revision	0.126***	0.031	0.157***	0.257***
	(0.040)	(0.079)	(0.049)	(0.048)
L.Bilateral trade (logged)	-0.085***	-0.085***	-0.085***	-0.085***
	(0.007)	(0.007)	(0.007)	(0.007)
L.Any COW military alliance	0.027	0.027	0.028	0.026
	(0.036)	(0.036)	(0.036)	(0.036)
L.Simple distance, most-populated cities (logged)	-0.174***	-0.174***	-0.173***	-0.174***
	(0.022)	(0.022)	(0.022)	(0.022)
L.Contiguity	0.231***	0.229***	0.230***	0.231***
	(0.056)	(0.056)	(0.056)	(0.056)
L.PTA entry	0.318***	0.331***	0.332***	0.338***
	(0.115)	(0.114)	(0.114)	(0.114)
L.UNGA ideal-point distance	-0.016	-0.018	-0.016	-0.013
	(0.018)	(0.018)	(0.018)	(0.019)
L.Polity 2 score, A (P5 2018)	0.005*	0.005*	0.005*	0.004
	(0.003)	(0.003)	(0.003)	(0.003)
L.Polity 2 score, B (P5 2018)	-0.002	-0.002	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)
L.WTO membership, country A	0.072	0.073	0.073	0.077
	(0.054)	(0.054)	(0.054)	(0.054)
L.WTO membership, country B	0.075	0.075	0.077	0.071
	(0.063)	(0.063)	(0.063)	(0.063)
L.Logged sum of GDPs	0.420***	0.421***	0.421***	0.420***
	(0.043)	(0.043)	(0.043)	(0.043)
L.Logged Difference in GDPs	-0.120***	-0.120***	-0.120***	-0.120***
	(0.019)	(0.019)	(0.019)	(0.019)
L.Global GDP growth (annual %)	-0.048***	-0.048***	-0.047***	-0.049***
	(0.016)	(0.016)	(0.015)	(0.016)
Constant	-3.721***	-3.755***	-3.727***	-3.715***
	(0.449)	(0.451)	(0.450)	(0.450)
Observations	13971	13971	13971	13971
R ²	0.054	0.054	0.054	0.054

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: PTA Revisions and trade flows: long-run effects (additional controls)

<i>Type of revision</i>	DV: D.Bilateral trade (logged)			
	Error correction model (Bewley's transformation)			
	(1)	(2)	(3)	(4)
<i>First differences</i>	<i>All</i>	<i>Administrative</i>	<i>Expansionary</i>	<i>Increase access</i>
D.PTA revision	0.609*** (0.046)	-0.628*** (0.100)	1.171*** (0.049)	2.650*** (0.049)
D.Any COW military alliance	5.415*** (0.089)	5.403*** (0.089)	5.481*** (0.090)	5.388*** (0.089)
D.PTA entry	2.622*** (0.108)	2.743*** (0.107)	2.705*** (0.106)	2.760*** (0.106)
D.UNGA ideal-point distance	-1.227*** (0.116)	-1.225*** (0.116)	-1.243*** (0.116)	-1.197*** (0.116)
D.Polity 2 score, A (P5 2018)	-0.367*** (0.021)	-0.363*** (0.021)	-0.364*** (0.021)	-0.364*** (0.021)
D.Polity 2 score, B (P5 2018)	-0.160*** (0.015)	-0.163*** (0.015)	-0.160*** (0.015)	-0.158*** (0.015)
D.WTO membership, country A	-0.336 (0.255)	-0.388 (0.255)	-0.319 (0.255)	-0.302 (0.255)
D.WTO membership, country B	1.879*** (0.149)	1.887*** (0.148)	1.897*** (0.149)	1.895*** (0.149)
D.Logged sum of GDPs	32.006*** (0.634)	32.416*** (0.634)	31.730*** (0.634)	32.044*** (0.634)
D.Logged Difference in GDPs	-1.618*** (0.062)	-1.618*** (0.062)	-1.614*** (0.062)	-1.618*** (0.062)
D.Global GDP growth (annual %)	0.002 (0.010)	0.004 (0.010)	0.009 (0.010)	0.000 (0.010)
<i>Lags (long-term effects)</i>				
L.PTA revision	1.476*** (0.039)	0.359*** (0.078)	1.839*** (0.049)	3.008*** (0.048)
L.Any COW military alliance	0.316*** (0.036)	0.320*** (0.036)	0.327*** (0.036)	0.304*** (0.036)
L.Simple distance, most-populated cities (logged)	-2.036*** (0.019)	-2.052*** (0.019)	-2.037*** (0.019)	-2.042*** (0.019)
L.Contiguity	2.716*** (0.051)	2.700*** (0.051)	2.703*** (0.051)	2.709*** (0.051)
L.PTA entry	3.727*** (0.117)	3.895*** (0.116)	3.897*** (0.115)	3.967*** (0.115)
L.UNGA ideal-point distance	-0.187*** (0.018)	-0.208*** (0.018)	-0.187*** (0.018)	-0.155*** (0.018)
L.Polity 2 score, A (P5 2018)	0.054*** (0.003)	0.056*** (0.003)	0.055*** (0.003)	0.052*** (0.003)
L.Polity 2 score, B (P5 2018)	-0.025*** (0.003)	-0.025*** (0.003)	-0.024*** (0.003)	-0.025*** (0.003)
L.WTO membership, country A	0.843*** (0.055)	0.860*** (0.055)	0.855*** (0.055)	0.902*** (0.055)
L.WTO membership, country B	0.877*** (0.063)	0.888*** (0.063)	0.900*** (0.063)	0.831*** (0.063)
L.Logged sum of GDPs	4.932*** (0.025)	4.963*** (0.025)	4.939*** (0.025)	4.926*** (0.025)
L.Logged Difference in GDPs	-1.406*** (0.017)	-1.410*** (0.017)	-1.411*** (0.017)	-1.403*** (0.017)
L.Global GDP growth (annual %)	-0.568*** (0.015)	-0.560*** (0.015)	-0.558*** (0.015)	-0.569*** (0.015)
Fitted values	-10.737*** (0.083)	-10.783*** (0.083)	-10.744*** (0.083)	-10.725*** (0.083)
Constant	-43.671*** (0.295)	-44.241*** (0.294)	-43.774*** (0.296)	-43.562*** (0.296)
Observations	13971	13971	13971	13971
R^2	0.933	0.933	0.933	0.933

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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