Secure *and* Trade-Efficient Borders?
How trusted trader agreements affect bilateral trade

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Abstract*: What effect do trusted trader agreements have on bilateral trade?* How states control what crosses their borders is undergoing a dramatic transformation. In addition to managing territorial access unilaterally at physical borderlines, states increasingly exchange information to regulate the movement of goods "upstream" as they move through global supply chains. By getting information on low risk traders before they arrive at physical ports of entry, states hope to reduce congestion at borders (to facilitate trade) while, at the same time, focusing their attention on higher risk flows (to increase security). Trusted trader agreements are one tool states use to accomplish this objective. When two countries sign a trusted trader agreement, certified traders in one country who are compliant with World Customs Organization (WCO) supply chain security standards are entitled to benefit from streamlined customs procedures in the other. They are expedited through the ports of entry of the partner country and gain preferential access to its markets. States, in turn, are freed from exhausting their limited law enforcement resources on trusted traders and may focus instead on finding the proverbial illicit needle in a now smaller haystack. Surprisingly, research has not evaluated to what extent these agreements actually facilitate trade. We estimate a series of gravity models on a new global dyadic dataset of 147 trusted trader agreements signed from 2007 to 2020 to evaluate their effect on bilateral trade.

Introduction

After the terrorist attacks on 9/11, the United States subjected nearly every inbound vehicle and vessel to a security check, effectively closing U.S. borders. "The reflexive response," recalls Alan Bersin, who would become the Chief Diplomatic Officer of the new U.S Department of Homeland Security, "was to hunker down behind traditional concepts of borders as lines of defense."[1]As a result, delays at the U.S.- Canada border jumped from a standard thirty minutes to upwards of twelve hours, and each day of gridlock jeopardized $1.4 billion in bilateral trade tied up in highly integrated, just in time supply chains.[2] With only a few days, if not hours, of safety-net inventory on-hand, the delays led to factory closures on both sides of the border.[3]

The issues at North American borders after 9/11 point to a broader tension in the global economy between secure and trade-efficient borders. Economic globalization and its promises depend on a simple premise: goods must be able to move predictably and rapidly across international borders, unimpeded by time-consuming inspections. Prioritizing the facilitation of cross-border transit, however, generates potential negative security externalities: rogue actors may, and do, exploit global transportation systems to smuggle goods and people across borders. Thus, failing to inspect inbound flows leaves open the possibility for security breaches, which threaten national security and the political basis for economic openness. On the flip side, responding to security concerns with traditional border solutions, like increasing inspections at ports of entry, risks trade-suppressing logjams. Physical border barriers cannot meet the dual

[1] Alan Bersin, *Lines and Flows: The Beginning and End of Borders*, World Customs Journal, Vol. 6, No. 1, pp. 115-126, March 2012

[2] "Economic Consequences of Terrorism." OECD Economic Outlook 71, 2002.

[3] "Parts Shortages Cause Ford Shutdown," *Associated Press*, September 14, 2001.

objective of secure *and* trade-efficient borders.[4] To resolve this dilemma – to create borders that function simultaneously as security barriers and economic bridges[5] – states are globalizing their border controls. They increasingly cooperate to govern global *flows* so that their border *lines* become "last lines of defense" in layered perimeters that extend the globe.[6] This paper focuses on the effects of one increasingly popular manifestation of this transformation: trusted trader agreements (TTs).

When two countries sign a trusted trader agreement, certified traders in one country who are compliant with World Customs Organization (WCO) supply chain security standards are entitled to streamlined customs procedures in the other. They are expedited through the ports of entry of the partner country and gain preferential access to its markets, reducing congestion at the border. Agencies at the border, in turn, are freed from exhausting their limited law enforcement resources on trusted traders and may focus instead on higher risk flows – on finding the proverbial illicit needle in a now smaller haystack. By getting information on low risk traders before they arrive at physical ports of entry, states facilitate *legal* trade while, at the same time, blocking *illicit* trade. At least, this is the theory. Do trusted trader agreements actually improve the filtering function of international borders? To answer this question fully, we would need to know the effect of TTs on cross-border licit and illicit trade. Reliable data on the latter does not exist, so we focus on the former: *What effect do trusted trader agreements have on legal bilateral trade?*

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[4] Carter, David B., and Paul Poast. "Barriers to Trade: How Border Walls Affect Trade Relations." *International Organization 74*, no. 1 (2020): 165–85.
[5] Andreas, Peter. "Redrawing the Line: Borders and Security in the Twenty-First Century." *International Security* 28, no. 2 (2003): 78–111.; Simmons, Beth A., and Michael R. Kenwick. "Border Orientation in a Globalizing World." *American Journal of Political Science 66*, no. 4 (2022): 853–870.
[6] Alan Bersin, *Lines and Flows: The Beginning and End of Borders*, World Customs Journal, Vol. 6, No. 1, pp. 115-126, March 2012.

We offer the first study that addresses this question using new data on the universe of trusted trader agreements – an important first step towards understanding the economic consequences of managing inbound trade "upstream" before it arrives at the border. While political science has paid special attention to the consequences of *physical* border barriers, the consequences of cooperation between border agencies has been comparably neglected. David Carter and Paul Poast, for example, have found that border walls are associated with a reduction in trade between neighboring countries.[7] Their finding contributes to economic research (much of which focuses on the U.S.-Canada border) suggesting international borders function as non-tariff barriers to trade, and that security measures which "thicken" borders increase trade transaction costs.[8] Our intervention flags a *less visible* border barrier to inter-state trade than physical infrastructure: customs cooperation. We argue that because customs agencies regulate who and what enters the state *at* ports of entry, rather than between them (walls), their activity – both at the border and beyond – should generate the most important "border effects".[9]

This paper also contributes to a growing focus amongst IOs and policy analysts on the role of customs cooperation in facilitating trade[10] – attention prompted by a 2013 World Trade

[7] Carter, David B., and Paul Poast. "Barriers to Trade: How Border Walls Affect Trade Relations." *International organization* 74, no. 1 (2020): 165–185.

[8] McCallum, John. 1995. National Borders Matter: Canada–US Regional Trade Patterns. American Economic Review 85 (3):615–23.; Globerman, Steven, and Paul Storer. "Border Security and Canadian Exports to the United States: Evidence and Policy Implications." *Canadian Public Policy / Analyse de Politiques* 35, no. 2 (2009): 171–86.;Grady, Patrick. "Were Canadian Exports to the U.S. Curtailed by the Post-9/11 Thickening of the U.S. Border?" Global Economics Working Paper. October 9, 2009.

[9] Given that much illicit trade also crosses borders through ports of entry, the activity of Customs agencies is arguably also relevant to the question of *illicit* cross border trade. See, for example: "Want to know where most drugs cross the border? Look at the Border Patrol's news releases," Washington Post, 1 February 2018. [link]

[10] See, for example: Moïsé, E. and S. Sorescu (2019), "Exploring the role of trade facilitation in supporting integrity in trade", *OECD Trade Policy Papers*, No. 228. [link]; Lopez Gonzales, J. and S. Sorescu (2019), "Helpding SMEs internatinalise through trade facilitation," OECD Trade Policy Papers, No. 229. [link]; Moïsé, E. and S. Sorescu (2015), "Contribution of Trade Facilitation Measures to the Operation of Supply Chains", *OECD Trade Policy Papers*, No. 181.

Organization (WTO) Trade Facilitation Agreement (TFA). Among other goals, the WTO TFA calls for Border Agency and Customs Cooperation and, towards this end, suggests that member states negotiate trusted trader agreements – formally called Mutual Recognition Agreements (MRA) on Authorized Economic Operators (AEO).[11] To track progress on this metric, the OECD's Trade Facilitation Indicators (TFI) measure the extent to which individual country Customs agencies are cooperating with their foreign counterparts, including a measure on *if* they have a trusted trader program and Mutual Recognition Agreements.[12] The TFI does not, however, provide more granular information on the agreements themselves – how many a country has signed and with who. Similarly, the World Bank's "*Business Ready"* (B-READY) benchmarking project has a series of indicators measuring the extent to which countries facilitate international trade, which includes a monadic indicator denoting *if* a country has signed a trusted trader agreement (MRA of AEO) with any of its three main trading partners, but not how many or with who.[13] We contribute a dyadic and time-varying trusted trader agreement variable drawing on information from the World Custom Organization (WCO) AEO Compendium.

It is plausible that trusted trader agreements have *no* effect on trade flow. It could be the case that firms signing up to be certified traders do not comprise a significant portion of a country's trade value, in which case the privileged status of certified traders makes those small firms more competitive but does not have a meaningful impact on overall trade. Alternatively, even if high value firms become certified as trusted traders, customs agencies entering into trusted trader agreements may not have the actual capacity to implement the agreement and fast track low-risk goods across borders.

[11] World Trade Organization (WTO), Trade Facilitation Agreement. [link]
[12] OECD Trade Facilitation Indicators (TFIs). [link]
[13] World Bank, Business Ready Methodology Handbook, Subcategory 2.2.3–Border Agency Programs. [link]

We provide preliminary evidence that TTs do positively affect cross-border trade. We do so by estimating a series of gravity models of bilateral trade, with country-year fixed effects for both the exporting country and importing country, in addition to directed dyadic fixed effects. This finding is consistently positive and significant across various model specifications and for differing subsets of data.

[*Of course, with observational data it is possible that our models omit a key variable that drives both TTs and the increase in trade. We plan to test for the sensitivity of our estimates to selection on unobservables. Any advice on other ways to assess the possibility that the positive correlation is spuriously driven by some alternative factor is welcome!*]

The Security v Facilitation Dilemma at International Borders

The tension between borders as security barriers versus borders as trade bridges took on a heightened importance in the years following 9/11. While the economic cost of inspecting every good and person moving across U.S. borders after the post-9/11 border closures quickly proved unsustainable, the politics of the new security reality foreclosed a return to meager inspections at ports of entry. As put by one observer: this was the "end of the [open border] joyride."[14] Free trade proponents objected to the new emphasis on border security, arguing that it amounted to a non-tariff barrier that would "increase the cost of trading internationally" and "lead to a significant drop in international trade, negatively affecting openness, productivity and medium-term output growth"[15] – a "21st century post-9/11 equivalent of Smoot-Hawley"[16] with

[14] Flynn, Stephen E. "End of the Joyride: Confronting the New Homeland Security Imperative in the Age of Globalization." Paper prepared for the Colloquium Series on Border Control and Homeland Security at the Center for Global Change and Governance, Rutgers University, 7 April 2003.
[15] "Economic Consequences of Terrorism." OECD Economic Outlook 71, 2002, p. 118.
[16] "The Canadian-United States Supply Chain in an Era of Global Economic Competitiveness," Paul Vandevert remarks at the Proceedings of the Annual Conference of the Canadian-United States Law Institute, Canada-United States Law Journal, Vol. 34, No. 1 (2008), pp. 7-34, p 30.

an impact no less calamitous, so the argument went, than the destruction of New York's twin towers. As put by one official: "The twentieth century 'playbook' for responding to a security event at the border – ramping up security inspections or shutting down the border – ended up being a catastrophic 'cure' worse than the terrorist threat's disease."[17]

With 40 percent of their GDP tied to trade with the United States, Canadians were especially hostile to the post-9-11 closing of the 49th parallel. Reopening the U.S. border, and keeping it open, catapulted the future of U.S. border control to the top of Ottawa's foreign policy agenda. The stakes, as put by the Canadian business community, were no less than a matter of survival for the Canadian economy:

> Border delays harm productivity and increase the cost of doing business in Canada. If the border is a barrier to the efficient flow of goods and people, it will directly affect the future flow of foreign direct investment into Canada. Without unimpeded access to the U.S. market, companies will be reluctant to establish operations in Canada. In addition, companies with facilities in Canada may relocate, and future investment by Canadian and foreign companies may be reduced.[18]

In response, Thomas d'Aquino – widely acknowledged as one of Canada's most influential thinkers and strategists – pulled together the largest business coalition in Canadian history. The new "Coalition for Secure and Trade-Efficient Borders" represented most of the country's business activity and met with Cabinet Ministers, members of Parliament, and the then U.S. Ambassador to Canada, Paul Cellucci, to promote their November 2001 report titled *Rethinking our Borders: A Statement of Principles.* In the report, the Canadian Business Coalition called for a "new approach" to border control informed by principals of "risk management" – making

[17] Stodder, Seth M. "Rethinking Borders: Securing the Flows of Travel and Commerce in the Twenty-First Century." In *Beyond 9/11: Homeland Security for the Twenty-First Century*, edited by Chappell Lawson, Alan Douglas Bersin, and Juliette N. Kayyem, 77–99. Belfer Center Studies in International Security. Cambridge: The MIT Press, 2020, pg. 78.
[18] Statement of Principles, Coalition for Secure and Trade-Efficient Borders 2001, 1.

analytically informed choices about where to target enforcement, rather than targeting everything (effectively clogging ports of entry to the point of closure) or targeting randomly (seen by security hawks as a *de facto* open borders policy). Implementing a risk-management approach, the report made clear, would require international cooperation to screen goods and people *abroad*:

> To deal effectively with unknown and high-risk movements, Canadians have to think of the border in terms that go beyond the 49th parallel. This does not mean the disappearance of the border. Rather, border management systems must effectively identify and facilitate known low-risk goods and people, including pre-clearance and other procedures prior to arrival at the 49th parallel. This will relieve pressure on the 49th parallel so that border resources can be targeted to areas of greatest risk…
>
> Problems must be detected before they hit Canadian or American shores. In concrete terms, this means screening people and goods and assessing their risk before they depart for North America.[19]

The Canadian business coalition reached across the border to its counterpart in the United States, producing a joint letter to President Bush and Prime Minister Chretien that called for a "zone of confidence" between the U.S. and Canada which would transform the 49th parallel into a shared checkpoint. The Canadian business coalition also courted John Manley, then the Canadian Foreign Minister, who brought the new border solution to the inaugural White House Director of Homeland Security, Tom Ridge. Ridge had extensive experience working with his Canadian counterparts as former governor of Pennsylvania, and that experience, according to Manley, meant that he "well understood the importance of the Canada-U.S. border" (Manley, Wilson Center Interview, 2022). Indeed, by December 2001, Ridge signed onto a 30-point U.S.-Canada "Smart" Border Declaration penned by the Canadian Privy Council.

[19] Statement of Principles, Coalition for Secure and Trade-Efficient Borders 2001, 3.

The Declaration was an acknowledgement that hardening the border by traditional means was self-defeating and a demonstration of bilateral political will to try something new: "approaches to move customs and immigration inspection activities away from the [U.S.-Canada] border to improve security and relieve congestion where possible."[20] It was also the beginning of a much broader shift in border management, as practitioners on both sides of the border argued that the principles underlying the Declaration should be *globalized*. For example: George Haynal, then assistant deputy minister in Canada's Department of Foreign Affairs and International Trade, argued:

> The notion that a line around the continent would, of itself, defend North America, is fanciful. This is a world where threats come from networks without geography. Offshore cooperation then would need to take the form of networks to monitor and anticipate threatening flows. …
>
> For the longer term, we must reinvent our borders, both those that lie between us and those that we present to the world, and make them part of a broader framework of security and cooperation in the world.[21]

Similarly, Seth Stodder, then the Director of Policy for the new U.S. Customs and Border Protection agency (CBP), argued that "only by working in *partnership* could the nations of the world successfully secure and facilitate the transnational flow of travel and commerce so essential to every nation's prosperity."[22] By 2002, the White House position was that "the border of the future must integrate actions abroad to screen goods and people prior to their arrival in

[20] George W. Bush White House archives, "U.S. - Canada Smart Border/30 Point Action Plan Update," 6 December 2002. [link]
[21] George Haynal, "Interdependence, globalization, and North American borders," Policy Options, 1 September 2002. [link]
[22] Stodder, Seth M. "Rethinking Borders: Securing the Flows of Travel and Commerce in the Twenty-First Century." In *Beyond 9/11: Homeland Security for the Twenty-First Century*, edited by Chappell Lawson, Alan Douglas Bersin, and Juliette N. Kayyem, 77–99. Belfer Center Studies in International Security. Cambridge: The MIT Press, 2020, pg. 88.

sovereign US territory"[23] and, to this effect, the July 2002 U.S. Security Strategy for Homeland Security stated that "the Department and its partners will conduct border security functions abroad to the extent allowed by technology and international agreements."[24]

An inaugural cadre of U.S. homeland security diplomats staffing a new Office of International Affairs within a new Homeland Security Department (DHS) worked hard in the years that followed to transform the worlds' borders. One important multilateral aspect of this effort was embedding new supply chain security standards into the World Customs Organization, including blueprints for domestic "Authorized Economic Operator" (AEO) programs to certify traders as "low-risk" along with corresponding blueprints for bilateral agreements that mutually recognized the status of low-risk traders located in the both countries party to the agreement.

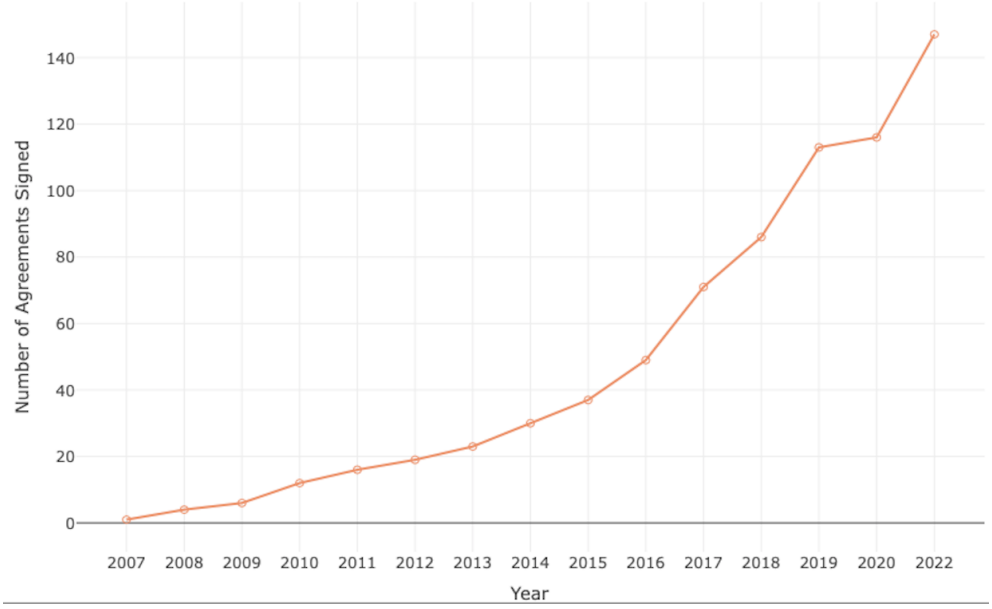
While the Trusted Trader concept is not a North American invention and pre-dates 9/11,[25] U.S. diplomatic efforts in the early 2000s were fundamental to its globalization.[26] These efforts were targeted at the World Customs Organization (WCO) from 2002 to 2004, and concluded in a 2005 Framework of Standards to Secure and Facilitate Global Trade (SAFE). A central objective of SAFE was, and remains, "to establish and enhance Customs-to-Customs network arrangements to promote the seamless movement of goods through secure international trade supply chains."[27] To accomplish this objective, SAFE encouraged Customs to exchange

[23] President George W. Bush White House Archives, "Securing America's Borders Fact Sheet: Border Security." [link]
[24] 2002 U.S. National Strategy for Homeland Security. [link]
[25] Pioneer programs existed in Sweden (Swedish Gateway) and Finland (Green Corridor) as early as the 1980s, though these programs were limited to contiguous states. See: Karlsson, Lars. "Back to the Future of Customs: A New AEO Paradigm Will Transform the Global Supply Chain for the Better." *World Customs Journal* 11, no. 1 (2017): 12.
[26] That the U.S. played a lead role elevating supply chain security as a key function for Customs via the WCO after 9/11 is widely accepted. See, for example, statement by Kunio Mikuriya, Secretary General of the World Customs Organization: "Supply chain security: the Customs community's response," *World Customs Journal*, 1, No.2 (2007).
[27] World Customs Organization (WCO) SAFE Framework of Standards, p.4. [link]

information on high and low risk traders, including via mutual recognition of Authorized Economic Operators (AEOs) (trusted trader agreements). Towards the end, the WCO has released blueprints to facilitate the signing of trusted trader agreements (MRA-AEOs), including MRA Guidelines and a Strategy Guide for AEO Mutual Recognition.[28]

Since the U.S. and New Zealand signed the world's inaugural trusted trader agreement in 2007, they have proliferated across most regions of the globe – totaling 148 agreements as of 2022 (Figure 1). South Korea, China, and the U.S. have signed the most agreements (14, 12, and 11, respectively), but the median number of TTs for the 49 countries who have signed them is three (Figure 2). There is a noticeable absence of TTs with or between countries in sub-Saharan Africa and in parts of the Middle East and South Asia.

Figure 1. Trusted trader agreements signed over time (cumulative)



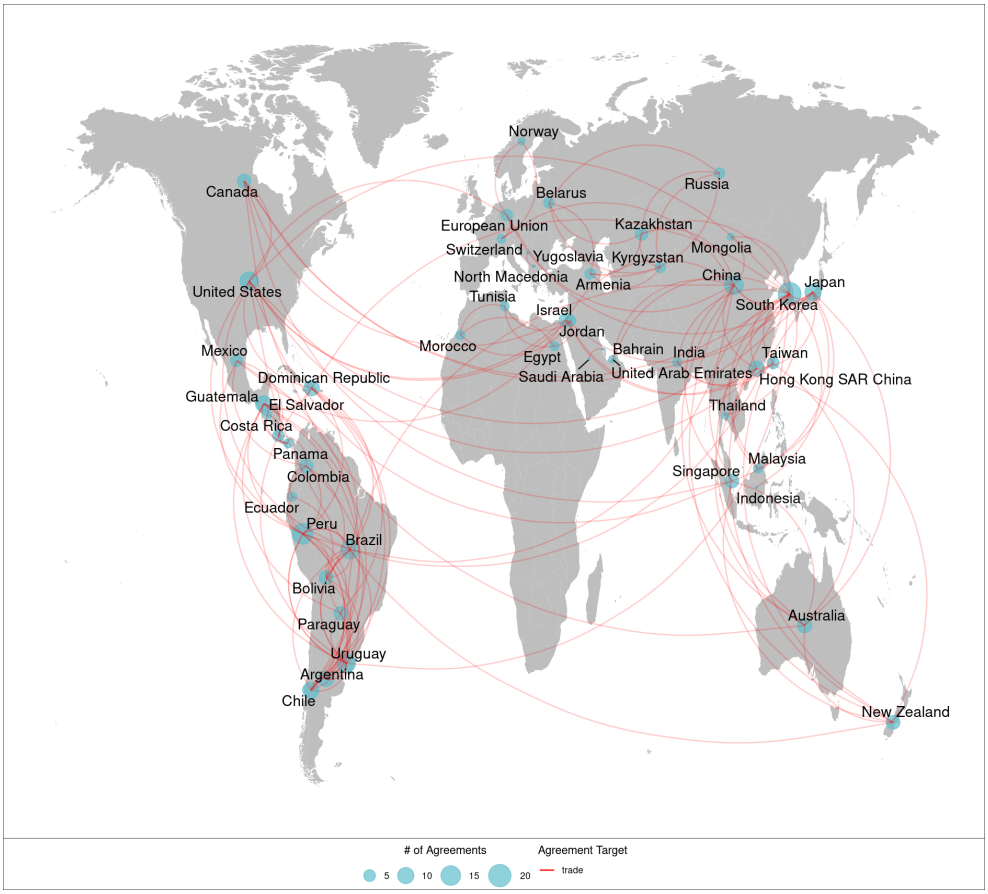
Unsurprisingly, countries seem to be signing Trusted Trader agreements because they believe that they work. After signing a 2023 arrangement with Australia, the Indian Revenue

[28] World Customs Organization (WCO), 2021 Mutual Recognition Arrangement/ Agreement Strategy Guide. [link]

Authority stated it "shall benefit our exporters to Australia and thereby promote a trade relationship between the two countries."[29] According to the European Union, its agreement with China marks "a big step forward in our trade relationship." The agreement is heralded as "fully in the spirit of trade facilitation, by making customs procedures easier, cheaper and faster for our trusted operators. It is also in the spirit of growth, by improving our business environment and accelerating trade." More than an engine of growth, "Our citizens will benefit from greater protection too, as customs can focus more resources on where the real risks lie. In short, everyone is a winner with this customs agreement."[30] Similarly, U.S. agreements with Colombia and Guatemala signed in 2023 "are furthering our efforts to facilitate trade and enhance our economic security mission."[31] Research, however, has not yet evaluated these assumptions.

Figure 2. Geographic Distribution of Trusted Trader Agreements, 2022

[29] Indian Ministry of Finance Press Release, "Cabinet approves Mutual Recognition Arrangement of Authorized Economic Operators between India and Australia", 16 August 2023. [link]
[30] European Commission Press Release, 16 May 2014.
[31] U.S. Customs and Border Protection Press Release, "CBP and Customs Administrations Agree on Strengthening Supply Chain Security," 18 April 2023. [link]



Alternative Expectations

While we have emphasized the positive consequences of trusted trader agreement for legal trade, there are reasons to expect they have no effect. First, it could be the case that firms signing up to be certified traders do not comprise a significant portion of the countries trade value, in which case the privilege status of certified traders makes those small or medium firms more competitive but does not have a meaningful impact on overall trade.

Alternatively, even if high value firms become certified as trusted traders, Customs agencies entering into trusted trader agreements may not have the *capacity* to deliver on the cost-saving promise of being a trusted trader: more predictable and fast transit across international borders. If this is right, we might expect trusted trader agreements to have

differentiated impacts on bilateral trade based on a country's customs agency capacity. We use a crude proxy for customs capacity in this draft (country income level), but plan to include more granular measures of customs capacity. First, the World Bank's Logistics Performance Index (LPI) captures survey data on the "The efficiency of customs and border management clearance" from 2007 to 2018. This data is based on a worldwide survey of global traders, and their perceptions of the logistics "friendliness" of the countries in which they trade. Second, we plan to include a measure of infrastructure at ports of entry from Simmons and Kenwick (2022) – an observable implication of a country's capacity to filter inbound flows efficiently.[32]

Research Design and Data

To assess the effects of trusted trader agreements on trade flows, we estimate a series of gravity models of trade. The baseline gravity model is the reference model for the determinants of bilateral trade flows in the political science and economics literature, relying on the relative size of traders' economies and a distance metric to estimate bilateral trade volumes.[33] The baseline gravity model can be easily augmented by including other covariates that are likely to impact trade flows. In the present case, we include a binary measure of whether a dyad had a trusted trader agreement (a so-called Mutual Recognition Agreement) in effect in a given year as a key independent variable in all models. To measure the effect of MRAs on bilateral trade, we estimate a series of gravity models in R, beginning with a 'baseline' model and gradually adding relevant covariates to subsequent models. In each model, we also incorporate country-year fixed effects and directed dyadic fixed effects. The former control for time-varying unobservable

[32] Simmons, Beth A., and Michael R. Kenwick. "Border Orientation in a Globalizing World." *American Journal of Political Science* 66, no. 4 (2022): 853–870.
[33] Chaney, Thomas. "The Gravity Equation in International Trade: An Explanation." *National Bureau of Economic Research* (2013). [link]

factors which may affect a given country's trade flows in a given year, whereas the latter control for time-invariant unobservable properties of dyads.

Our data on truster trader agreements covers the full universe of cases, including every bilateral agreement (MRA) signed since the first such agreement in 2007. Empirically, all MRAs that have been signed so far are still in effect. We obtain dyadic data on MRAs from the Annexes of the 2020 World Customs Organization AEO Compendium[34] and verified signage dates via press releases. We obtain dyadic data on bilateral trade flows from the CEPII *Gravity* database, which includes data up to 2020 and includes a variety of trade-relevant covariates.[35] The CEPII data is in part preferable to the commonly-used *Correlates of War* trade data, given that the latter only has coverage up to 2014. After subsetting for years in the 2007-2020 range, we merge the CEPII data with our agreement data, matching on dyad-years. For each observation, we construct a binary measure of whether or not an MRA was in effect in that year.

We also wish to test whether the effects of trusted trader agreements are dependent on states' capacity to enforce key provisions of agreements that facilitate trade. Presumably, lower-income countries have fewer means to devote to robust customs enforcement and especially to differential treatment of goods based on source. Accordingly, we estimate an additional set of models specifically subsetted by income, using the World Bank's 2022 GDP threshold for 'high-income' countries of $13,846 USD per capita as a basis to bifurcate our data.[36] In other words, only dyad-years in which both countries were either above or below this threshold are used to produce these estimates.

[34] See Annex 5. [link]
[35] The *Gravity* database and supporting documentation are available from CEPII [link]
[36] World Bank [link]

Preliminary Results

We consistently find significant, positive effects of trusted trader agreements (MRAs) on bilateral trade flows. Table 1 provides model estimates using the full dataset. The effect of trusted agreements is positive across all models. In each case, values for bilateral trade flows are logged. The presence of a trusted trader agreement is associated with an increase of approximately 1.31 logged millions of U.S. dollars in trade per dyad-year in the baseline Model 1, reducing slightly in Models 2 and 3, respectively. Substantively, Model 1 estimates that a dyad-year with the median value of annual bilateral trade (7.6 logged millions, USD) would expect an approximately 17% higher overall trade volume if a trusted trader agreement is in effect. In Model 2, which adds population measures and a territorial contiguity indicator, the effect is about a 15.5% conditional increase in trade. This effect diminishes slightly to an estimated 11.2% increase in Model 3, which includes WTO membership and regional trade agreements (RTAs) as covariates. Predictably, joint WTO membership and RTAs are associated with greater bilateral trade volumes, slightly lessening the magnitude of the observed effect of MRAs on flows. Territorial contiguity is also positively associated with trade volumes. The populations of either destination or origin countries, while statistically significant, have no substantive effect in Models 2 and 3.

Models 4–6 produce similar estimates using Poisson Pseudo-Maximum Likelihood Estimation (PMLE). The intuition of using a Poisson distribution is to assess model sensitivity to missing (or zero) bilateral trade values, which are prevalent in the full directed dyad data.[37] In this case, we see that the estimates for MRAs remain strongly positive, with some gradual reduction in effect size as the number of covariates is increased. This serves as an initial

[37] See: Carter and Poast (2020); Silva, J.M.C. Santos, and Tenreyro, Silvana. 2006. "The Log of Gravity." *The Review of Economics and Statistics 88* (4): 641–58.

robustness check, improving our confidence in the overall positive relationship between trusted trader agreements and bilateral trade.

Table 1: Full-sample gravity models

	OLS			*Poisson PMLE*		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	−19.02***	−18.78***	−19.49***	18.42***	18.28***	15.30***
	(0.07)	(0.08)	(0.08)	(0.09)	(0.07)	(0.08)
logDistance	−1.51***	−1.45***	−1.30***	−0.62***	−0.66***	−0.50***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
logGDP (origin)	1.24***	1.23***	1.20***			
	(0.00)	(0.00)	(0.00)			
logGDP (destination)	0.97***	0.95***	0.91***			
	(0.00)	(0.00)	(0.00)			
MRA	1.31***	1.18***	0.85***	3.54***	2.38***	1.95***
	(0.12)	(0.12)	(0.12)	(0.07)	(0.04)	(0.03)
Contiguity		1.11***	0.99***		0.88***	0.75***
		(0.03)	(0.03)		(0.03)	(0.02)
Pop. (origin)		0.00***	0.00***		0.00***	0.00***
		(0.00)	(0.00)		(0.00)	(0.00)
Pop. (destination)		0.00***	0.00***		0.00***	0.00***
		(0.00)	(0.00)		(0.00)	(0.00)
Regional Trade Agreement			0.85***			0.88***
			(0.01)			(0.02)
Both WTO			0.53***			1.56***
			(0.01)			(0.03)
Country-year FE	✓	✓	✓	✓	✓	✓
Directed Dyadic FE	✓	✓	✓	✓	✓	✓
R^2	0.63	0.63	0.64			
Adj. R^2	0.63	0.63	0.64			
Num. obs.	349981	349981	349981	383201	372300	372300

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

When we turn to the data subsetted by high and low-income countries, we see that the effect of trusted trader agreements on trade flows remains persistent and positive, despite differing sample subsets and variations in model specifications. Table 2 provides estimates from a series of OLS models on the same range of covariates in Table 1 but on income-subsetted data. Contrary to expectations, the effect size of trusted trader agreements (MRAs) on trade is consistently greater among the lower-income subsample than for the higher-income subsample. Substantively, lower-income dyad-years (under $13,846 USD per capita) that have signed trusted trader agreements have a mean estimated trade volume that is 16–31% higher than those who

have not. The same estimate for higher-income dyads is smaller, with trusted trader agreements being associated with 5–7% higher trade volumes. While the examination of specific mechanisms is beyond the scope of this paper, a possible explanation of this finding is that, while lower-income countries *may* have relatively less customs enforcement capacity, trusted trader agreements may significantly lessen the overall enforcement demands on customs agencies, thereby serving to facilitate flows.

Table 2: Sub-sample gravity models

	Model 7 *(low income)*	Model 8 *(low income)*	Model 9 *(low income)*	Model 10 *(high income)*	Model 11 *(high income)*	Model 12 *(high income)*
Intercept	−14.35***	−12.46***	−15.10***	−23.12***	−24.56***	−23.89***
	(0.12)	(0.13)	(0.14)	(0.17)	(0.20)	(0.22)
logDistance	−1.66***	−1.54***	−1.28***	−1.31***	−1.29***	−1.18***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
logGDP (origin)	1.16***	1.08***	1.08***	1.30***	1.38***	1.31***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
logGDP (destination)	0.86***	0.76***	0.76***	1.06***	1.06***	0.99***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
MRA	2.01***	1.92***	0.95***	0.52***	0.81***	0.75***
	(0.27)	(0.26)	(0.26)	(0.15)	(0.15)	(0.15)
Contiguity		1.47***	1.10***		−0.10	−0.01
		(0.05)	(0.05)		(0.07)	(0.07)
Pop. (origin)		0.00***	0.00***		0.00	0.00***
		(0.00)	(0.00)		(0.00)	(0.00)
Pop. (destination)		0.00***	0.00***		−0.00***	−0.00***
		(0.00)	(0.00)		(0.00)	(0.00)
Regional Trade Agreement			1.69***			0.34***
			(0.03)			(0.03)
Both WTO			0.34***			0.74***
			(0.02)			(0.03)
Country-year FE	✓	✓	✓	✓	✓	✓
Directed Dyadic FE	✓	✓	✓	✓	✓	✓
R^2	0.51	0.52	0.54	0.76	0.76	0.77
Adj. R^2	0.51	0.52	0.54	0.76	0.76	0.77
Num. obs.	143752	143752	143752	40667	40667	40667

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Discussion

While our initial findings suggest a relatively consistent, positive effect of trusted trader agreements on trade flows, much remains to be explored on the nature of this relationship. In future research, we plan to include a wider range of theoretically relevant covariates to our models, including measures of infrastructure at ports of entry, customs cooperation on high-risk

flows, and strategic variables such as alliances and regime convergence. We also seek to measure whether trusted trade agreements facilitate specific *types* of trade more so than others – for example, whether trade in certain sectors or in certain types of goods are better-facilitated through such agreements. And while we have thus far used gravity models producing both OLS and Poisson PMLE estimates, we plan to test a wider range of model types. Finally, we hope to conduct additional sensitivity analysis to assess the likelihood of spurious correlation between our trade agreement measure and outcome.[38]

[38] See, for example: Oster, Emily. 2019. "Unobservable Selection and Coefficient Stability: Theory and Evidence." *Journal of Business and Economic Statistics 37* (2):187–204.