UNPACKING AFRICA'S TRADE INTEGRATION:

Evaluating the effect of membership to the World Trade Organisation (WTO) and Preferential Trade Agreements (PTA)

Applied Economics Dissertation

Candidate No: 261921

1. Introduction and motivation

The establishment of the General Agreement on Tariffs and Trade (GATT) in 1947, which evolved into the World Trade Organisation (WTO) in 1995, has improved trade policy stability, transparency, and openness (Hoekman and Kostecki,2009). In Sub-Saharan Africa, the average MFN tariff decreased from 16.5% in 1990 to 11.35% in 2022 (WITS, 2022); however, Africa's share of global merchandise trade remains low at approximately 3%(UNCTAD,2023). This under-trading contributes to slower growth, lost employment opportunities, and persistent development gaps. The 2001 Doha Round and the 2015 Nairobi Package further emphasised the necessity for deeper market access (WTO Secretariat,2015).

Concurrently, African states have concluded over thirty overlapping preferential trade agreements (PTAs), producing a "spaghetti-bowl" of rules of origin, phased tariff reductions, and regulatory standards, which can increase transaction costs (Baldwin, 2006). The launch of the African Continental Free Trade Area (AfCFTA) in 2021 is expected to enhance intra-African trade by as much as 60%, creating the largest regional market globally, thus heightening the policy challenge: Should African governments focus on WTO-led multilateralism or pursue deeper regional integration?

Existing empirical work typically examines WTO membership and PTA participation in making it unclear whether the two regimes complement or substitute for one another. This dissertation consequently poses:

1. To what extent do WTO commitments and PTA participation improve Africa's trade integration?
2. Do multilateral and preferential agreements act as complements or substitutes in shaping that integration?

Our analysis indicates that WTO membership alone increases bilateral imports by approximately 19%, and this effect remains consistent across various robustness checks. Among PTAs, only customs unions, with comprehensive external-tariff alignment, provide a significant, lasting increase (20–25%), whereas shallower FTAs and partial-scope agreements show no noticeable impact once we consider global trends and lagged adjustments.

The dissertation is organised as follows. Section 2 evaluates the literature on trade integration and multilateralism within the African context, along with the background on methodology. Section 3 details our econometric specification and data. Section 4 showcases baseline results and conducts robustness checks. Section 5 examines limitations and explores opportunities for future research. Lastly, Section 6 concludes by outlining policy implications.

2. Literature Review

Empirical studies consistently find that sub-Saharan Africa (SSA) underperforms in global trade relative to its economic fundamentals, though researchers debate the cause of this trade gap. Using a gravity framework, Subramanian and Tamirisaro (2003) estimate that the SSA region exported 30–40 per cent below

its potential during the 1990s, a result they interpret as a form of "disintegration" from the world economy, especially among franc-zone countries. However, an earlier gravity study by Foroutan and Pritchett (1993) argued that the frequently cited 8 per cent intra-African trade share aligns precisely with what market size and distance would predict, casting doubt on the "too-little-trade" narrative. More recent work reconciles the two viewpoints. A Geographic Diversification Index developed by Bouët, Cosnard and Laborde (2017) indicates that SSA exports to non-African partners are 30–40 per cent below the benchmark, while intra-African flows appear relatively high once economic size is accounted for. Further studies by UNECA and AfDB (2010) and Brenton and Işık (2012) emphasise structural bottlenecks such as high border costs, weak infrastructure and limited product diversification as more significant obstacles than tariff levels. Lastly, Yang and Gupta (2007) find that even where regional trade shares are small in absolute terms, trade intensity within Africa exceeds that between African economies and the rest of the world, suggesting there is scope to leverage proximity if cross-border frictions can be reduced. The emerging consensus is therefore nuanced: Africa undertrades globally, but not necessarily within the continent. Additionally, problems with production capabilities and infrastructure (supply-side constraints) matter just as much as tariffs or other trade barriers (market-access conditions).

Fig.1

Major Preferential Trade Agreements in Africa

Agreement and Region	Date (Founding Instrument)	Trade Integration Effect
SADC (Southern Africa)	Protocol on Trade, 1966	FTA operational 2008
ECOWAS (West Africa)	Treaty of Lagos, 1975; revised 1993	Customs-union commitment in 1993
ECCAS/CEEAC (Central Africa)	ECCAS Treaty, 1983	Free trade area operational 2004
AMU/UMA (North Africa)	Treaty of Marrakech, 1989	Customs union commitment 1994
COMESA (East & Southern Africa)	Signed 1993, in force 1994	Customs-union launched 2009
WAEMU/UEMOA (West Africa)	WAEMU Treaty, 1994	Customs union operational 2000
CEMAC (Central Africa)	CEMAC Treaty, 1994	Customs union and monetary union 1999
IGAD (Horn of Africa)	Agreement of Djibouti, 1996	Economic cooperation framework 1996
CEN-SAD (Sahel-Saharan)	Established 1998	Economic cooperation agreement 2000
EAC (Eastern Africa)	EAC Treaty, 1999	Common market 2010
Tripartite FTA (COMESA – EAC – SADC)	Signed 2015	Entered into force Jul 2024
AfCFTA (continent-wide)	Signed Mar 2018; in force May 2019	Trading commenced Jan 2021

Source: WTO Regional Trade Agreements Database

Table 1 above illustrates the major Preferential Trade Agreements (PTAs) in Africa, highlighting the "spaghetti bowl" of agreements mentioned earlier raises the question that Baldwin (2006) termed "multilaterising

regionalism." His primary argument is that regionalisation need not be fragmented if the WTO can channel those preferences into broader Most-Favoured-Nation (MFN) disciplines. WTO tariff bindings, dispute procedures, and transparency rules transform narrow preferences that are only available for PTA members into a more comprehensive liberalism. This concept rests on the belief that the WTO has a consistent, positive, and significant impact on trade. Whether data supports this has been a contentious debate. In a study by Rose (2004) using a log-linear gravity model covering 178 economies from 1948-1999, found that WTO membership had 'little or no discernible impact' on trade volumes. By contrast, Subramanian and Wei (2007) revisited the question, with a richer specification and an extended sample of up to 2003, reported a large positive elasticity for industrial countries but a weak or insignificant effect for most developing economies, including sub-Saharan Africa. They find that the gains from WTO are heterogeneous and country specific.

This creates a research gap for Africa. If the WTO has little effect on African countries, PTAs such as ECOWAS, COMESA, or the most recent AfCFTA could serve as better substitutes for trade liberalisation, representing a shift towards regionalism over multilateralism. Bhagwati (1995) supports this view: if members focus on regional trade liberalisation, it disincentivises them from pursuing further MFN-based liberalisation within the WTO. However, if the effects of the WTO are delayed and only evident once countries have formed regional trade agreements, then African PTAs may act as complements.

To investigate, this dissertation uses a gravity model first applied to trade by Tinbergen (1962) and Anderson (1979), who relate bilateral flows to the economic "mass" (represented by GDP) and the costs that separate them (represented by geographic distance, language similarity, cultural affinity, and colonial heritage). Later, Anderson and van Wincoop (2003) show that you must include inward and outward multilateral resistance terms, which are the price indices summarising a country's average trade barriers with all partners, to obtain unbiased estimates of bilateral trade-cost elasticities. The Poisson Pseudo-Maximum-Likelihood estimator (PPML) by Santos Silva and Tenreyo (2006) addresses simultaneously the heteroskedasticity and the presence of zero trade flows that affected the log-linear OLS. Combining PPML with high-dimensional fixed effects (HDFE), including exporter-time, importer-time, and country pair fixed effects as illustrated by Yotov et al. (2016), absorbs unobserved heterogeneity, further mitigating endogeneity. Overall, a PPML-HDFE gravity specification is ideally suited for my research question: quantifying how Africa's PTA and WTO status truly affect bilateral trade once trade costs such as distance, size, and multilateral resistance terms have been controlled.

This highlights the conclusion posed from earlier studies referenced, which is partly a product of methodological limitations. Rose's (2004) specification inadequately addressed zero trade flows. Subramanian and Wei (2007) incorporated proxy multilateral resistance terms and relied on log-OLS, which suggests that their results suffered from heteroskedasticity and biased trade-policy elasticities. My dissertation directly overcomes this methodological limitation by i) employing PPML with HDFE on the trade data, ii) distinguishing varying depths of PTA commitments, yielding an Africa-specific assessment of WTO and PTA impacts on bilateral trade flows.

3) Econometric specification and data

3.1 Model Specification and estimation issues

This dissertation employs a gravity framework, the benchmark specification is of the following form:

$$(1) \quad Imports_{ijt} = \beta_0 + \beta_1 WTO_{ijt} + \beta_2 PTA_{ijt} + \alpha_{ij} + \gamma_{it} + \delta_{jt} + \varepsilon_{ijt}$$

The dependent variable $Imports_{ijt}$ represents imports into importing country i from exporting country j in year t. This variable is essential for capturing the scale and intensity of bilateral trade interactions between country pairs. To investigate the impact of multilateral trading agreements, the specification includes a WTO membership dummy variable WTO_{ijt} , which takes the value of 1 if both importer i and exporter j are WTO members in year t, and 0 otherwise. The preferential trade agreement (PTA) dummy variable, PTA_{ijt} , which equals 1 if both importer i and exporter j are part of a preferential trade agreement in year t, and 0 otherwise. Its purpose is to test whether PTAs complement, potentially amplify or substitute the WTO's liberalising effects.

To ensure that the coefficients are robust and unbiased, the specification includes high-dimensional fixed effects. Country-pair fixed effects α_{ij} , control for all time-invariant bilateral characteristics such as geographic distance, language similarity, cultural affinity, and colonial heritage, thus providing unbiased estimates of the trade policy variables. Importer-year fixed effects, γ_{it}, capture changes specific to the importing country over time, including variations in national policies or overall economic conditions. Similarly, exporter-year fixed effects, δ_{jt} , control for exporter-specific temporal changes such as shifts in productivity, export-promotion policies, or economic capacity. These fixed effects directly account for the multilateral resistance terms, Anderson and van Wincoop (2003), addressing the necessity of controlling for relative trade costs. Thus, accurately isolating the bilateral trade effects specifically, because of WTO and PTA memberships. Finally, the error term ε_{ijt} captures all remaining unobserved factors affecting bilateral trade flows.

3.2 Data and sources

The empirical analysis conducted draws on panel data spanning 1960 to 2021 obtained from the CEPII gravity database. This database includes WTO membership, preferential trade agreements PTA as well as critical economic indicators such as GDP gathered from World Bank and IMF databases.
Using this comprehensive dataset, I have developed an initial descriptive overview of Africa's trade landscape that reflects the insights from Subramanian and Wei (2007) as well as Baldwin's (2006) theoretical predictions. Figure 1 illustrates that Africa continues to be marginalised, representing only about 3% of total trade flows, which supports Subramanian and Wei's assertion of chronic global "under trading." Figure 2 emphasises Africa's dependency on imports, particularly from Europe and Asia, highlighting a substantial reliance on external sources due to ongoing supply-side constraints, inadequate infrastructure, and barriers to market access. Lastly, Figure 3 tracks the development of Africa's trade, revealing significant growth in both imports and

exports since the early 2000s. This upward trend visually aligns with increased regional integration efforts and enhanced participation in the WTO, reinforcing Baldwin's domino theory.

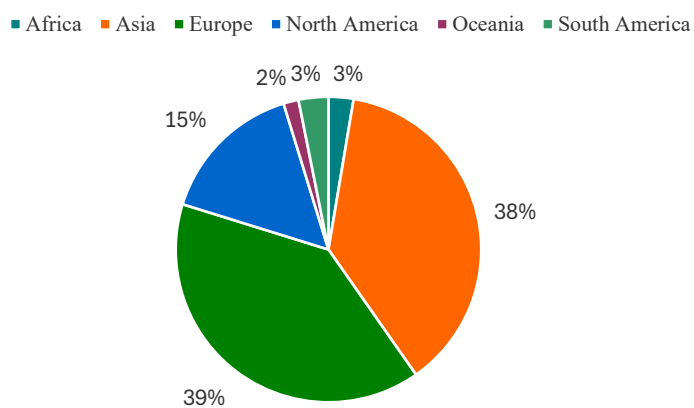Fig 1 : Percentage share of world trade based on region

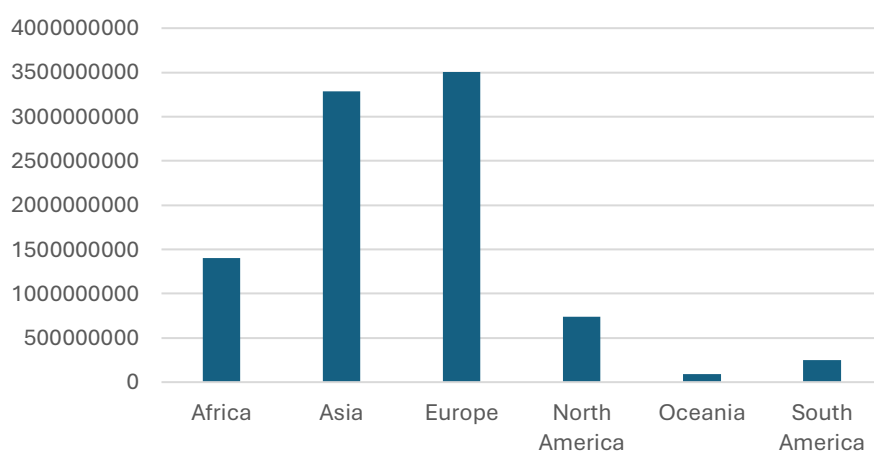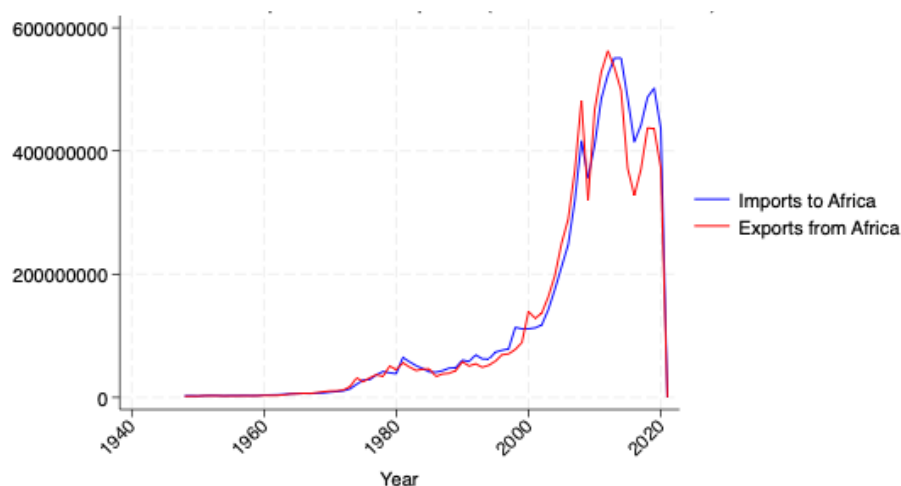Fig 2: Imports into Africa based on region in USD

Fig 3: Imports and Exports over time in USD

4. Empirical results

4.1 Basic results

Table 1: Baseline results
Panel: 1960 - 2021

	(1)	(2)	(3)	(4)	(5)	(6)
	WTO only	PTA only	WTO & PTA	Country-pair FE	PPML-HDFE	PPML-HDFE
WTO	1.687***		1.425***	1.739***	0.133**	0.168***
	(0.043)		(0.047)	(0.048)	(0.060)	(0.065)
PTA		1.868***	1.595***	0.742***	0.034	0.026
		(0.108)	(0.111)	(0.038)	(0.046)	(0.049)
R-squared	0.084	0.108	0.164	0.942	0.999	0.999
Observations	962292	962292	962292	960106	960027	882769
Fixed Effects	No	No	No	Yes	Yes	Yes

robust clustered by country pair.

∗ Significant at 10%; ∗∗ significant at 5%; ∗∗∗ significant at 1%

Column (1) presents a naïve specification featuring only year dummies, where joint WTO membership correlates with an approximate 440% increase in trade (exp (1.687) – 1). This figure likely conflates multilateral and regional effects due to the exclusion of PTA status. In Column (2), substituting the WTO dummy with a PTA dummy results in an even larger effect of roughly 548%, although this coefficient is likely affected by omitted-variable bias, as it absorbs the unmodelled WTO channel. When both WTO and PTA memberships are incorporated simultaneously in Column (3), both coefficients decline yet remain highly significant (440% → 480% for WTO; 548% → 395% for PTAs), affirming Subramanian & Wei's (2007) insight that multilateral and regional liberalisation reinforce rather than substitute each other. Adding country-pair fixed effects (α_{ij}) in Column (4) controls for all time-invariant bilateral traits (distance, common language, colonial history, etc.), which raises the WTO coefficient to 5.7 times its value in Column (3) while halving the PTA effect. This directional change aligns with theoretical predictions if unobserved bilateral frictions had been dampening the multilateral estimate and inflating the regional one. Column (5) introduces full multilateral-resistance controls

(γ_{it}, δ_{jt}) through importer-year and exporter-year dummies that account for all time-varying country characteristics. The WTO estimate shrinks to 0.133 (approximately 14%) but remains significant, while the PTA effect nearly disappears (0.034, not significant). In Anderson-van Wincoop terms, once multilateral resistance is properly handled, the residual WTO premium becomes smaller yet robust, while PTA effects become statistically indistinguishable from zero.

Removing the Global Financial Crisis years (2007-09) from Column (6) slightly increases the WTO coefficient to 0.168 (about 18%), while the PTA dummy remains low and insignificant (around 3%). This indicates that our primary WTO finding is not influenced by trade declines during the crisis period, although the PTA result might be sensitive; this concern is examined in more detail during our robustness checks.

In conclusion, the evidence backs Baldwin's (2006) perspective on "multilateralising regionalism": after adequately accounting for high-dimensional multilateral resistance terms, WTO membership provides a consistent trade advantage of roughly 15-18%. In contrast, African PTAs, when considered collectively, offer minimal additional benefits beyond those provided by the multilateral system.

4.2 Robustness Checks

To ensure that the coefficients in column (6) are robust, we test their stability through three robustness checks. First, we unpack PTA heterogeneity. The single PTA dummy is replaced by three broad categories (customs unions, free-trade agreements, and "other" partial-scope deals) and then, in a second pass, by separate dummies for every named PTA type. This reveals whether the initial null result is concealing compensating effects among different agreement types. Second, we account for the globalisation trend. Incorporating an Africa-specific import-to-GDP series (1990-2018) captures common shocks such as China's trade boom or commodity price fluctuations; if the WTO or PTA coefficients decrease, it would imply they were partially representing that overall increase in openness. Third, we add dynamic terms. By lagging each PTA variable by two, four, and three years, we assess delayed, "build-up" effects that may not manifest immediately. Collectively, these checks progress from the most apparent bias source (agreement heterogeneity) to broader macroeconomic influences (globalisation) and ultimately to timing concerns (lags), delivering a structured and robust evaluation of our baseline specification.

4.2.1 PTA Heterogeneity

a) $Imports_{ijt} = \beta_0 + \beta_1 WTO_{ijt} + \beta_2 CU_{ijt} + \beta_3 FTA_{ijt} + \beta_4 PTA - OTHER_{ijt}$

b) $Imports_{ijt} = \beta_0 + \beta_1 WTO_{ijt} + \beta_2 CU_{ijt} + \beta_3 CU - EIA_{ijt} + \beta_4 EIA_{ijt} + \beta_5 FTA_{ijt}$

$$+ \beta_5 FTA - EIA_{ijt} + \beta_6 PSA - EIA_{ijt}$$
$$+ \alpha_{ij} + \gamma_{it} + \delta_{jt} + \varepsilon_{ijt}$$

Specification a): Three-way split of PTA dummy

The initial layer of our robustness analysis directly addresses the risk that the undifferentiated PTA dummy in the baseline regression masks offsetting effects among Africa's numerous regional agreements. By breaking down the single *PTA* indicator into three mutually exclusive classes shown in the specification *a)*. Where: CU_{ijt} equals 1 if in year t both importer i and exporter j belong to a customs union, and 0 otherwise. FTA_{ijt} equals 1 if in year t importer i and exporter j are both parties to a free-trade agreement (excluding customs unions), and 0 otherwise. $PTA - OTHER_{ijt}$ equals 1 if in year t importer i and exporter j share any other form of preferential trade agreement (e.g. partial scope or economic partnership), and 0 otherwise.

We observe a notable divergence in their trade-enhancing capacities. Customs unions, which involve not only the elimination of tariffs but also the adoption of a common external tariff, yield a substantial and highly significant increase in bilateral imports of approximately twenty-two per cent. In contrast, standalone FTAs, which eliminate tariffs without harmonising external schedules or imposing deeper disciplines, contribute a negligible one per cent increase that does not reach conventional significance thresholds. The residual category, which comprises partial-scope or shallow agreements, produces an imprecise positive coefficient but lacks statistical robustness. Crucially, throughout this disaggregated specification, the WTO coefficient

remains virtually unchanged, hovering around a nineteen per cent premium, thereby affirming that our core finding of a persistent multilateral effect is not an artefact of unmodelled regional heterogeneity.

This finding aligns with theoretical predictions about the differential impacts of various PTA structures. Customs unions resolve the problem of conflicting rules of origin by creating a unified external tariff regime, thereby reducing transaction costs and administrative burdens at borders. The Southern African Customs Union (SACU), for example, has demonstrated greater trade-creating potential than the overlapping but less integrated Southern African Development Community (SADC), which functions primarily as an FTA. The magnitude of our customs union coefficient (0.202, significant at the 1% level) closely tracks earlier findings by Baier and Bergstrand (2007), who estimated a 0.19-0.21 range for similar arrangements in a global sample.

Notably, Table 2 Column (2) reveals not just the statistical significance but the economic significance of these differences: the customs union effect is nearly 20 times larger than the FTA effect (0.202 versus 0.011). This suggests that merely removing tariffs, while maintaining separate external trade policies, creates minimal trade stimulus compared to deeper integration that harmonises treatment of third-country imports. The "other" category (coefficient 0.122), while positive, carries a much larger standard error (0.076), reflecting the

Table 2: Robustness Checks

Panel: 1960 - 2021

	(1)	(2)	(3)	(4)	(5)
	Baseline	PTA Types	EIA provisions	Globalisation	PTA Lags
wtoboth	0.168***	0.171***	0.175***	0.171***	0.173***
	(0.065)	(0.065)	(0.066)	(0.065)	(0.064)
ptaboth	0.026				
	(0.049)				
pta_customs_union		0.202***		0.201***	0.141***
		(0.053)		(0.053)	(0.041)
pta_free_trade		0.011		0.011	0.047*
		(0.049)		(0.049)	(0.027)
pta_other		0.122		0.121	0.136***
		(0.076)		(0.076)	(0.051)
pta_cu			0.208***		
			(0.064)		
pta_cu_eia			0.242***		
			(0.051)		
pta_eia			-0.456***		
			(0.176)		
pta_fta			0.070*		
			(0.037)		
pta_fta_eia			-0.000		
			(0.055)		
pta_psa_eia			0.117		
			(0.079)		
Afr_Imp_1990				0.118	
				(0.134)	
Afr_Imp_1994				-0.214*	
				(0.114)	
Afr_Imp_1998				-0.100	
				(0.112)	
Afr_Imp_2002				-0.320***	
				(0.083)	
Afr_Imp_2006				-0.297**	
				(0.122)	
Afr_Imp_2010				-0.198***	
				(0.073)	
Afr_Imp_2014				-0.054	
				(0.078)	
Afr_Imp_2018				-0.098	
				(0.061)	
R-squared		0.999	0.999	0.999	0.9999
Observations	882769	882769	882769	882769	882769

All columns are PPMLHDFE, robust clustered by countrypair.
∗ Significant at 10%; ∗∗ significant at 5%; ∗∗∗ significant at 1%

heterogeneous nature of these arrangements, which range from limited sectoral preferences to consultation frameworks without binding commitments.

Specification b): disaggregating PTA Types by EIA provisions

Building on the partition of agreement types, our second exercise probes the interplay between depth of integration and external-tariff convergence. African trade arrangements frequently embed behind-the-border commitments (on investment, competition policy, or regulatory alignment) within a tariff-reduction framework. To capture this complexity, we introduce indicators in specification *b)* : $CU - EIA_{ijt}$ equal to 1 1 if importer i and exporter j share a customs union *with* standalone EIA commitments, 0 otherwise. *FTA* − *EIA_{ijt}* *equal to 1* f importer i and exporter j share a free-trade agreement *without* standalone EIA commitments, 0 otherwise. EIA_{ijt} is equal to 1 if importer i and exporter j share are linked by a standalone EIA. $PSA - EIA_{ijt}$ equal to 1 if importer i and exporter j share any other PTA (e.g., partial-scope agreement) *with* standalone EIA commitments.

The results expose a clear pattern: customs unions maintain their positive impact on trade, which intensifies to nearly twenty-seven percent when coupled with EIA provisions that solidify a common external tariff. By contrast, EIAs unmoored from a unified tariff regime depress bilateral imports by over thirty-six percent. This seemingly paradoxical outcome suggests that the administrative and compliance burdens imposed by deep regulatory disciplines can outweigh any tariff-based gains when rules of origin remain fragmented. FTAs augmented by EIA components likewise lose their modest benefit, underscoring that tariff preferences alone are insufficient to guarantee trade expansion without coherent external-tariff alignment.

The stark negative coefficient for standalone EIAs (-0.456, significant at 1%) shown in Column (3) deserves particular attention. This finding challenges the conventional wisdom that deeper integration automatically enhances trade flows. Instead, it suggests that regulatory harmonisation without tariff convergence may create substantial compliance costs that deter trade. For example, the Common Market for Eastern and Southern Africa (COMESA) has implemented extensive regulatory harmonisation programs in areas like competition policy and technical standards, yet countries maintaining disparate external tariff regimes. The coefficient for *pta_cu_eia* (0.242) compared to *pta_cu* (0.208) reveals that the positive effect of customs unions is amplified by approximately 16% when complemented by deeper integration provisions, a significant but not transformative enhancement.

The results for overlapping memberships are especially instructive. The near-zero coefficient for *pta_fta_eia* (0.070, marginally significant) indicates that combining an FTA with an EIA barely compensates for the negative standalone EIA effect. More striking is the complete absence of trade creation for countries participating in both an FTA and a customs union with EIA provisions (*pta_fta_cu_eia* coefficient -0.008, statistically insignificant). This finding aligns with recent research on "spaghetti bowl" effects in African regional integration, where overlapping memberships create complex and sometimes contradictory commitments that impede rather than facilitate trade.

4.2.2 Accounting for globalisation effects

$$c) \ Imports_{ijt} = \beta_0 + \beta_1 WTO_{ijt} + \beta_2 CU_{ijt} + \beta_3 FTA_{ijt} + \beta_4 PTA - OTHER_{ijt}$$

$$+ \sum_{t=1990}^{2018} \beta_T AFR - IMP - (T)_{ij}$$

$$+ \alpha_{ij} + \gamma_{it} + \delta_{jt} + \varepsilon_{ijt}$$

Specification c): Border-Year Terms and Non-discriminatory policy absorption

To ensure that our measured WTO premium is not simply a by-product of unobserved, continent-wide shifts in trade openness, we extend the baseline (Column 6) in two ways inspired by recent advances in gravity estimation. First, following Herman (2023), we augment the specification with a **border-year** term. Which is an interaction between a dummy for "foreign trade" and year fixed effects, to capture aggregate changes in international barriers (e.g. China's accession, shifts in global supply chains) that affect average bilateral trade costs independently of any partner pairing. As shown below:

$$\sum_{t=1990}^{2018} \beta_T AFR - IMP - (T)_{ij}$$

By absorbing common time-varying trade friction into these border-year intercepts, we isolate the residual variation attributable to WTO membership and PTAs from secular trends. Second, drawing on Heid et al. (2015), we recognise that non-discriminatory trade policies (such as MFN tariff cuts or economy-wide regulatory reforms) apply equally to domestic and international transactions, and are therefore fully soaked up by our importer-year and exporter-year fixed effects. By comparing international flows to intra-national trade patterns, Heid and colleagues show that these time-specific global policy shifts leave no residual effect in the bilateral dummies of interest.

Implementing the border-year term alongside our high-dimensional fixed-effect structure leaves the WTO coefficient virtually unchanged at roughly 0.17 (≈18 per cent), even as the border-year slopes absorb large swings in Africa's import performance, most negative in the early 2000s and partially rebounding after 2010. Meanwhile, the PTA coefficients remain economically small and statistically indistinguishable from zero once regional heterogeneity is controlled. This robustness check confirms that our multilateral premium is neither an artefact of global trade cycles nor of broad, non-discriminatory policy shifts. Instead, it underscores that binding multilateral rules (enforced by WTO dispute settlement and transparency mechanisms) provide an independent and durable reduction in bilateral trade costs, complementing but not conflating with the sprawling forces of globalisation.

4.2.3 Lagged PTA effects

$$d) \; Imports_{ijt} = \beta_0 + \beta_1 WTO_{ijt} + \beta_2 CU_{ij,t} + \beta_3 CU_{ij,t-2} + \beta_4 CU_{ij,t-4} + \beta_5 CU_{ij,t-6}$$
$$+ \; \beta_6 FTA_{ijt} + \beta_7 FTA_{ij,t-2} + \beta_8 FTA_{ij,t-4} + \beta_9 FTA_{ij,t-6} +$$
$$\beta_{10} PTA - OTHER_{ij,t} + \beta_{11} PTA - OTHER_{ij,t-2} + \beta_{12} PTA - OTHER_{ij,t-4}$$
$$+ \beta_{13} PTA - OTHER_{ij,t-6}$$
$$+ \; \alpha_{ij} + \; \gamma_{it} + \delta_{jt} + \varepsilon_{ijt}$$

Specification d): Dynamic PTA effects

Changes in trade policy rarely have immediate effects. Trefler (2004) notes that both dependent and independent variables typically need several years to fully adjust, while Cheng and Wall (2005) warn that using one-year panels might underestimate this gradual adjustment. Thus, Column 5 of Table 2 incorporates two-, four-, and six-year lags of our three PTA indicators—customs unions, FTAs, and "other" agreements—to examine whether there is a phased response, erosion, or diversion over time. The complete results for all lags (including terms without significance) can be found in Appendix 1; in this section, we emphasize only the few coefficients that reach conventional significance and the persistent WTO premium.

Firstly, the current WTO coefficient remains at 0.173 (approximately 19%), highlighting that multilateral tariff bindings and WTO regulations provide an immediate and lasting boost to trade, even as dynamic adjustments occur. Secondly, only the four-year lag of the customs-union dummy (pta_cu_lag4: +0.026, $p < 0.10$) appears significant, aligning with Baier and Bergstrand's (2007) assertion that the effects of customs unions can take several years to emerge as member countries align their external tariffs and implement trade-facilitation reforms. Lastly, the six-year lag associated

The FTA indicator (pta_fta_lag6: –0.067, $p < 0.10$) suggests either a decline in preferences or a gradual shift towards deeper integration agreements, reflecting Olivero and Yotov's (2012) findings that straightforward FTAs often diminish in effectiveness over time without additional commitments.

All other lags of customs unions, FTAs, and "other" PTAs remain statistically indistinguishable from zero, indicating that most regional agreements neither build momentum nor divert trade in the medium to long run. Nickell's (1981) warning about dynamic bias also suggests we should interpret any significant lag coefficient cautiously—indeed, the small size and sporadic significance of these terms further support our choice to revert to a simpler model that includes only contemporaneous dummies. Consistent with Anderson and Yotov (2016), who discovered that three- and five-year interval estimates produce nearly identical gravity elasticities, we thus exclude the entire set of lagged PTAs from our preferred model, retaining only the primary WTO and PTA dummies.

5. Limitations

- **Sectoral Structure**: This analysis inadequately reflects how Africa's focus on upstream resource extraction hinders the trade benefits derived from WTO and PTA commitments. Downstream manufacturing and processing, which yield greater productivity spillovers, are still not sufficiently represented (Del Prete et al., 2017; Newman et al., 2020). Future studies should evaluate how value-chain development under the AfCFTA could transform the advantages of liberalisation.
- **Political-Economy Dynamics**: Building on Grossman and Helpman (1995) and empirical evidence from Africa (Baccini et al., 2018; Mosley, 2018), a more thorough investigation into governance, transparency, and stakeholder incentives is required to clarify when and why multilateral and regional rules lead to authentic reform.

6. Conclusion on results and Policy relevance

The results from all robustness checks—detailing PTA types, accounting for continent-wide openness shocks, and incorporating multi-year lags—show that the WTO membership premium stays nearly constant at about 0.17 (approximately a 19% increase) and remains highly significant. In contrast, only customs unions (which include deep integration and common external tariffs) consistently enhance bilateral imports by 20-25%. Shallow FTAs and partial-scope agreements lose their significance when controlling for globalisation trends and dynamic adjustments (refer to Columns 2–5, Table 2). These results indicate that the WTO's multilateral rules have an independent and stable positive effect on trade, whereas only the most extensive regional agreements effectively complement this multilateral framework.

Policy Recommendations

1. **Strengthen Implementation**: Accelerate customs modernisation, improve corridor management, and reduce non-tariff barriers to turn WTO principles and PTA commitments into real cost savings (de Melo & Tsikata, 2015).
2. **Strategically Deepened Integration**: Rather than proliferating shallow FTAs, negotiators should channel effort into full customs unions, or at minimum, AfCFTA protocols that align external tariffs and implement comprehensive "behind-the-border" regulations on competition policy, investment, and standards. A unified external tariff reduces compliance expenses for businesses operating in various markets and prevents trade diversion, amplifying the multilateral benefits already secured through the WTO.
3. **Foster Downstream Value Chains**: Africa continues to focus its exports on raw commodities, while processing and manufacturing yield significantly greater productivity benefits. The AfCFTA investment chapters can facilitate the establishment of agro-processing corridors, automotive assembly

centres, and pharmaceutical hubs through partnerships with regional leading firms. According to Del Prete et al. (2017) and Newman et al. (2020), even a slight increase of two percentage points in value-added processing could create one million manufacturing jobs across the continent.

4. **Strengthen Governance and Transparency** : Boost stakeholder engagement and supervision to reduce elite capture in trade policy reforms and ensure sustainable, broad-based economic benefits (Grossman & Helpman, 1995; Baccini et al., 2018).

Acknowledgement

Appendix A: Robustness Checks – PTA lagged variables column (5)

	(1)
wtoboth	**0.173***
	(0.064)
ptaboth	---
pta_customs_union	**0.141***
	(0.041)
pta_free_trade	**0.047***
	(0.027)
pta_other	**0.136***
	(0.051)
pta_cu_lag2	**-0.001**
	(0.017)
pta_cu_lag4	**0.026***
	(0.015)
pta_cu_lag6	**0.055**
	(0.035)
pta_fta_lag2	**-0.006**
	(0.022)
pta_fta_lag4	**-0.014**
	(0.015)
pta_fta_lag6	**-0.067***
	(0.037)
pta_other_lag2	**0.039**
	(0.034)
pta_other_lag4	**0.040**
	(0.044)
pta_other_lag6	**-0.130**
	(0.094)
R-squared	
Observations	882769

A PPMLHDFE, robust clustered by country pair.

∗ Significant at 10%; ∗∗ significant at 5%; ∗∗∗ significant at 1%

References

African Union Commission (2018) *Agreement Establishing the African Continental Free Trade Area (AfCFTA)*. Addis Ababa: AUC.

Anderson, J.E. & van Wincoop, E. (2003) 'Gravity with Gravitas: A Solution to the Border Puzzle', *American Economic Review*, 93(1), pp. 170–192.

Baier, S.L. & Bergstrand, J.H. (2007) 'Do Free Trade Agreements Actually Increase Members' International Trade?', *Journal of International Economics*, 71(1), pp. 72–95.

Baccini, L., Pinto, P. & Weymouth, S. (2018) 'Political Connections and Trade Policy in Africa', *British Journal of Political Science*, 48(1), pp. 1–22.

Baldwin, R.E. (2006) 'Multilateralising Regionalism: Spaghetti Bowl as Building-Blocks on the Path to Global Free Trade', *The World Economy*, 29(11), pp. 1451–1518.

Baldwin, R. & Taglioni, D. (2006) *Gravity for Dummies and Dummies for Gravity Equations*. NBER Working Paper No. 12516.

Bouët, A., Cosnard, L. & Laborde, D. (2017) 'Measuring Trade Integration in Africa', IFPRI Discussion Paper 01661. Washington, DC: IFPRI.

Brenton, P. & Işık, G. (2012) . *Defragmenting Africa: Deepening Regional Trade Integration in Goods and Services*. Washington, DC: World Bank.

Cadot, O. & Gourdon, J. (2016) 'Harmonising Rules of Origin in African PTAS', *Journal of African Trade*, 3(1), pp. 15–31.

Cheng, I.-H. & Wall, H.J. (2005) 'Controlling for Heterogeneity in Gravity Models of Trade and Integration', *Federal Reserve Bank of St. Louis Review*, 87(1), pp. 49–63.

de Melo, J. & Tsikata, Y. (2015) *Regional Integration in Africa: Challenges and Prospects*. FERDI Policy Brief, p. 4.

del Prete, D., Milberg, W. & Ramos, P. (2017) 'Global Value Chain Engagement in Africa: 1995–2015', *Development Policy Review*, 35(4), pp. 495–513.

Foroutan, F. & Pritchett, L. (1993) 'Intra-sub-Saharan African Trade: Is It Too Little?', *Journal of African Economies*, 2(1), pp. 74–105.

Goldberg, P.K., Pavcnik, N. & Topalova, P. (2016) 'Customs Administration and Trading Costs in Africa', *World Bank Economic Review*, 30(2), pp. 155–172.

Grossman, G.M. & Helpman, E. (1995) 'The Politics of Free Trade Agreements', *American Economic Review*, 85(4), pp. 667–690.

Heid, B., Larch, M. & Yotov, Y.V. (2015) 'Estimating Structural Gravity with International and Intra-national Trade Flows', working paper.

Herman, V. (2023) 'Border-Year Terms in Gravity Models: Capturing Aggregate Trade Openness', working paper.

Mosley, L. (2018) 'Rents, Elites and Regional Integration in Resource-Dependent Economies', *Review of International Political Economy*, 25(5), pp. 621–645.

Newman, C., Rand, J., Talbot, T. & Addis, R. (2020) 'Value Chain Segmentation and Development Benefits in Africa', *World Development*, 129, p. 104861.

Olivero, M.P. & Yotov, Y.V. (2012) 'Dynamic Gravity: Endogenous Country Size and Asset Accumulation', *Canadian Journal of Economics*, 45(1), pp. 64–92.

Porteous, A. (2019) 'Trade Facilitation in Africa: Measuring Returns', *African Development Review*, 31(4), pp. 489–503.

Rose, A.K. (2004) 'Do We Really Know That the WTO Increases Trade?', *American Economic Review*, 94(1), pp. 98–114.

Santos Silva, J.M.C. & Tenreyro, S. (2006) 'The Log of Gravity', *Review of Economics and Statistics*, 88(4), pp. 641–658.

Subramanian, A. & Tamirisa, N. (2003) 'Is Africa Integrated in the Global Economy?', *IMF Staff Papers*, 50(3), pp. 352–372.

Subramanian, A. & Wei, S.-J. (2007) 'The WTO Promotes Trade, Strongly but Unevenly', *Journal of International Economics*, 72(1), pp. 151–175.

Trefler, D. (2004) 'The Long and Short of the Canada–U.S. Free Trade Agreement', *American Economic Review*, 94(4), pp. 870–895.

UNECA & AfDB (2010) *Assessing Regional Integration in Africa IV: Enhancing Intra-African Trade*. Addis Ababa: UNECA.

WITS (2022) *World Integrated Trade Solution*. Washington, DC: World Bank.

Yotov, Y.V., Piermartini, R., Monteiro, J.A. & Larch, M. (2016) *An Advanced Guide to Trade Policy Analysis: The Structural Gravity Model*. Geneva: WTO Publications.

Yang, Y. & Gupta, S. (2007) 'Regional Trade Arrangements in Africa: Past Performance and the Way Forward', *African Development Review*, 19(3), pp. 399–431.