LEVERAGING REGIONAL TRADE AGREEMENTS FOR DIGITAL TRADE ACCELERATION: AN EMPIRICAL ANALYSIS OF EMERGING ASIAN ECONOMIES

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MOTIVATION & CONTEXT

Digitally Delivered Services (DDS)
Services supplied from one country to another **over computer networks (e.g., the internet), with the delivery itself occurring digitally-** no physical shipment or in-person presence required.
Inclusions: computer & IT services; telecommunications & information services; professional/business services (e.g., consulting, legal, accounting, advertising) when provided online, etc.

DDS by the Numbers: Scale, Speed, Spread

- Global DDS exports hit US$3.82T in 2022, about 54% of all services exports (WTO/World Bank)
- Global DDS climbed to US$4.5T; developing economies crossed US$1T in DDS exports for the first time (UNCTAD)
- In 2022, Asia-Pacific exported ~US$958B in DDS- 52% of the region's total services exports
- But highly concentrated: Six economies account for ~85% of Asia-Pacific DDS; LDCs' share is <1%
- As of May 2025 there were 375 RTAs in force globally, with a growing share embedding digital/e-commerce provisions
- WTO projects DDS volumes to grow ~5.6% in 2025 (baseline 6.6%), remaining among the most resilient services segments (WTO, Apr 2025)

MOTIVATION & CONTEXT

- **Why agreements matter**: Deep RTAs add behind-the-border rules (data flows, e-signatures, privacy/cyber, payments, interoperability) that cut fixed and variable trade costs (search, contracting, compliance)
- **Binding frictions**: Regulatory misalignment (data-localisation, weak recognition of e-signatures, licensing limits, privacy divergence) raises trade costs and suppresses DDS
- **General-purpose input**: Data mobility + trusted digital infrastructure (cloud, IDs, payments, cybersecurity) enable scale/network effects in modern services
- **Predicted heterogeneity**: Pay-offs from deep provisions depend on domestic readiness (infrastructure, institutions, trade intensity) → RTAs act as accelerators, not uniform drivers

LITERATURE REVIEW

Theme	Core concept
Defining & measuring DDS	DDS = cross-border services delivered over ICT; operationalized from EBOPS/BPM6; global dataset 2005–2023. WTO (2021); Miroudot (2020); EBOPS/BPM6
Regulatory frictions	Domestic rules on data, e-transactions, e-payments, IP, etc., shape trade costs for digital services. Heuser and Mattoo (2017); Ferracane and van der Marel (2020); Burri (2021)
Deep trade agreements	RTAs with "behind-the-border" disciplines reduce fixed/variable trade costs and enhance services integration. Lawrence (1996) - Deep Integration Theory; Mattoo, Rocha & Ruta (2020); Freund et al. (2021)
Digital provisions in RTAs	Clauses on data flows, e-signatures, consumer protection, IP, cybersecurity, interoperability. Monteiro & Teh (2017); Murray & Enders (2021); ASEAN Digital Integration Framework (Chia, 2021)
RTAs on services /DDS (empirics)	Do digital rules lift services trade? Evidence points to positive effects, varying by rule strength. Freund et al. (2021); Chen & Nordås (2021); Mulabdic et al. (2017)
Global momentum of DDS	Rapid growth heightens policy relevance of rules enabling cross-border delivery. WTO (2021); Baldwin (2016); López González & Jouanjean (2020); Fernandes et al. (2020)

RESEARCH GAPS

- **Aggregation bias:** Prior work treats *digital trade as one block*, masking sectoral (EBOPS) differences in response to RTAs
- **Missing conditionality:** Limited evidence on how macro trade conditions (services trade share, EXPVI, IMPVI, external balance) condition RTA effects on DDS
- **Underused heterogeneity methods:** Few DDS studies apply staggered DiD or related tools to handle timing and dynamic effects
- **Emerging Asia underexplored:** Country-group contrasts (ASEAN vs SAARC vs others) and distributional effects across the DDS spectrum remain thin
- **Institutions-policy interaction:** Theory predicts gains depend on domestic complements (data governance, skills, infrastructure), yet empirical tests for DDS are sparse

RESEARCH QUESTIONS

- RQ1. Do RTAs with digital provisions significantly raise Digitally Delivered Services (DDS) in emerging Asian economies?
- RQ2. How do RTA effects vary across DDS sub-components (EBOPS categories)?
- RQ3. What role do trade-related moderators (TRDS, EXPVI, IMPVI, external balance) play in conditioning RTA impacts?
- RQ4. How do effects differ across regional groups (e.g., ASEAN vs SAARC vs others), reflecting digital/trade readiness?

DATA AND VARIABLES

- **Coverage & unit:** 15 emerging Asian economies, 2005–2024; annual country-year panel.
- **Sources (core)**→ DDS (outcome): WTO Trade in Services Database; Extended Balance of Payments Services (EBOPS)-aligned disaggregation, Policy (RTA)→ WTO notifications, national trade-ministry archives, and digital-policy briefs (to code watershed year when enforceable digital provisions take effect).

Block	Variables	Source / Notes
Dependent	DDS exports (US$ mn); EBOPS sub-components: insurance & pension; financial; IP charges; telecom; computer; information; other business; personal/cultural/recreational	WTO Trade in Services; EBOPS 2010 mapping.
Independent (policy)	RTA (digital) dummy = 1 from watershed year of an RTA (or equivalent arrangement) with explicit digital/e-commerce/fintech/data/cyber provisions; 0 before	Coded from WTO notifications + official archives; Table 1 details country-specific watershed years.
Moderators	TRD (trade as % of GDP), EXPVI, IMPVI, External balance/CAB - capture trade readiness that can scale RTA effects	Standard international databases (as in IV first-stage)
Controls	GDP growth, FDI inflows, employment in services, gross savings	Included in TWFE baseline to absorb macro dynamics.

EMPIRICAL STRATEGY- VISUAL SUMMARY

Baseline effect (TWFE)

Country and year fixed effects; controls: GDP growth, FDI, services employment, gross savings → average impact of RTA (digital) on DDS (and each EBOPS sub-component).

Endogeneity check (2SLS IV)

Instrument RTA with TRD, EXPVI, IMPVI, CAB (Baier-Bergstrand logic) → two-stage least squares to mitigate self-selection/omitted factors.

Diagnostics (Wu–Hausman F, first-stage F) reported.

Conditional effects (RTA × Moderators)

Estimate interaction models with TRDS, EXPVI, IMPVI, CAB to test if trade readiness/macroeconomic space scales RTA pay-offs.

Staggered timing (DiD: Callaway–Sant'Anna)

Group-time ATT to handle staggered adoption, dynamic effects, and use never-/not-yet-treated units as controls (addresses TWFE heterogeneity bias).

Distributional heterogeneity (Quantile regression)

Assess whether RTA impacts differ across the DDS distribution (e.g., lower vs higher DDS performers).

EMPIRICAL STRATEGY- MODELS

1. Baseline Fixed Effects Model

$$DDS_{it} = \beta_1 RTA_{it} + \beta_2 X_{it} + \alpha_i + \delta_t + \varepsilon_{it}$$

Where: DDS_{it} = Digitally delivered services; RTA_{it} = RTA treatment dummy; X_{it} = Controls (GDP growth, FDI, services employment, savings); α_i = Country fixed effects; δ_t = Time fixed effects

2. Instrumental Variables (2SLS)

First Stage: $RTA_{it} = \gamma_1 TRD_{it} + \gamma_2 EXPVI_{it} + \gamma_3 IMPVI_{it} + \gamma_4 CAB_{it} + X_{it} + \mu_{it}$

Second Stage: $DDS_{it} = \beta_1 \widehat{RTA_{it}} + \beta_2 X_{it} + \alpha_i + \delta_t + \varepsilon_{it}$

3. Interaction Effects with Trade Moderators

$$DDS_{it} = \beta_1 RTA_{it} + \beta_2 (RTA_{it} \times M_{it}) + \beta_3 X_{it} + \alpha_i + \delta_t + \varepsilon_{it}$$

Where: M_{it} = Trade moderators (Services trade, Export/Import volume indices, External balance)

EMPIRICAL STRATEGY- MODELS

4. Callaway-Sant'Anna Difference-in-Differences

Designed for staggered treatment adoption: Allows different units (countries) to receive the "treatment" (RTAs) at different times, not just two periods or two groups

Flexible comparison groups: Uses not-yet-treated and never-treated countries as controls for improved causal inference

Group-time average treatment effects (ATT): Estimates how the effect of RTAs on digitally delivered services evolves for different groups over time

$$ATT(g,t) = E[Y_t(1) - Y_t(0)|G = g]$$

Where: g = Treatment group; t = Time period; Uses never-treated and not-yet-treated as controls

5. Quantile Regression

$$Q_\tau(DDS_{it}) = \beta_1(\tau)RTA_{it} + \beta_2(\tau)X_{it} + \varepsilon_{it}(\tau)$$

Where: τ = Quantile (10th, 25th, 50th, 75th, 90th percentiles); Captures distributional heterogeneity

RESULTS- DDS & RTA

Spec	Key regressor	Coef.	N	FE / Controls
Model 1 (no controls)	RTA (digital)	**0.9540*** **	300	Country FE; no controls
Model 2 (Baseline)	RTA (digital)	**0.2547*** **	300	TWFE (country & year); controls (GDP growth, FDI, services employment, gross savings)
Model 3 (IV–2SLS)	RTA (digital)	**0.6143*** **	300	Instruments: TRD, EXPVI, IMPVI, CAB; Wu-Hausman F=14.03***; First-stage F=8.196***

On average, adopting an RTA with enforceable digital clauses is associated with a statistically significant rise in digitally delivered services, even after absorbing country and year effects and macro controls.

RESULTS- DDS SUB-COMPONENTS

DDS sub-component (EBOPS)	RTA coef.
Financial services	0.975***
Personal / Cultural / Recreational	0.850***
Computer services	0.572***
Use of Intellectual Property	0.639***
Other business services	0.409***
Telecommunications	0.308**
Insurance & pension	0.305*
Information services	0.260***

Digital-provision RTAs lift DDS broadly, with largest gains in Financial, Personal / Cultural/ Recreational, and Computer services.

RESULTS- WITH MODERATORS

Interaction term	Coef.
RTA × TRDS (trade in services, % GDP)	**0.0220****
RTA × EXPVI (export volume index)	**0.0073*****
RTA × IMPVI (import volume index)	**0.0119*****
RTA × External balance (goods & services)	**0.0234****

In models without moderators, the RTA main effect can be insignificant (e.g., 0.0632)→ RTAs are accelerators, not automatic drivers, absent enabling conditions.

Digital-provision RTAs raise DDS when trade fundamentals are strong- effects scale with services intensity, export/import dynamism, and external balance.

RESULTS- STAGGERED DID

Cohort (first treat)	Window	ATT	SE	p-value
2015	2014–2018	0.138	0.048	0.004
2015	2014–2024	0.684	0.220	0.002
2018	2017–2019	0.146	0.068	0.031
2018	2017–2024	0.960	0.407	0.019

RTA effects accumulate over time- later windows show larger, significant gains in DDS for treated cohorts.

Dynamic ATTs rise from short to long post-treatment windows→ consistent with compounding benefits as digital rules interact with countries' trade readiness and infrastructure.

RESULTS- DISTRIBUTIVE HETEROGENEITY

- Across DDS deciles: Effects grow toward higher deciles; countries with stronger external balances see smoother gains, while deficit countries show erratic responses.
- By region: SAARC exhibits steeper coefficients at lower deciles (catch-up), ASEAN shows muted averages, "Other" group is moderate but steady.
- By moderator thresholds: Above-mean TRDS/EXPVI/IMPVI/CAB → larger RTA effects across the distribution (policy works best where trade capacity is higher).
- Quantile models estimate effects along the DDS distribution and are also split by moderator thresholds to reveal conditional heterogeneity.

POLICY RECOMMENDATIONS

Digital Regulatory Alignment	Investment & Infrastructure	Skills & Human Capital	Trade Facilitation	Regional Cooperation
Align laws with RTA digital rules	Attract FDI in digital services	Launch digital skilling programs	Digitize customs and licensing	Develop SAARC digital trade strategy
Enable data flow, e-signatures, cybersecurity	Align policies with RTA investment norms	Build IT and service sector capabilities	Create regional e-trade corridors	Share digital platforms and cloud tools
Simplify and unify digital regulations	Support public-private infrastructure projects	Partner with industry and donors	Enable cross-border digital payments	Support regional innovation clusters

CONCLUSION

- RTAs significantly boost DDS
- Conditional effectiveness: RTAs act as accelerators, not uniform drivers
- Sector-specific impacts
- Trade fundamentals matter
- Institutional complementarity
- Regional heterogeneity

Bottom Line: *RTAs unlock digital trade potential when countries are ready* - institutional quality and trade fundamentals determine whether digital commitments translate into economic gains.

THANK YOU