The Impact of Digital Trade Rule Depth on Manufacturing GVC Position in Developing Countries

Mingzhu Zhao[1*] and Danupon Ariyasajjakorn[2]

Abstract

This paper examines whether digital trade rule depth affects the manufacturing global value chain (GVC) position of developing countries. Although digital trade rules have become increasingly common in regional trade agreements, their structural implications for manufacturing upgrading have received limited attention. Using a country–industry–year panel covering 32 developing economies and 17 manufacturing industries during 2000–2020, this study estimates three-way fixed effects models with country, industry, and year fixed effects. Manufacturing GVC position is measured using data from OECD TiVA, while digital trade rule depth is constructed from the TAPED database. The results show that higher digital trade rule depth is significantly associated with a lower manufacturing GVC position. Decomposition analysis indicates that this pattern is driven by declining forward participation and rising backward participation, suggesting that higher digital trade rule depth tends to strengthen import-linked integration rather than promote upstream upgrading. The negative association is weaker in countries with a higher share of medium- and high-technology manufacturing exports, which implies that stronger productive capability and technological intensity improve the ability to benefit from digital openness. Additional analysis suggests that foreign direct investment (FDI) may be one transmission channel, although this evidence remains suggestive. Disaggregated estimates further show that cross-cutting, data-related, and e-commerce provisions have the strongest structural associations. Overall, the findings indicate that digital trade rule depth does not automatically improve the structural position of developing-country manufacturing in GVCs; its effects depend on domestic productive capability, technological structure, and policy complementarity.

[1] Master of Arts in Applied Economics (MAAE), Faculty of Economics, Chulalongkorn University

[2] Assoc. Prof. Dr., Associate Dean of Faculty of Economics, Chulalongkorn University

* Corresponding author E-mail : 6784109729@student.chula.ac.th

Keywords: digital trade rule depth, global value chains, GVC position, manufacturing, technological intensity

Introduction

Digitalization is reshaping the organization of global value chains (GVCs) and international production. In manufacturing industries, cross-border production increasingly depends not only on the movement of goods, but also on data flows, digital services, electronic payments, software-enabled coordination, and online communication. As production becomes more fragmented and digitally connected, these elements play a growing role in supplier management, logistics, certification, and coordination across borders (WTO, 2023). For developing countries participating in manufacturing GVCs, this transformation creates both opportunities and risks. On the one hand, digitalization may strengthen connectivity and improve competitiveness. On the other hand, deeper participation does not necessarily imply structural upgrading. Countries may remain concentrated in downstream, assembly-based activities with limited domestic value added and strong dependence on imported intermediates, creating a risk of low-end lock-in (Agrawal & Mishra, 2022). The key issue is therefore not only whether developing countries participate in GVCs, but whether they can improve their manufacturing GVC position.

In this context, trade agreements have become an increasingly important institutional factor shaping cross-border production. Many regional trade agreements now include digital trade rules covering e-commerce, cross-border data flows, data privacy, source code, cybersecurity, digital intellectual property, and emerging digital issues such as AI and blockchain (Liu et al., 2025). At the same time, trade agreements have become deeper and more institutionally complex. In this paper, digital trade rule depth refers to the extent to which digital trade rules are broad, detailed, and legally binding across agreements and countries (Monteiro, 2017; Hofmann et al., 2018). For developing countries, variation in digital trade rule depth may generate both opportunities and challenges. Deeper digital trade rules may improve market access, reduce uncertainty, and facilitate cross-border coordination, but weak digital infrastructure, regulatory capacity, and governance may limit developing countries' gains (Gray, 2014).

Existing studies provide mixed evidence on the relationship between digital trade rules and GVC outcomes. While some studies find that deeper digital trade rules improve GVC participation or positioning, others show that these benefits are uneven and tend to favor

developed economies, as developing countries often face structural disadvantages in translating digital trade rule depth into manufacturing upgrading where digital infrastructure and governance capacity remain weak (Wu et al., 2024; Zhu, 2025; Shi et al., 2025; Yu & Yao, 2024). Yet existing research focuses mainly on trade flows, service trade, aggregate participation, or country- and product-level outcomes, leaving the manufacturing GVC position of developing countries less clearly addressed (Wang & Liu, 2025; Yu & Zhao, 2025; Luo & Xiao, 2025; Shi et al., 2025). This study therefore examines whether digital trade rule depth promotes upstream, value-added-intensive upgrading or reinforces downstream, import-dependent integration in developing countries.

Research objective

This study aims to examine whether digital trade rule depth affects the manufacturing GVC position of developing countries.

Related Literature

Digital trade rule depth may matter for manufacturing GVC position because broader and more enforceable digital rules can reduce uncertainty, improve regulatory predictability, and facilitate cross-border coordination (Hofmann et al., 2017; Burri & Polanco, 2019; Jiang et al., 2023). In manufacturing GVCs, where production is increasingly fragmented across borders, firms rely on the timely coordination of goods, data, and services. Clearer and more binding digital rules may therefore shape how production stages are organized, linked, and allocated across countries. At the same time, the GVC literature shows that development outcomes depend not only on whether countries participate in global production networks, but also on where they are positioned within them. Countries in more upstream segments generally contribute more domestic value added, while those concentrated in downstream assembly activities tend to rely more heavily on imported intermediates and capture less value added. In the value-added trade literature, manufacturing GVC position is closely related to forward participation and backward participation, which capture domestic value added embodied in other countries' exports and foreign value added embodied in domestic exports, respectively (Koopman et al., 2012; Antràs, 2020).

This relationship may also operate through foreign direct investment. Stronger and more predictable digital trade rules may improve the regulatory environment for multinational firms and encourage investment. However, foreign investment does not necessarily lead to structural upgrading. If investment is concentrated in assembly-based or import-intensive

activities, it may deepen participation without improving structural position (Antràs, 2020; Li & Wang, 2025). In addition, the effect of digital trade rule depth may vary according to productive capability. Economies with stronger technological intensity are generally better able to absorb digital openness, strengthen domestic linkages, and convert participation into upgrading, while less advanced economies may remain more vulnerable to import-dependent integration.

Emerging empirical evidence presents a mixed picture. Shi et al. (2025) found that deepening digital trade rules negatively affects developing countries' GVC positions across all product categories, while benefiting industrialized countries. Similarly, Yu and Yao (2024) demonstrated that regulatory disparities in digital trade lower manufacturing GVC positions, with larger negative impacts in developing economies, particularly those with underdeveloped digital infrastructure. However, Zhu (2025) found positive effects for developing–developing country pairs, with new data clauses showing the strongest promotion of GVC participation. Wu et al. (2024) noted that although digital trade enhances GVC positioning overall, developed countries experience significantly greater impacts than developing countries. These arguments provide the basis for the conceptual framework and hypotheses developed in this paper.

Methodology

1. Conceptual framework and research hypotheses

Based on the related literature and theoretical arguments, this study develops the conceptual framework shown in Figure 1.

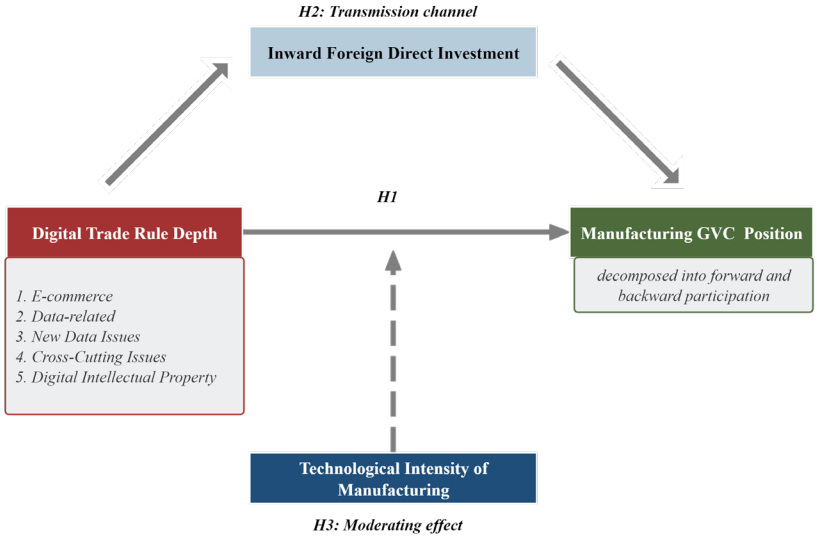

Figure 1 Conceptual framework of the study

Hypothesis 1: Digital trade rule depth affects the manufacturing GVC position of developing countries.

Hypothesis 2: Foreign direct investment inflow may serve as a transmission channel through which digital trade rule depth affects the manufacturing GVC position of developing countries.

Hypothesis 3: The effect of digital trade rule depth on the manufacturing GVC position of developing countries varies with the technological intensity of manufacturing.

2. Sample selection

This study uses a country–industry–year panel covering 32 developing countries and 17 manufacturing industries during 2000–2020. The sample is restricted to developing economies and manufacturing sectors.

The countries included in the sample are Argentina, Belarus, Brazil, Cambodia, Cameroon, Chile, China, Colombia, Costa Rica, Côte d'Ivoire, Egypt, India, Indonesia, Israel, Jordan, Kazakhstan, Lao PDR, Malaysia, Mexico, Morocco, Myanmar, Pakistan, Peru, Philippines, Russia, Saudi Arabia, South Africa, Thailand, Tunisia, Türkiye, Ukraine, and Viet Nam.

The manufacturing industries include food products, beverages and tobacco; textiles, textile products, leather and footwear; wood and products of wood and cork; paper products and printing; coke and refined petroleum products; chemical and chemical products; pharmaceuticals, medicinal chemical and botanical products; rubber and plastics products; other non-metallic mineral products; basic metals; fabricated metal products; computer, electronic and optical equipment; electrical equipment; machinery and equipment, nec; motor vehicles, trailers and semi-trailers; other transport equipment; and manufacturing nec, including repair and installation of machinery and equipment.

3. Variables and measurement

3.1 Dependent variable

The dependent variable is the manufacturing GVC position index, constructed following Koopman et al. (2012) using OECD TiVA data. It is measured as:

$$Position_{ist} = \ln\left(1+\frac{DVA_{ist}}{X_{ist}}\right) - \ln\left(1+\frac{FVA_{ist}}{X_{ist}}\right) \quad (1)$$

where Position denotes the manufacturing GVC position index, DVA refers to domestic value added embodied in foreign exports and FVA refers to foreign value added embodied in domestic exports. A higher value of the position index indicates that a manufacturing sector occupies a more upstream position in global production networks, reflecting a stronger

domestic value-added contribution relative to reliance on imported intermediates. Conversely, a lower value suggests a more downstream and import-dependent position (Li & Wang, 2025; Feng et al., 2024; Li et al., 2021). To better understand structural changes, this study also examines forward participation (DVA/X) and backward participation (FVA/X) separately.

3.2 Explanatory variable

The main explanatory variable is digital trade rule depth, measured using the TAPED database. This index captures the legal enforceability and comprehensiveness of digital trade provisions in regional trade agreements (Jiang et al., 2023; Wu et al., 2023; Liang & Cui, 2024). Following the TAPED classification, digital trade rule depth is composed of five categories: e-commerce provisions, data-related provisions, new data economy provisions, cross-cutting provisions, and digital intellectual property provisions (Burri & Polanco, 2019; Jiang et al., 2023). These sub-indices are also used to examine provision-specific associations with manufacturing GVC position.

3.3 Control variables

The control variables include economic size, measured by the natural logarithm of GDP (ln_GDP) from UNCTAD; regulatory quality (RQ) from the Worldwide Governance Indicators; internet penetration (Internet), measured as individuals using the Internet as a percentage of population, from the World Bank; foreign direct investment (FDI), measured as net inflows as a share of GDP, from the World Bank; and technology intensity, measured as the share of medium- and high-technology exports in manufacturing (MHTech), also from the World Bank.

4. Empirical strategy

This study estimates a three-way fixed effects model with country, industry, and year fixed effects, clustering standard errors at the country level. The baseline model is specified as follows:

$$Position_{ist}=\alpha_0+\alpha_1 Index\_total_{it}+\theta X_{it}+FE_i+FE_s+FE_t+\varepsilon_{ist} \quad (2)$$

where $Position_{ist}$ denotes the GVC position index of manufacturing industry s in country i in year t; $Index\_total_{it}$ represents the total digital trade rule depth index; X_{it} is a vector of time-varying country-level control variables; FE_i, FE_s, FE_t denote country, industry, and year fixed effects; and ε_{ist} is the error term.

In addition to the baseline model, the analysis proceeds in four ways. First, it decomposes manufacturing GVC position into forward and backward participation. Second, it

tests inward foreign direct investment (FDI) as a possible transmission channel. Third, it examines the moderating role of technological intensity by including an interaction term between digital trade rule depth and MHTech. Finally, it replaces the aggregate digital trade rule depth index with its five sub-indices to assess whether different categories of digital trade provisions show different structural associations with manufacturing GVC position.

Although the three-way fixed effects specification helps control for unobserved country, industry, and year heterogeneity, potential endogeneity concerns, including reverse causality and omitted variable bias, cannot be fully ruled out.

5. Descriptive statistics

Table 1 reports the descriptive statistics for the main variables. The results show substantial variation across countries, industries, and years in manufacturing GVC position, digital trade rule depth, its sub-indices, and the main control variables, supporting the empirical analysis.

Table 1 Descriptive statistics

	Obs	Mean	S.D.	Min	Max
Position	11,424	0.0867	0.1971	-0.5883	0.6219
Forward	11,424	0.4006	0.1912	0	0.9390
Backward	11,424	0.2844	0.1401	0	0.8930
Index_total	11,424	0.2062	0.2479	0	1.0000
Index_ec	11,424	0.2160	0.2636	0	0.9412
Index_data	11,424	0.1755	0.2400	0	1.0000
Index_new_data	11,424	0.0500	0.1210	0	0.5714
Index_cross	11,424	0.1482	0.2116	0	0.7000
Index_ip	11,424	0.2055	0.2493	0	0.8889
ln_GDP	11,424	12.1270	1.5125	8.5029	16.4977
FDI	11,424	3.1905	2.6387	-2.7574	23.5372
RQ	11,424	46.0659	20.2092	0	92.7000
Internet	11,407	36.2833	20.5791	0.5303	83.0982
MHTech	11,424	31.0348	25.8572	0.0002	97.8623

Results

1. Baseline and decomposition results

The baseline estimates (Table 2) show that digital trade rule depth is negatively and significantly associated with manufacturing GVC position. The decomposition results further indicate that this pattern is driven by lower forward participation and higher backward participation, suggesting that digital trade rule depth is associated more with stronger import-linked integration than with stronger domestic value-added supply.

Table 2 Baseline and decomposition results

	Position	Forward	Backward
Index_total	-0.0503**	-0.0347**	0.0402**
	(0.0227)	(0.0131)	(0.0196)
Controls	Yes	Yes	Yes
Constant	-0.8894**	-0.0124	1.1066***
	(0.3325)	(0.1947)	(0.2910)
Country/Industry/Year FE	Yes	Yes	Yes
Adj. R^2	0.6834	0.7576	0.5467

Note: robust standard errors clustered at the country level are reported in parentheses.

*p < 0.1, **p < 0.05, ***p < 0.01.

Source: Author's calculation.

2. Mechanism analysis: the FDI channel

The mechanism analysis (Table 3) provides suggestive evidence that FDI may be one transmission channel linking digital trade rule depth to manufacturing GVC position. Digital trade rule depth is positively associated with FDI in the first-stage regression, while FDI is negatively associated with GVC position when included in the baseline specification. The reduction in the coefficient on digital trade rule depth after FDI is added suggests partial transmission, although the first-stage relationship is only marginally significant.

Table 3 Mechanism analysis: the FDI channel

	(1) Baseline without FDI Position	(2) First-stage FDI FDI	(3) Baseline with FDI Position
Index_total	-0.0546**	1.3807*	-0.0503**
	(0.0229)	(0.7877)	(0.0227)
FDI			-0.0031**
			(0.0015)
Controls	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	No	Yes
Year FE	Yes	Yes	Yes
Adj. R^2	0.6827	0.5524	0.6834

Note: robust standard errors clustered at the country level are reported in parentheses.

*p < 0.1, **p < 0.05, ***p < 0.01.

Source: Author's calculation.

3. Moderation analysis: technological intensity

The moderation analysis (Table 4) shows that technological intensity weakens the negative association between digital trade rule depth and manufacturing GVC position. The interaction term between digital trade rule depth and MHTech is positive and statistically significant for both GVC position and forward participation. This suggests stronger productive capability helps convert digital openness into more favorable structural outcomes. Figure 2 further shows that the negative marginal effect of digital trade rule depth on manufacturing GVC position, forward participation, and backward participation becomes smaller as technological intensity increases.

Table 4 Moderating effect of technological intensity

	Position	Forward	Backward
Index_total	-0.0967***	-0.0614***	0.0753***
	(0.0215)	(0.0150)	(0.0199)
MHTech	-0.0010	-0.0009**	0.0009
	(0.0007)	(0.0004)	(0.0006)
Index_total × MHTech	0.0011*	0.0006*	-0.0008
	(0.0006)	(0.0003)	(0.0005)
Constant	-0.9604**	-0.0532	1.1604***

	(0.3325)	(0.2113)	(0.3084)
Controls	Yes	Yes	Yes
Country/Industry/Year FE	Yes	Yes	Yes
Adj. R^2	0.6840	0.7579	0.5475

Note: robust standard errors clustered at the country level are reported in parentheses.

*p < 0.1, **p < 0.05, ***p < 0.01.

Source: Author's calculation.

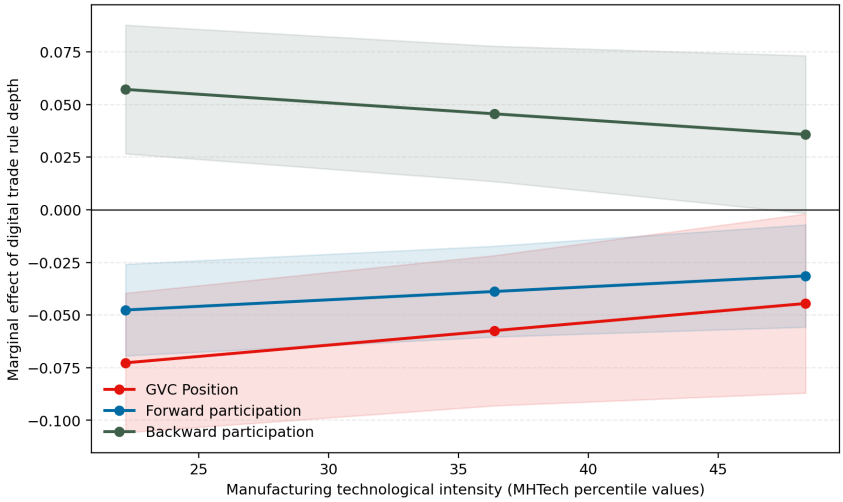

Figure 2 Conditional marginal effects of digital trade rule depth at different levels of manufacturing technological intensity

Source: Author's calculation.

4. Disaggregated effects of digital trade rule depth

The disaggregated analysis (Figure 3) shows that digital trade governance is not homogeneous across provision types. Cross-cutting, data-related, and e-commerce provisions display the strongest structural associations with GVC outcomes, while new data economy provisions show weaker short-run effects. Across most provision categories, the dominant pattern remains the same: digital trade rule depth is associated with lower forward participation and higher backward participation.

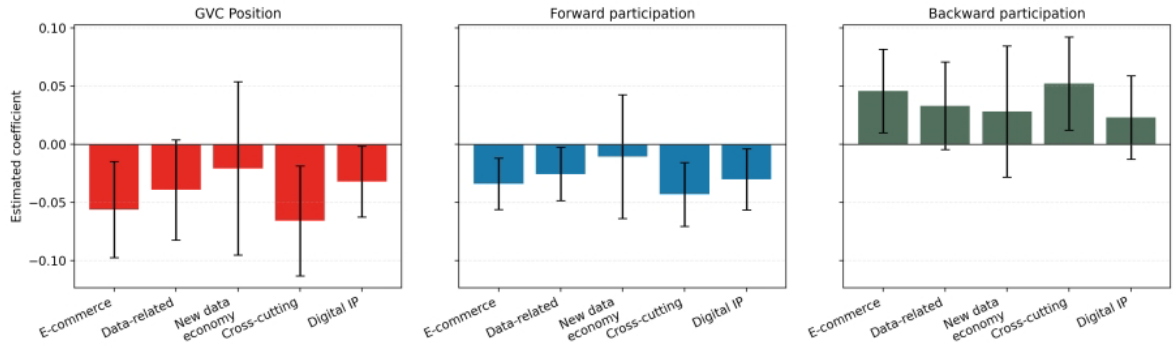

Figure 3 Provision-specific effects of digital trade rule depth on GVC position, forward participation, and backward participation

Source: Author's calculation.

5. Robustness checks

Robustness checks using lagged indices of digital trade rule depth (Table 5) and alternative samples excluding China and/or India (Table 6) confirm the stability of the main findings.

Table 5 Robustness check: Lagged effects of digital trade rule depth

	Position	
	(1)	(2)
L1_Index_total	-0.0484**	
	(0.0227)	
L2_Index_total		-0.0529**
		(0.0224)
Controls	Yes	
Constant	-0.8865**	-0.9563**
	(0.3460)	(0.3687)
Country/Industry/Year FE	Yes	
Adj. R^2	0.6841	0.6857

Note: robust standard errors clustered at the country level are reported in parentheses.

*p < 0.1, **p < 0.05, ***p < 0.01.

Source: Author's calculation.

Table 6 Robustness check: excluding China and/or India

	Position			
	(1)	(2)	(3)	(4)

	Full sample	Excl. CHN	Excl. IND	Excl. CHN & IND
Index_total	-0.0503**	-0.0510**	-0.0493**	-0.0501**
	(0.0227)	(0.0230)	(0.0234)	(0.0237)
Controls	Yes	Yes	Yes	Yes
Country/Industry/Year FE	Yes	Yes	Yes	Yes
Observations	11,407	11,050	11,050	10,693
Adj. R^2	0.6834	0.6766	0.6870	0.6802

Note: robust standard errors clustered at the country level are reported in parentheses.

*p < 0.1, **p < 0.05, ***p < 0.01.

Source: Author's calculation.

Discussion

The results suggest that digital trade rule depth should not be automatically equated with manufacturing upgrading. Although greater digital trade rule depth may improve coordination, predictability, and cross-border integration, in developing countries these gains may primarily facilitate access to foreign intermediates rather than strengthen domestic value-added creation. This interpretation is consistent with the baseline and decomposition results, which show lower forward participation and higher backward participation under greater digital trade rule depth.

The findings also highlight the importance of domestic productive capability. The moderating effect of manufacturing technological intensity suggests that digital openness is more likely to support favorable structural outcomes when countries possess stronger absorptive capacity and a more advanced manufacturing base. The FDI results further suggest that foreign investment may be one channel through which digital trade rule depth affects manufacturing GVC position, but this mechanism should be interpreted with caution. Whether FDI contributes to upgrading depends in part on the extent of local spillovers and the absorptive capacity of domestic industries. Where these are weak, foreign investment may reinforce assembly-based and import-dependent integration rather than generate stronger domestic value-added linkages.

The disaggregated results further show that digital trade rule depth is not homogeneous across provision types. Cross-cutting, data-related, and e-commerce provisions display the strongest structural associations with manufacturing GVC outcomes, while new data provisions show weaker short-run effects and digital intellectual property provisions exhibit more limited associations overall. This pattern suggests that the effect of digital trade

rule depth depends not only on the overall depth of commitments, but also on the composition of those commitments.

Overall, these findings contribute to the broader debate on how trade governance interacts with structural transformation in developing countries. Digital trade rule depth matters, but its developmental effects are conditional rather than uniform. At the same time, several limitations should be acknowledged. The TAPED database captures the legal depth of digital trade provisions rather than their implementation quality, the OECD TiVA database involves sector aggregation that may mask within-industry heterogeneity, and the sample is restricted to 32 developing countries and 17 manufacturing industries, which may limit the generalizability of the findings.

Recommendations

First, digital trade liberalization should be linked more closely to industrial and technological upgrading policies. Deeper digital trade rule commitments may improve connectivity and facilitate cross-border coordination, but they do not automatically strengthen domestic value-added creation. Governments should therefore complement digital trade reforms with policies that support domestic suppliers, technology upgrading, innovation, workforce skills, and medium- and high-technology manufacturing.

Second, policy priorities should differ across groups of developing economies. For lower-middle-income economies, the immediate priority is to strengthen digital infrastructure, regulatory capacity, and basic industrial capabilities before expecting substantial upgrading from deeper digital trade commitments. For upper-middle-income economies, greater emphasis should be placed on innovation capacity, domestic supplier upgrading, and higher value-added manufacturing activities so that digital openness can be translated into stronger domestic value-added creation.

Third, digital trade provisions should be negotiated selectively and strategically. The findings suggest that cross-cutting, data-related, and e-commerce provisions have the strongest structural associations with manufacturing GVC outcomes. Governments should therefore pay closer attention not only to the overall depth of commitments, but also to the composition of digital trade rules, and align them with domestic regulatory capacity and sectoral readiness. For export-oriented developing economies in particular, deeper digital integration should be accompanied by policies that prevent specialization from remaining concentrated in assembly-based and import-dependent activities.

Fourth, foreign direct investment should be managed more strategically. Rather than focusing only on attracting larger inflows, governments should encourage forms of investment that strengthen local linkages, learning effects, and technological spillovers. This is particularly important because foreign investment may deepen import-dependent integration if it remains concentrated in assembly-based activities. Whether FDI contributes to upgrading depends in part on the absorptive capacity of domestic industries and the extent of local spillovers.

Finally, digital trade rule depth should be embedded within a broader development strategy. For developing countries, the policy objective should not be limited to deeper integration into GVCs, but should also include stronger domestic value added, greater productive capability, and more resilient participation in global production networks. In this sense, digital trade rule depth is more likely to support structural upgrading when it is combined with domestic capability building rather than pursued as a stand-alone liberalization strategy.

References

Agrawal, B., & Mishra, N. (2022). Addressing the global data divide through digital trade law. *Trade L. & Dev., 14*, 238.

Antràs, P. (2020). Conceptual aspects of global value chains. *The World Bank Economic Review, 34*(3), 551–574. https://doi.org/10.1093/wber/lhaa006

Burri, M., & Polanco, R. (2019). Digital trade provisions in preferential trade agreements: Introducing a new dataset. *Journal of International Economic Law, 23*(1), 187–220. https://doi.org/10.1093/jiel/jgz044

Cui, R., Guo, Z., & Chen, Y. (2024). The impact of digital trade rules in regional trade agreements on the domestic value added of exporting countries [in Chinese]. *International Trade Issues (Guoji Maoyi Wenti)*, 2024(5), 54–69. https://doi.org/10.13510/j.cnki.jit.2024.05.003

Feng, S., Zhang, R., Di, D., & Li, G. (2024). Does digital transformation promote global value chain upgrading? Evidence from Chinese manufacturing firms. *Economic Modelling, 139*, 106810. https://doi.org/10.1016/j.econmod.2024.106810

Gray, J. (2014). Domestic capacity and the implementation gap in regional trade agreements. *Comparative Political Studies*, *47*(1), 55–84. https://doi.org/10.1177/0010414013488535

Hofmann, C., Osnago, A., & Ruta, M. (2017). Horizontal Depth: a new database on the content of preferential trade agreements. *World Bank policy research working paper, (7981).* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2923535

Hofmann, C., Osnago, A., & Ruta, M. (2018). The content of preferential trade agreements. *World Trade Review, 18*(3), 365–398. https://doi.org/10.1017/s1474745618000071

Jiang, T., Hu, Y., Haleem, F., & Zeng, S. (2023). Do digital trade rules matter? empirical evidence from TAPED. *Sustainability, 15*(11), 9074. https://doi.org/10.3390/su15119074

Koopman, R., Wang, Z., & Wei, S. (2012). Tracing value-added and double counting in gross exports. *American Economic Review, 104*(2), 459–494. https://doi.org/10.1257/aer.104.2.459

Li, X., Zhou, W., & Hou, J. (2021). Research on the impact of OFDI on the home country's global value chain upgrading. *International Review of Financial Analysis*, *77*, 101862. https://doi.org/10.1016/j.irfa.2021.101862

Li, Y., & Wang, Z. (2025). Digital trade facilitation and GVC restructuring: Implications for manufacturing upgrading in developing countries. *Finance Research Letters, 86*, 108413. https://doi.org/10.1016/j.frl.2025.108413

Liang, J., Zhang, Y., & Huang, X. (2024). Digital trade rules and manufacturing digitalization [in Chinese]. *International Trade Issues (Guoji Maoyi Wenti)*, (10), 105–122. https://doi.org/10.13510/j.cnki.jit.2024.10.006

Liu, B., Liu, C., Li, C., & Chen, X. (2025). The impact of digital trade rules on firms' international joint patent applications. *Research Policy, 55*(1), 105366. https://doi.org/10.1016/j.respol.2025.105366

Luo, X., & Xiao, Y. (2025). Digital trade rules and division of labour in global value chains. *Finance Research Letters*, *85*, 108164. https://doi.org/10.1016/j.frl.2025.108164

Monteiro, J., & Teh, R. (2017). Provisions on electronic commerce in regional trade agreements. *SSRN Electronic Journal.* https://doi.org/10.2139/ssrn.3005148

Shi, Z., Wei, Y., & Xing, X. (2025). Does the deepening of digital trade rules improve GVC positioning?– A product-level analysis. *Chinese Management Studies*, *20*(2), 388–416. https://doi.org/10.1108/cms-11-2024-0928

Wang, Y., & Liu, B. (2025). The impact of digital trade rules on services trade: an empirical investigation from the DVA perspective. *Review of International Economics*, *33*(3), 641–656. https://doi.org/10.1111/roie.12803

World Trade Organization (WTO). (2023). *Digital trade for development.* https://www.wto.org/english/res_e/publications_e/dtd2023_e.htm

Wu, H., Wang, X., Khalid, Z., & Elahi, E. (2024). The digital trade advantage: investigating the impact on global value chain positions in manufacturing and service industries. *Applied Economics, 57*(43), 6963–6978. https://doi.org/10.1080/00036846.2024.2387370

Wu, J., Luo, Z., & Wood, J. (2023). How do digital trade rules affect global value chain trade in services?—Analysis of preferential trade agreements. *World Economy*, *46*(10), 3026–3047. https://doi.org/10.1111/twec.13412

Yu, C., & Zhao, J. (2025). Digital trade rules and Asia-Pacific regional GVC trade in services: analysis from the perspective of regional trade agreements. *Journal of the Asia Pacific Economy*, 1–24. https://doi.org/10.1080/13547860.2025.2544427

Yu, H., & Yao, L. (2024). The impact of digital trade regulation on the manufacturing position in the GVC. *Economic Modelling*, *135*, 106712. https://doi.org/10.1016/j.econmod.2024.106712

Zhu, M. (2025). The impact of regional digital trade rules on global value chains. *Asia Pacific Economic and Management Review*, *2*(2). https://doi.org/10.62177/apemr.v2i2.215