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Assessing Policy Impacts in Digital Services Trade: Implications for the Philippines

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Abstract

Rapid digitalization has become an integral feature of the global economy in recent years, as markets became more connected and new modes of production and trade emerged. Having a relatively open digital environment, the Philippines is poised for digital trade integration with its Asia-Pacific neighbors. However, various measures must be taken for the country to be fully prepared for regional integration. Some of these are considered low-hanging fruits and can be quickly adopted by the government. This paper examined these low-hanging fruits, in terms of their effects on digital services trade. It conducted a two-stage regression of the gravity model of trade, using data from various sources. This allowed for the estimation of country-specific characteristics in the presence of three-way fixed effects. Results show that the low-hanging fruits generate heterogenous effects on digital services trade. Ratifying the revised WTO Agreement on Government Procurement (GPA) is positively associated with digital services trade, despite an earlier version having negative effects. Data retention requirements and online piracy have both positive and negative effects, while the effects of local loop unbundling were inconclusive. Overall, data retention was more facilitative while online piracy had greater adverse effects on digital services trade. These findings suggest the importance of acceding to the GPA, as well as revising the conditions of data retention requirements, strengthening copyright enforcement, and providing additional channels for promotion of legal content.

Keywords: digital services trade, WTO GPA, local loop unbundling, data retention policy, copyright enforcement

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List of Acronyms

ASEAN – Association of Southeast Asian Nations

BSA – Business Software Alliance

CPC – Central Product Classification

DTRI – Digital Trade Restrictiveness Index

FTA – free trade agreement

GDP – gross domestic product

GPA – Agreement on Government Procurement

IPR – intellectual property rights

ITPD-E – International Trade and Production Database for Estimation

LLU – local loop unbundling

MSMEs – micro, small, and medium enterprises

MTR – multilateral trade resistance

NTC – National Telecommunications Commission

NTM – non-tariff measure

OECD – Organisation for Economic Co-operation and Development

PJEPA – Philippines-Japan Economic Partnership Agreement

PPML – Poisson Pseudo-maximum Likelihood

RDTII – Regional Digital Trade Integration Index

UNCTAD – United Nations Conference on Trade and Development

WTO – World Trade Organization

Assessing Policy Impacts in Digital Services Trade: Implications for the Philippines

Neil Irwin S. Moreno[1] and Francis Mark A. Quimba[2]

1. Introduction

The rise of digital technologies has been one of the key drivers of globalization in recent years, as markets become more integrated and seamless from digitalization. In 2019, the United Nations Conference on Trade and Development, or UNCTAD, identified several key points about the digital economy. For instance, they noted that "the growing power of digital platforms has global implications" and that "countries must be ready to create and to capture digital value." The significance of the digital economy was further highlighted during the coronavirus (COVID-19) pandemic, as almost all sectors of the economy had to utilize digital technologies in order to adjust to government-imposed measures.

For the Philippines, the importance of electronic commerce (digital trade) in internationalizing Philippine micro, small, and medium enterprises (MSMEs) is manifested in the country's active digital economy—the country's digital economy slightly grew from US$7.1 billion in 2019 to $7.5 billion in 2020—as well as its strong position as a net exporter of digitally-deliverable services (3.6% of 2019 GDP). Quimba et al. (2021) finds that the Philippines is ready for regional digital trade integration with the Asia-Pacific. The Philippines generally has an open policy environment for digital trade, evidenced by the country's 2020 RDTII score of 0.342.

The Philippines performed best in three pillars, particularly: pillar 1 on tariffs and trade defense measures; pillar 6 on cross-border data policies; and pillar 8 on intermediary liability and content access. All three pillars scored less than 0.2, thus indicating a non-restrictive environment. However, the proper implementation of some policies has not been fully achieved, and this could be a great obstacle or challenge to regional integration. There is also room for improvement in in three pillars, namely: pillar 2 on public procurement; pillar 3 on investment; and pillar 5 on infrastructure and competition. These three pillars reported a score of above 0.610, so these pillars were characterized as having a strongly restrictive environment (See Table 2 in Section 2).

In addition, Quimba et al. (2021) and Ferracane (2021) identified low-hanging fruits—measures that could easily be adopted—by the Philippines in order to improve its digital trade environment. Some of these are acceding to the WTO Agreement on Government Procurement, implementing local loop unbundling, lifting data retention requirements on online services and telecom providers, and improving copyright enforcement. However, these studies were not able to assess the potential impacts of these policies on digital trade. Building on the findings of the two studies, this study seeks to identify the relationship between digital services trade and fulfilling these low-hanging fruits. Aside from strengthening the country's position in digital trade integration, this study also aims to provide insights in supporting the development of the services trade, which is a key driver of post-pandemic economic recovery.

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The rest of the paper is organized as follows: Section 2 provides a literature review on the relationship between digital services trade and the low-hanging fruits; Section 3 presents the methodology and data sources; Section 4 discusses the findings; Section 5 presents the conclusion and recommendations.

2. Literature Review

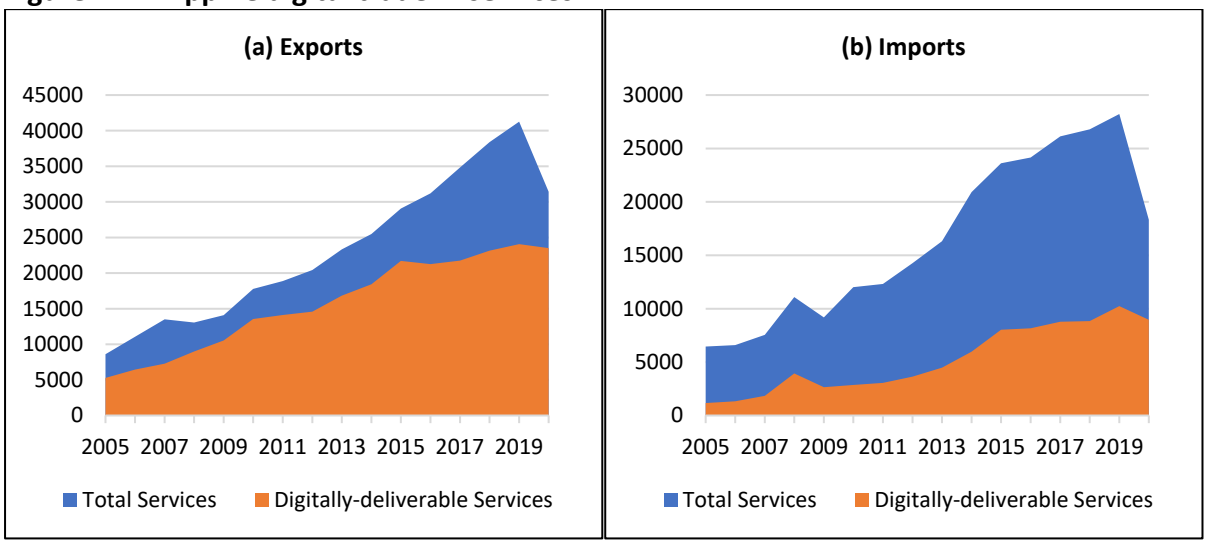
Trade has been an important component of the Philippine economy. Services trade, in particular, has been a major source of output and employment. With the emergence of digital transformation in recent years, this study focused on the digital component of services trade. While there is still no universally-accepted definition of digital trade (OECD), there have been attempts to measure digital trade. OECD statistics on digital trade covers digitally-enabled transactions of trade in goods and services that can either be digitally or physically delivered, and that involve private consumers, businesses, and/or the public sector. That is, while all forms of digital trade are conducted digital technologies, not all digital trade is digitally delivered.

Serafica and Albert (2018) distinguish the nature of transactions of digital trade: digitally ordered, platform enabled, and digitally delivered. Digitally ordered trade is a cross-border e-commerce transaction, made over the web, extranet or electronic data interchange, excluding orders made by phone, fax or manually typed email. Platform enabled transactions involve intermediary digital platforms such as Amazon, Lazada, Uber, Alibaba, or Airbnb. In these cases, the residence of the intermediary is not automatically determined, raising uncertainties in identifying whether the underlying transactions are cross-border trade or income flows. Moreover, recording the cross-border transactions as 'gross' (i.e., the value of underlying services provided between residents is included) or 'net' (i.e., only the intermediation fee is considered as cross-border) has been an important issue. Finally, digitally delivered services covers those services and data flows that are delivered digitally as downloadable products (e.g., software, e-books, data, and database services). This study focuses on this type of digital trade.

2.1 State of Philippine Digital Services Trade

The significance of the digital economy in Philippine services trade has been notable during the previous two decades. Exports of digitally-deliverable services have steadily increased since the late 2000s. From around USD 5.3 billion in 2005, digital services exports ballooned to more than USD 23 billion by 2020. Digitally-deliverable services have also accounted for the bulk of services exports—around 50% to 76%—during the period. On the other hand, imports of digital services only comprised a modest percentage of services imports. For majority of the 2005-2020, period, the share of digitally-deliverable services imports ranged from 18% to 36%. On a positive note, digital services imports have evidently exhibited an increasing trend since 2010, with the share reaching 48.9% in 2020. The country has been a net exporter of digital services, with trade balance gradually increasing from USD 4.4 billion in 2005 to USD 15 billion in 2020.

Figure 1. Philippine digital trade in services



Note: Figures are in million United States dollars (USD).
Source: United Nations Conference on Trade and Development (UNCTAD)

Technical, trade-related, and other business services have been the key driver of digital services trade. The percentage share of the sector in total exports of digitally-deliverable services have ranged from 70% to 80% since 2005. It also accounted for the highest share—between 31% and 62%—of digital services imports during the 2005-2020 period. Computer services also emerged as an important component of digital services exports, with average annual share increasing from 10.6% in late 2000s to 23.2%. In terms of imports, insurance and pension services posted considerable shares of digital services imports, albeit decreasing during the 2010s.

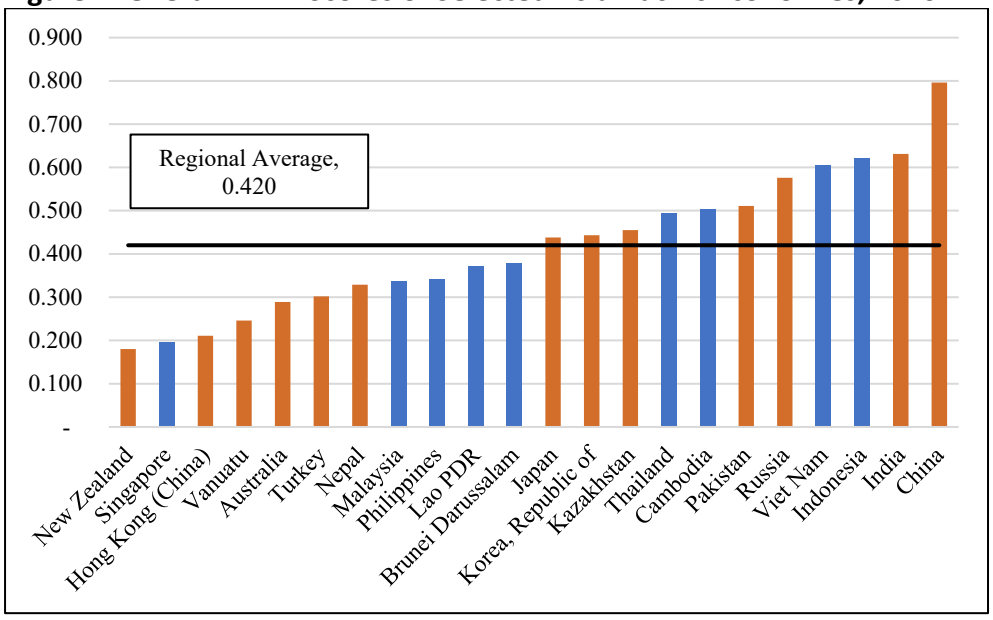
Table 1. Philippine trade in digitally-deliverable services, by sector

	Exports			Imports		
	2005-2010	**2011-2015**	**2016-2020**	**2005-2010**	**2011-2015**	**2016-2020**
Insurance and pension services	50.5	99.3	82.6	537.3	867.5	1452.9
Financial services	115.8	178.8	246.3	210.1	329.3	568.2
Charges for the use of intellectual property n.i.e.	4.2	7.3	22.7	374.4	520.4	713.4
Telecommunications services	444.0	406.0	447.8	114.1	273.5	497.0
Computer services	1016.0	2800.2	5275.2	80.7	241.2	539.9
Information services	1.5	2.0	24.5	8.5	10.1	36.2
Research and development (R&D)	13.7	40.7	50.4	17.5	41.4	18.4
Professional and management consulting services	16.4	35.2	98.7	67.9	83.9	251.6
Technical, trade-related, and other business services	6994.5	13454.2	16338.7	859.3	2595.7	4733.8
Audiovisual and related services	19.9	49.2	71.7	18.1	21.7	73.4
Other personal, cultural, and recreational services	8.2	60.8	89.5	10.2	50.8	112.5
Total	**8684.6**	**17133.5**	**22748.2**	**2298.1**	**5035.5**	**8997.1**

Note: Figures are in million USD.
Source: UNCTAD

The growth of the country's digital services trade may be related to its relatively open digital trade environment. Based on the Regional Digital Trade Integration Index (RDTII), the digital trade environment of the Philippines has improved over the last few years—from an overall score of 0.351 in 2018 to 0.342 in 2020.[3] The country has also been one of the least restrictive economies in the Asia Pacific region. Looking at Figure 2, the country was ranked as the ninth least restrictive economy out of the 22 Asia-Pacific countries in 2020; moreover, its score is lower than the regional average of 0.420. Among the ASEAN members, the Philippines was only behind Singapore and Malaysia in terms of openness of digital trade environment.

Figure 2. Overall RDTII Scores of Selected Asia-Pacific Economies, 2020



Note: Scores of ASEAN member states are colored blue.
Source: Quimba et al. (2021)

Quimba et al. (2021) observed that the Philippines performed best in three pillars: tariffs and trade defense measures, cross-border data policies, and intermediary liability and content access. In particular, the policy and regulatory environment in these pillars are considered non-restrictive. The study posited that the most important factor strengthening the country's position in digital trade integration is the remarkably low tariffs synergizing well with non-tariff measures (NTMs), which are only slightly restrictive. Other factors propelling the Philippines' position include improvements on intellectual property rights (IPR) enforcement complementing the liberal access to online content, and strong policies on data. On the other hand, the study noted that the Philippines is heavily restricted by potential foreign equity limitations on some electronic commerce and electronic retailing sectors, highly discouraging policies affecting foreign bidders' participation in public procurement, and strong barriers to entry in the telecommunications sector.

Ferracane (2021) and Quimba et al. (2021) came up with recommendations that the Philippines could pursue to improve its digital trade environment. Some of these recommendations are considered low-hanging fruits that could serve as starting points in addressing the binding constraints that keep the Philippines from being fully prepared for digital trade integration with the Asia-Pacific region. Notable low-hanging fruits include joining the WTO Agreement on

[3] The RDTII score takes a value between 0 and 1, with higher value signifying greater restrictiveness.

Government Procurement (GPA), implementing local loop unbundling, lifting data retention requirements on online services and telecom providers, and enforcing copyrights to combat online piracy. This study assesses the impact of these initiatives on facilitating digital trade in services.

Table 2. Overall RDTII scores of the Philippines, by pillar

Pillar	2015	2018	2020	Remarks
1. Tariffs and trade defense measures applied on intraregional imports of ICT-related goods	0.006	0.005	0.003	Non-Restrictive
2. Public procurement related to digital goods and services	0.745	0.751	0.751	Strongly Restrictive
3. Foreign direct investment in sectors relevant for digital trade	0.625	0.625	0.625	Strongly Restrictive
4. Intellectual Property Rights	0.289	0.274	0.271	Slightly Restrictive
5. Telecommunications infrastructure and competition	0.604	0.620	0.620	Strongly Restrictive
6. Cross-border data policies	0.200	0.200	0.100	Non-Restrictive
7. Domestic policies on the use of data	0.365	0.363	0.363	Slightly Restrictive
8. Intermediary liability and content access	0.125	0.125	0.125	Non-Restrictive
9. Quantitative trade restrictions	0.125	0.350	0.350	Slightly Restrictive
10. Standards	0.250	0.250	0.250	Slightly Restrictive
11. Online sales and transactions	0.400	0.300	0.300	Slightly Restrictive
Overall RDTII score (simple average)	**0.339**	**0.351**	**0.342**	**Slightly Restrictive**

Source: Quimba et al. (2021)

2.2 Membership on WTO Agreement on Government Procurement

The WTO GPA is a plurilateral agreement that aims to mutually open government procurement markets among its parties by gradually reducing and eliminating discriminatory measures. Signed on 15 April 1994 and entered into force on 1 January 1996, the Agreement currently consists of 21 parties covering 48 WTO members (United Nations Economic and Social Commission for Asia and the Pacific [UNESCAP] 2021).[4] In addition, 35 WTO members and observers, and four international organizations participate in the Committee on Government Procurement as observers (Ferracane, 2021). The Philippines has been granted an observer status in June 2019. This enables the country to participate in the discussions of the Committee in drafting the framework for the conduct of international trade in government procurement without any commitment. It also allows the Philippines to access relevant information and become better acquainted with the operation of the GPA (Philippines, Department of Foreign Affairs 2019).

[4] The 27 member states of the European Union are considered as one party.

Joining the GPA has been deemed to be important in promoting digital trade, since the Agreement includes procurement commitments on services sectors considered most important for digital trade—telecommunications services (CPC 752), telecommunication-related services (CPC 754), and computer and related services (CPC 84).[5] Moreover, digitalization has become a key component of the revised version of the Agreement, the GPA 2012. Completed in 2012 and entered into force on 6 April 2014[6], the revised GPA contained provisions on modern procurement practices, such as the use of electronic procurement tools, as well as promotion and facilitation of e-commerce (Anderson and Müller 2017). While acceding to the GPA is expected to facilitate trade, Chen and Whalley (2011) contended that the impact of GPA could be limited due to the ambiguity in the effect coverage of GPA commitments. The commitments of the parties differ in terms of the entities bound under GPA commitments, product coverage, and the threshold value—above which the public procurement contract should be administered under the GPA rules.

Chen and Whalley (2011) evaluated the impact of GPA membership on goods and services trade among OECD countries. The regression analysis accounted for the total number of GPA parties, as well as the thresholds set by the parties. The study observed that, overall, GPA membership was positively and significantly associated goods trade, and services trade through cross-border supply; moreover, the magnitude of impact is larger for service trade. For services trade by foreign affiliate sales, GPA membership did not generate significant estimates.[7] The findings also suggest potential trade diversion effects of GPA membership of non-OECD countries, especially on intra-OECD goods trade. In terms of services trade, the number of parties was not significantly associated with cross-border imports and foreign affiliate services trade, but had positive and significant relationship with cross-border services exports. Meanwhile, the growth of government procurement contracts above threshold is positively and significantly associated with cross-border services trade, as well as foreign affiliate services exports.

Although the country has become an observer in the GPA, it is still uncertain whether this will result in an eventual accession to the agreement. In evaluating the country's likelihood to accede to the GPA, Molino (2019) observed that the Republic Act 9184 (also known as the Government Procurement Reform Act), as well as its implementing rules and regulations, is mostly aligned with the GPA provisions. While the study noted of various factors that could further encourage the Philippines to accede to the GPA (e.g., access to other parties' covered procurement, governance-related technical assistance from WTO Secretariat, enhanced competition in government procurement, FDI facilitation), it also posited potential barriers that could hinder its accession. For instance, the country could alternatively gain access to foreign procurement markets through establishing FTAs; two of the country's FTAs—the Philippines-Japan Economic Partnership Agreement (PJEPA) and the Philippines-EFTA Agreement—contain government procurement provisions. The country has also prioritized the protection of its local industries from foreign competitors, as evidenced by policies on domestic preference in public procurement. This could disincentivize the country from becoming a party to the GPA.

[5] CPC stands for Central Product Classification.
[6] While the GPA 2012 came into force on the said date, parties were still allowed time to complete their respective ratification procedures. The last party to complete its ratification was Switzerland, where the GPA 2012 entered into force on 1 January 2021. The GPA 2012 also completely replaced the GPA 1994 on that day.
[7] Cross-border services trade corresponds with modes 1 (cross-border) and 2 (consumption abroad) of services trade supply, foreign affiliate sales correspond with mode 3 (commercial presence).

2.3 Local loop unbundling

Local loop unbundling (LLU) obliges the incumbent operator to provide other firms access to the local loop—circuit wiring that links the telecommunications network with the customer premise, enabling a firm to provide broadband and other advanced services (Mirandilla-Santos 2016). The importance of this regulatory policy in digital trade primarily lies on promoting competition and infrastructure development in the telecommunications sector. Since most services trade are provided through the use of internet, the telecommunications sector has an integral aspect of the digital economy (Ferracane 2021).

The LLU policy is intended to encourage competition, especially in areas where the incumbent operator enjoys a large market share, as new entrants are given a better chance to compete. Unbundling addresses the high infrastructure costs faced by new entrants, and enables these firms reallocate their resources to complementary investments, thereby enhancing their competitiveness. This would then result in lower prices of telecommunications services (Klein and Wendel 2014). However, Laffont and Tirole (2000) noted that, while it could encourage competition in the short run, unbundling could lower the incentives of incumbents to invest.

Many empirical studies on local loop unbundling evaluated its impact on broadband penetration. Kongaut and Bohlin (2012) observed that literature in the early 2000s suggests that the LLU policy has a positive impact on broadband penetration. Succeeding research, however, posited the trade-off between competition and investments; moreover, inter-platform competition has emerged to be a more crucial issue in enhancing internet access. The findings of the study suggest that the LLU policy is a significant determinant of broadband penetration, especially when there is only one dominant platform; however, when many technologies are available, unbundling becomes less significant. The study asserted that when policy focuses on infrastructure competition, the competition-enhancing effects of the LLU policy becomes unnecessary, as competition between different technologies and platforms is already adequate.

While there is a possibility of the unbundling policy becoming non-significant in improving internet access and promoting competition, it could still contribute to improving internet quality, which is also beneficial for efficiently facilitating digital trade. According to the study of Nardotto (2016), the implementation of local loop unbundling in the United Kingdom (UK) did not sustainably increase broadband penetration; while LLU initially had a positive impact on penetration, the effect exhibited a decreasing trend over time. The study also found out, however, that the LLU policy was associated with improvements in service quality, as measured by average broadband speed. Moreover, the incumbent operator—British Telecom—did not increase its connection speed in areas with LLU policy; instead, it standardized the quality of its services across the country.

2.4 Data retention requirements

Digital trade facilitation is highly dependent on data. As such, policies on data flows can be legitimate and necessary to protect individual privacy and ensure national security (Ferracane 2021). A country implements data retention requirements to regulate how long a company should store certain data, and make it available upon the request by the authorities (UNESCAP 2021). These measures are usually formulated to help investigations on issues such as tax payments, or to reinforce the government's law enforcement efforts. However, data retention requirements could potentially harm digital trade, as they can lead to issues associated with business cost, data privacy, and cybersecurity. These requirements could increase compliance

burdens for firms. These additional costs could be especially challenging for micro, small, and medium enterprises (MSMEs), which often lack sufficient resources to consistently comply with these measures. In terms of data privacy issues, requiring companies to store personal data even after it becomes unnecessary could undercut data privacy. Moreover, data retention requirements could also pose problems for cybersecurity, as storing data for a long period of time increases the risk of data leaks, as well as abuses and misuses of data (UNESCAP 2021).

Ferracane (2021) observed that the Philippines enforces data retention requirements on online services and telecom providers. Republic Act No. 10175, also known as the Cybercrime Prevention Act of 2012, mandates that traffic data and subscriber information be retained for a minimum period of six months from the date of transaction. Meanwhile, in accordance with the National Telecommunications Commission (NTC) Memorandum Circular No. 04-06-2007, telecommunications entities are required to retain call traffic data within the following periods: two months for non-metered services with fixed monthly charges; four months for other telecommunications services; or until excused by NTC for records requested in connection with pending complaints.

While empirical literature on the impacts of data retention requirements has been scarce, studies assessing the relationship between various data policies and trade have emerged in the last few years. van der Marel and Ferracane (2021) assessed whether data policy restrictions inhibit services trade. The study used the Digital Trade Restrictiveness Index (DTRI) to measure data policy restrictions. It also used sub-indices covering cross-border data flows and domestic use of data, the latter covering data retention requirements. The findings of the study indicate that restrictive data policies are negatively associated with imports of data-intensive services across countries over time. The sub-index on cross-border data flows had also a negative and significant association. On the other hand, the domestic use index was either weakly significant or non-significant. However, it was also observed that the trade-inhibiting effects of domestic use policies were significantly less for countries with better digital-enabling environment. This suggests that fostering a strong digital ecosystem could dampen the restrictiveness of domestic use policies.

Potluri et al. (2020) examined the effects of data localization policy[8] on digital trade. The study noted that compliance costs can adversely affect the price and quality of services provided by foreign firms. The findings also suggest that data localization restrictions decrease competition, and erect entry barriers for foreign firms. Restricting foreign entry could limit consumers' choice of services, and could result in innovative services being potentially unavailable in the country.

2.5 Copyright Enforcement

Digital trade mainly revolves around sectors that are knowledge-intensive; thus, IPRs such as patents and copyright are crucial in fostering innovation and creativity in digital trade (UNESCAP 2021). Policymaking on IPRs needs to focus on creating a proper balance between IPR protection and promoting the freedom to use and build upon existing intellectual property. Copyright has been important in the digital economy, as digital trade covers copyright-based industries, such as software and data processing industries. Copyright is also applicable to certain forms of creative work that could be included in digital economy, such as music and books (Ferracane et al. 2018).

[8] Data localization requirements in a certain country mandate firms to store a copy of certain data within the country's premises (UNESCAP, 2021).

One of the key issues of the Philippine digital economy is the country's inadequate enforcement of copyright. In the RDTII, the country's enforcement was characterized as most restrictive, as digital piracy is prevalent in the country. A survey conducted by the Business Software Alliance in 2017 noted that 64% of the respondents were using unlicensed software (Pugatch and Torstensson 2020). The country's high digital piracy poses problems to its cybersecurity, since unlicensed software cannot be patched, enabling hackers to gain control of the users' devices (Quimba et al. 2021).

Lionetti and Patuelli (2009) analyzed the effects of piracy on international trade in cultural goods—music, films, and new media.[9] Using the gravity model of trade, the study found that piracy in the importing country had significantly negative association with bilateral trade in music goods. However, piracy among exporting countries had positive and significant relationship with bilateral in films, and piracy among importers was significantly associated with higher bilateral trade in new media. Bilous (2019) revisited this assessment, using more recent trade data and consistent digital piracy indicator. The findings of the study imply that piracy in the importing country is significantly associated with lower levels of cultural goods trade. Piracy among exporters also significantly translates to reduced bilateral trade in audiovisuals and new media; however, it is significantly associated with higher levels of films trade. While Lionetti and Patuelli (2009) remarked that piracy could indirectly promote the legal distribution of films, Bilous (2019) contended that piracy compels domestic film producers to promote their films abroad, rather than in their own countries.

3. Methodology

3.1 Empirical Specification

To investigate the determinants of digital services trade, the gravity model of trade was utilized. The model has been an empirical workhorse in international trade analysis. The basic gravity model by Tinbergen (1962), which is analogous to Newton's law of universal gravitation, presents a direct relationship of economic sizes and the inverse relationship of geographical distance on bilateral trade. Based on the theoretical foundation of Anderson (1979), the model could be augmented to incorporate multilateral trade resistance (MTR) terms (Anderson and Van Wincoop 2003). The MTR terms imply that, after controlling for size, trade between two countries is determined by the bilateral trade barrier between them, relative to the average trade barriers that both countries face with the rest of the world. Thus, it is important for the gravity model to properly account for these factors to avoid generating biased results.

Several studies have advanced the use of fixed effects to account for the MTR terms, as well as other unobservable factors that explain bilateral trade flows (e.g., national institutions, business environment). The use of fixed effects has been instrumental in exploring the effects of various trade policies, such as free trade agreements (FTAs), on bilateral trade. Estimations utilizing fixed effects typically include country-pair, exporter-time, and importer-time fixed effects. The pair fixed effects would absorb unobservable time-invariant bilateral trade barriers (e.g., distance), while the other two fixed effects are expected to absorb time-variant country-specific characteristics and policies (Agnosteva et al. 2014, Baier et al. 2016). Thus, these fixed effects were incorporated in the estimating equation. This study also utilized the Poisson

[9] New media is defined as a digitalized form of creative content, such as cartoons, software, and interactive products like video games (Bilous, 2019).

pseudo maximum likelihood (PPML) method, which estimates the gravity model in multiplicative form. Santos Silva and Tenreyro (2006) argued that the PPML estimator addresses three important issues prevalent in gravity models estimated using log-linear ordinary least squares: logarithmic transformation, heteroskedasticity, and zero trade flows.

This study explores how bilateral exports of digital services are affected by policies and characteristics related to the low-hanging fruits for Philippine digital trade integration (i.e., WTO GPA membership, local loop unbundling, data-retention requirements, and online piracy). For the GPA membership, this study assessed the effects of being party to the GPA, as well as ratifying the GPA 2012. As noted in the literature review, the GPA 2012 has included provisions that could facilitate digitalization. Thus, more than the accession, being able to ratify the Agreement could be a more crucial determinant of digital services trade. On the other hand, the effects of LLU and data retention policies, and online piracy were examined among exporters. Thus, the variables were exporter-specific and time-variant and, unlike the GPA variables, would be absorbed by exporter-time fixed effects due to collinearity. In order to address this, a two-stage estimation method was employed, based on the recommendation of Head and Mayer (2014). This method has been utilized in a number of studies (see, for example, Freeman et al. 2021). Aside from allowing for the estimation of country-specific variables, the two-stage method also addresses potential biases in the standard errors that are present in other one-step alternatives. Moreover, it enables for the estimation of the full effects of the country-specific policies, which consist of the discriminatory and uniform effects (to be further explained in the succeeding paragraphs).

In the first stage, the gravity model with three-way fixed effects was estimated. The first-stage model is expressed by the following equation:

$$X_{ij,t} = \exp\left[\beta_1 FTA_{ij,t} + \beta_2 \boldsymbol{GPA}_{ij,t} + (\boldsymbol{Z}_{i,t} \times BRDR_{ij})'\boldsymbol{\beta_3} + \delta_{i,t} + \pi_{j,t} + \gamma_{ij}\right] \times \varepsilon_{ij,t} \quad (1)$$

where $X_{ij,t}$ are the exports of digitally-deliverable services from country *i* to country *j* at time *t*, $FTA_{ij,t}$ is a dummy variable equal to one when countries *i* and *j* have a FTA at time *t*; $\boldsymbol{GPA}_{ij,t}$ is the vector of GPA 1994 and 2012 variables—equal to one if countries *i* and *j* are parties to GPA 1994 (2012) at time *t*; $\boldsymbol{Z}_{i,t}$ is the vector of the other variables of interest for country *i* (or *j*); and $BRDR_{ij}$ is a dummy variable for international trade flow (i.e. $i \neq j$). The first-stage model accounts for the presence of bilateral trade policies (i.e. FTAs). Moreover, the discriminatory effects are estimated in this stage by including the interaction terms $\boldsymbol{Z}_{i,t} \times BRDR_{ij}$. These effects signify the impact of the country-specific policies on international trade relative to domestic sales (Freeman et al. 2021).

In the second stage, the estimated exporter-time fixed effects from the first stage were regressed on country-specific covariates, including $\boldsymbol{Z}_{it}$ and economic size.[10] The gravity model has established the significance of economic size as a determinant of bilateral trade flows; thus, it must be controlled for in the model. Exporter and year fixed effects were also included to control for unobserved exporter characteristics and time trends. While the second stage in Head and Mayer (2014) entailed estimating a log-linear model using OLS, Freeman et al. (2021) argued that using PPML is preferable for consistency. Thus, this study utilized the PPML estimator on the following equation:

$$\exp(\widehat{\delta_{i,t}}) = \exp\left[\alpha_1 lnY_{i,t} + \boldsymbol{\alpha_2 Z}_{i,t} + \varphi_i + \sigma_t\right] \times u_{i,t} \quad (2)$$

[10] Utilizing the estimated fixed effects is possible owing to the additive property of the PPML estimator. This signifies that the fixed effects are not influenced by the error term, and are identical to their corresponding structural gravity terms (Fally 2015).

where $\widehat{\delta_{i,t}}$ is the estimated exporter-time fixed effect, and $Y_{i,t}$ is the gross domestic product (GDP) of country *i* at time *t*. The estimates of $\boldsymbol{Z}_{it}$ in this stage capture the uniform effects—impact on trade regardless of destination—of the country-specific policies.

In conducting this two-stage procedure, various points need to be acknowledged. First, incorporating interaction terms to estimate the discriminatory effects requires data on internal trade flows (i.e. $i = j$). Including internal trade data is also essential in ensuring that the estimation is consistent with gravity theory (Yotov et al. 2016). Second, the standard errors in the first-stage estimation were clustered by country-pair, in order to account for correlations among country-pairs. Yotov et al. (2016) noted that clustering the errors over country-pairs would capture correlation patterns that are not covered by the explanatory variables and fixed effects. Third, the second-stage estimation was conducted at the exporter-time level; thus, the original data set was collapsed by removing the duplicate observations for each exporter-year. The standard errors were subsequently clustered by exporter. Lastly, this study used panel data with time intervals. Using yearly data has been criticized for not allowing time for trade flows to adjust to changes in trade costs (Cheng and Wall 2005). To utilize as much data as possible, the panel data for this study had two-year intervals.

Box 1. Estimating the gravity model using the Poisson-pseudo maximum likelihood estimator

The gravity model of trade has generally been estimated in log-linearized form, using the ordinary least-squares (OLS) estimator. However, since the gravity model is inherently in multiplicative form, utilizing the log-linear method entails a number of econometric issues, mainly due to the presence of heteroskedasticity and zero bilateral trade flows. Santos Silva and Tenreyro (2006) argued that the Jensen's inequality, which implies that $E(\ln X) \neq \ln E(X)$, is not taken into account in log-linearized gravity models. Thus, this method yields biased and inconsistent estimates, even when incorporating fixed effects, as elasticities can be greatly misleading in the presence of heteroskedasticity.

Estimating log-linear gravity models also runs into the problem of zero trade flows. Trade data, especially at a more disaggregated level, contains a substantial number of observations with zero trade flows. This is particularly evident in sectoral services trade, due to highly localized consumption and highly specialized production (Yotov et al. 2016). With the log-linear OLS method, zero-trade observations are automatically dropped after the logarithmic transformation of the trade value. It then fails to take into account any potential information contained in the zero trade flows.

Recognizing these issues, Santos Silva and Tenreyro (2006) advocated the use of Poisson pseudo-maximum likelihood (PPML) method for gravity model estimation. The PPML estimator identifies the coefficients using the same first-order conditions that are used by the maximum-likelihood estimator derived from the Poisson distribution (Fally 2015). While it is often used for count data, PPML does not require the dependent variable to be Poisson distributed and solely contain integers. The PPML method has been observed to be robust to different patterns of heteroskedasticity, and performs well even in when the trade data has large shares of zeros (Santos Silva and Tenreyro 2006, 2011).

3.2 Data Sources

This study utilized data from various sources. A panel data set of bilateral services trade flows was sourced from the International Trade and Production Database for Estimation (ITPD-E). Developed by Borchert et al. (2020), the ITPD-E contains data at the country-pair level, both on international and domestic trade, from 2000 to 2016. It also covers 243 countries and 170 industries (17 in services). Since the coverage of digital services trade has not yet been established, this study only utilized trade on digitally-deliverable services. It followed the OECD, WTO, IMF (2019) report in order to identify the digitally-deliverable services sectors. Table 3 shows the identified digitally-deliverable services sectors, and their corresponding sectors in the ITPD-E.

Table 3. Digitally-deliverable services

Code	Service Description	Corresponding ITPD-E Sector
SF	Insurance and pension services	Insurance and pension services
SG	Financial services	Financial services
SH	Charges for the use of intellectual property	Charges for the use of intellectual property n.i.e.
SI1	Telecommunication services	Telecommunications, computer, and information services
SI2	Computer services	
SI3	Information services	
SK1	Audiovisual and related services	
SJ1	Research and development services	Other business services; trade-related services
SJ2	Professional and management consulting services	
SJ3	Technical, trade-related, and other business services	
SK2	Other personal, cultural, and recreational services	Heritage and recreational services; health services; education services; other personal services

Source: Based on OECD, WTO, IMF (2019) and Borchert et al. (2020)

As discussed in the literature review section, this study assesses the impacts of the WTO GPA membership, local loop unbundling, data retention requirements, and digital piracy on bilateral trade flows of digital services. This study utilized various sources in order to gather the needed data for these variables. The accession dates of the parties, which can be obtained from the WTO website, serve as the basis of the GPA membership variable. Information on the local loop unbundling is sourced from the ICT Regulatory Tracker of the International Telecommunication Union. The said database covers more than 190 economies for the period 2007-2020. For data retention regulations, the Digital Trade Restrictiveness Index (DTRI) would be utilized. The DTRI database provides information on the specific regulations, including data retention policies, of 64 countries which potentially restrict their digital trade participation. Meanwhile, digital piracy would be proxied by statistics on unlicensed software installation from the Business Software Alliance (BSA) surveys. The surveys provide installation rates of more than 100 countries for the 2003-2017 period; however, data are not available for 2012, 2014, and 2016. Meanwhile, the trade data was also matched with country-pair FTA data, developed by Hofmann et al. (2017); the dataset consists of 279 FTAs signed between 1958 and 2015. Due to differences in coverage, the combined panel data set consists of 63 countries and years 2007, 2009, 2011, 2013, and 2015. Tables A1 and A2 in the Appendix section shows the list of countries covered, as well as the definitions of the variables used in the study.

4. Results and Discussion

Table 4 shows the differences in means of bilateral digital services exports, based on the GPA, local loop unbundling, and data retention variables. When accounting for both international and internal trade flows, it can be observed that bilateral exports are higher when countries are WTO GPA members and implement local loop unbundling. The significance of the differences, however, decreased in magnitude and significance across the years—by 2013, the differences were already non-significant. In terms of data retention policy, the differences in means between implementing and non-implementing countries were not significant for all years. Meanwhile, accounting for only international trade flows reveals statistically significant differences for all variables. Though they were significant, the differences in means were noticeably smaller when considering only international trade flows of digital service. This suggests that the bulk of digital services trade take place domestically.

Table 4. Differences in means of bilateral exports, by characteristic

	All trade			International only		
	With (1)	Without (2)	Diff. (3)	With (4)	Without (5)	Diff. (6)
WTO GPA (1994)						
2007				741.73	111.16	630.57***
2009				811.79	138.04	673.75***
2011				926.91	190.45	736.46***
2013				939.82	221.61	718.21***
2015				1020.29	314.35	594.06***
WTO GPA (2012)						
2015				767.40	621.60	145.80
LLU						
2007	13,075.49	1,524.60	11,550.89**	461.25	107.55	353.71***
2009	13,215.17	1,486.18	11,728.99**	512.25	139.97	372.28***
2011	14,919.25	4,458.58	10,460.67*	598.01	196.32	401.69***
2013	15,016.81	5,319.66	9,697.14	642.42	220.75	421.67***
2015	13,974.72	4,771.60	9,203.11	731.28	389.00	342.28***
Data Retention						
2007	14,387.71	6,482.48	7,905.23	551.23	176.90	374.34***
2009	14,194.35	7,106.15	7,088.20	621.03	187.74	433.29***
2011	15,336.65	10,243.53	5,093.12	716.28	246.32	469.96***
2013	14,239.57	12,217.17	2,022.40	691.46	324.83	366.63***
2015	13,603.55	9,796.91	3,806.63	762.12	411.60	350.52***

Note: This table reports the differences in means of bilateral exports of digitally-deliverable services, according to selected characteristics among exporters. Figures are in million US dollars. *p < 0.10, **p < 0.05, ***p < 0.01.

Since online piracy is a continuous variable, the preliminary analysis on its relationship with digital services trade involved looking at the correlation between the two variables. Based on the figures in Table 5, online piracy rate of exporters was negatively correlated with bilateral exports of digitally-deliverable services. In terms of international trade, online piracy and digital services trade exhibited larger correlation values for all years.

Table 5. Correlation of bilateral digital services exports and online piracy rate

	Correlation with bilateral trade of digitally-deliverable services	
	All trade (1)	International only (2)
Online Piracy		
2007	-0.044	-0.188
2009	-0.044	-0.186
2011	-0.042	-0.184
2013	-0.041	-0.184
2015	-0.037	-0.182

Source: Authors' calculations.

As a preliminary analysis of the impacts of country-specific variables on digital services trade, a naïve one-stage gravity model was estimated. Similar to the method of Freeman et al. (2021), the exporter-time fixed effects were dropped to allow a single-stage estimation of the effects of the exporter-specific variables (i.e., local loop unbundling, data retention policies, online piracy).[11] They were subsequently replaced by exporter and year fixed effects. A variable for the gross domestic product (GDP) was also included to control for exporter size. While this specification does not properly account for multilateral resistance, resulting in biased estimates (Baldwin and Taglioni 2006), it could still provide alternative insights on the potential impacts of country-specific policies.

Results from the naïve gravity estimation are reported in Table 6. The FTA dummy and exporter GDP were positively associated with higher bilateral digital services trade. The estimates of the FTA dummy were statistically significant, except for specifications that include online piracy. On the other hand, GDP is significant in all specifications, at the 99% level. Columns 1 to 3 show the results of the separate regressions for each characteristic. The results show both the general effects and the differential effects on international trade flows. It is interesting to note that, for all characteristics, the interaction term had the opposite sign as the main variable. The LLU and data retention variables exhibited similar findings—the main variable was significantly associated with a decrease in digital services trade. However, the positive estimates of the interaction terms were significant and higher in magnitude, suggesting greater trade creation effect among countries. In terms of online piracy, the main effect is positive and statistically significant; for international trade flows, this was offset by the significantly negative differential effect.

Column 4 shows the regression results that only accounted for the general effects of the variables of interest. The GPA variables were also included in the model. The two GPA variables had significant estimates; while the GPA 1994 was negatively associated with digital services trade, ratifying GPA 2012 was associated with increases in trade flows. The estimate of the LLU was also significant, albeit still negative. Finally, column 5 shows the results for the specification with all the variables of interest and interaction terms. Comparing the estimates of the general effects with those in column 4 highlights the importance of including the interaction terms, since internal trade flows were also included in the data. Only the GPA accession and online piracy variables had statistically significant estimates. As in the other specifications, acceding to the GPA was associated with decreases in digital services trade.

[11] A naïve gravity model with GPA as the sole variable of interest was not included, since it doesn't require a two-stage estimation, even in the presence of all fixed effects.

With regard to online piracy, the general effect was found to be positive, but the discriminatory effect was negative and greater in magnitude. This offsets the positive general effect, making the overall effect negative—consistent with the expected trade effects of online piracy.

Table 6. Naïve gravity estimation results

	(1)	(2)	(3)	(4)	(5)
$FTA_{ij,t}$	0.373***	0.368***	0.141	0.377***	0.161
	(0.116)	(0.115)	(0.113)	(0.121)	(0.114)
$GDP_{ij,t}$	1.305***	1.273***	0.784***	1.154***	0.801***
	(0.231)	(0.235)	(0.189)	(0.222)	(0.187)
$GPA1994_{ij,t}$				-0.152***	-0.207***
				(0.046)	(0.056)
$GPA2012_{ij,t}$				0.243***	0.058
				(0.040)	(0.043)
$LLU_{i,t}$	-0.440**			-0.273**	-0.082
	(0.173)			(0.116)	(0.177)
$LLU_{i,t}\times BRDR_{ij}$	0.691**				0.116
	(0.274)				(0.296)
$DataRet_{i,t}$		-0.357***		-0.014	-0.086
		(0.072)		(0.057)	(0.078)
$DataRet_{i,t}\times BRDR_{ij}$		0.483***			0.052
		(0.090)			(0.099)
$Piracy_{i,t}$			3.170***	-1.045	2.754***
			(0.697)	(0.740)	(0.750)
$Piracy_{i,t}\times BRDR_{ij}$			-7.482***		-6.904***
			(0.666)		(0.706)
Observations	13,739	13,739	13,739	13,739	13,739

Note: This table reports the estimated coefficients of FTAs, as well as exporter-specific variables, on bilateral exports of digitally-deliverable services, using the naïve gravity model. Standard errors are clustered by country-pair, and in parentheses. *p < 0.10, **p < 0.05, ***p < 0.01.

The results of the two-stage estimation are presented in Table 7. Panel A reports the results of the first-stage estimation. As mentioned in the previous section, it incorporates the differential effects of the country-specific characteristics on international digital services trade. The bilateral FTA estimates were similar to the naïve gravity results in terms of magnitude and significance. When online piracy was not accounted, the estimates were larger and significant at the 99% level. In terms of the GPA variables, both accession and ratification variables were generally significant determinants of digital services trade. The GPA accession variable exhibited negative effects in all specifications, while the GPA 2012 ratification translated to increases in bilateral digital services trade. For models that did not control for the other variables of interest (columns 1-3), the positive effect of the GPA ratification was greater than the negative effect of the accession variable. However, in the full specification (column 7), the GPA accession estimate was greater than the ratification estimate.

Table 7. Two-stage estimation results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. First Stage							
$FTA_{ij,t}$	0.321***	0.322***	0.323***	0.321***	0.318***	0.118	0.152*
	(0.071)	(0.072)	(0.072)	(0.071)	(0.070)	(0.086)	(0.084)
$GPA1994_{ij,t}$	-0.003		-0.127**				-0.350***
	(0.056)		(0.056)				(0.118)
$GPA2012_{ij,t}$		0.266***	0.267***				0.104***
		(0.031)	(0.031)				(0.036)
$LLU_{i,t}$×$BRDR_{ij}$				0.669***			-0.279
				(0.258)			(0.375)
$DataRet_{i,t}$×$BRDR_{ij}$					0.783***		0.494*
					(0.180)		(0.277)
$Piracy_{i,t}$×$BRDR_{ij}$						-7.115***	-5.940***
						(0.601)	(0.641)
Observations	13,735	13,735	13,735	13,735	13,735	13,735	13,735
B. Second Stage PPML							
$ln(Y_{i,t})$				1.017***	0.971***	0.782***	0.682***
				(0.289)	(0.287)	(0.195)	(0.192)
$LLU_{i,t}$				-0.356***			-0.0004
				(0.071)			(0.098)
$DataRet_{i,t}$					-0.308***		-0.141**
					(0.077)		(0.069)
$Piracy_{i,t}$						2.188**	1.844**
						(0.988)	(0.909)
Observations				309	309	309	309
C. Total Effects							
$LLU_{i,t}$				0.313			-0.279
$DataRet_{i,t}$					0.475		0.353
$Piracy_{i,t}$						-4.927	-4.096

Note: This table reports the estimates of the two-stage gravity model estimation. Panel A shows the results of the first-stage estimation. Panels B and C report the results of the second stage regression of the exporter-time fixed effect estimates on exporter-specific variables. Standard errors are clustered by exporter, and in parentheses. *p < 0.10, **p < 0.05, ***p < 0.01.

Compared to the naïve gravity results, the first-stage estimates reveal notable differences on the discriminatory effects of the exporter-specific variables. This is more evident in the first-stage full specification. For instance, the discriminatory effect of local loop unbundling was negative when controlling for all variables of interest; in contrast, the estimate in the full naïve

gravity model was positive and smaller in magnitude. With regard to data retention policy, the first-stage estimate was much larger than the full naïve estimate, with a moderate level of significance. These differences confirm the need to properly control for the fixed effects.

Panel B shows the results of the second-stage PPML regressions. As mentioned in the previous section, the second stage allows for the estimation of the general and, subsequently, full effects of country-specific characteristics. The results show that exporter GDP had significant and positive estimates, which is consistent with the gravity theory (i.e., economic size being a determinant of greater bilateral trade flows). All variables of interest exhibited statistically significant estimates at the individual specifications. The signs were also similar to the estimates in the individual naïve regressions; the only notable difference was the magnitude of online piracy being smaller in the second-stage estimation.

In the full model, the LLU estimate was statistically non-significant. Meanwhile, the general effects of the data retention policy and online piracy maintained their respective signs; however, their respective magnitudes decreased. Aside from the aforementioned findings, it is important to note that, for all exporter-specific characteristics, the discriminatory and uniform effects possess opposite signs, with the former exhibiting higher magnitudes of association. This suggests that the cross-border effects of the low-hanging fruits on digital services trade are more vital in promoting digital services trade.

For the purpose of comparison, a log-linear version of the second-stage model was also estimated using OLS. The findings from the OLS estimation presented in Appendix 4 that the exporter GDP estimates remained significant. In terms of the variables of interest, the signs of the estimates remained the same. However, the magnitude of the estimates, particularly for LLU and data retention policies, were noticeably different from those in the PPML results. Moreover, the general effects of all variables of interest became non-significant across all specifications. Thus, consistency in estimation methods could be important in properly executing the two-stage estimation procedure, as posited by Freeman et al. (2021).

Based on the presented results, this study acknowledges the importance of the Philippines' low-hanging fruits for digital services trade facilitation. However, the results also suggest a number of notable implications on the impacts of these factors, especially in relation to the Philippines' pursuit for digital integration. Acceding to the GPA was negatively associated with digital services trade. Aside from a number of potential factors noted by Chen and Whalley (2011) (e.g., differences in commitments, total number of parties), the GPA 1994 did not explicitly account for digital activities, as digitalization was not yet an integral feature of the world economy during the conception of the first GPA framework. Meanwhile, as noted by Anderson and Müller (2017), promotion and facilitation of e-commerce has recently been an important policy area in the WTO and, subsequently, the modernization of the GPA framework. Thus, the effects of the GPA 2012 ratification might have a more critical implication on the Philippines' decision to accede to the GPA. With the GPA 2012 replacing the previous framework in 2021, acceding to the GPA would automatically provide the country better market access in digital services.

The heterogeneous effects of data retention policy reiterate the importance of balancing between data utilization and national security and privacy protection (Ferracane, 2021). As digital economy is heavily reliant on data, efficient data utilization could be necessary for the Philippines to strengthen its position in digital trade. Firms could use the data to evaluate their current performance and make the necessary measures to address important operation issues.

Moreover, they could gain valuable information on their current and prospective target markets, which would enable them to specialize on these market segments. However, as noted in Section 2, requiring long periods of data retention increase the risk of data leaks, and data abuse and misuse. Moreover, storing data longer than what is necessary could result in significant unnecessary costs on firms (Ferracane, 2021). Thus, an important implication for the Philippines would be ensuring its data retention policies would be able to strengthen its digital services trade, without giving too much burden on businesses and exposing the country to cybersecurity issues.

The positive estimates in the online piracy variable can be explained by its potential to indirectly promote digital products. While it is expected that internet piracy would be detrimental to digital trade facilitation, studies such as Peukert et al. (2017) and Lu et al. (2020) suggest that piracy can actually generate positive effects on sales of digital products, most notably films. Specifically, piracy can act as a mechanism to increase market awareness, mainly through word of mouth. However, it is still not recommended to tolerate online piracy. As shown by the estimates, the overall effect of piracy is still negative, and is more significant in international digital trade. This suggests that having a high level of online piracy could greatly decrease a country's attractiveness as a prospective trading partner. Moreover, the positive effects of piracy could be misleading for policymakers. The reviews of Smith and Danaher (2020) and Danaher et al. (2020) argued that overall, piracy still reduces legal sales, and could disincentivize creators and producers from investing in high-quality projects. In addition, the current body of literature, as noted by the aforementioned studies, established that anti-piracy policies still reduce illegal consumption, the positive effects of piracy are highly conditional, and, ultimately, piracy is not the only mechanism to increase word of mouth and market awareness. Thus, effective copyright enforcement and creator and consumer protection must still be a priority.

5. Conclusion and Recommendations

With digitalization slowly taking center stage in international trade and production, it is important to evaluate if policies facilitate or impede digital trade. As a country with an emerging digital economy, the Philippines needs to determine its next steps to be fully prepared for regional digital trade integration. This paper attempted to contribute to this discussion, by building on the recommendations given by Ferracane (2021) and Quimba et al. (2021). In particular, it examined the effects of the following low-hanging fruits identified by the two studies: acceding to the WTO Agreement on Government Procurement, implementing local loop unbundling, lifting data retention requirements, and enforcing stricter measures on copyright protection.

This paper employed a two-stage gravity model estimation, drawing inspiration from the methodologies of Head and Mayer (2014) and Freeman et al. (2021). Utilizing both international and domestic trade flows, results show that various policies and characteristics are significant determinants of bilateral trade in digital services. Acceding to the GPA 1994 was negatively associated with digital services trade, while ratifying the revised GPA exhibited positive effects. In terms of the exporter-specific characteristics (i.e., local loop unbundling, data retention policy, online piracy), the two-stage estimation showed that these characteristics exhibit differing effects. Overall, data retention is more associated with greater digital services trade. On the other hand, online piracy, which served as a proxy for copyright enforcement,

was perceived to be detrimental to bilateral trade in digital services. Given the discussed findings, this study provides the following recommendations:

WTO GPA Membership. With the Philippines becoming an observer and the GPA 2012 replacing the GPA 1994, it could be an ideal time for the Philippines to accede to the GPA. Many of the GPA parties do not have a trade agreement with the Philippines, which could make the GPA accession complementary to the existing FTAs of the country. Thus, it is important to assess the issues discouraging the country from joining the Agreement, most especially the protection of domestic industries. Since the Agreement does not compel parties to cover all industries, the Philippines could identify which sectors can be fully covered by the GPA provisions, and those that need greater protection from foreign competition.

Data Retention. Ferracane (2021) recommended the revision of existing policies on data retention (i.e., Cybercrime Prevention Act of 2012 and NTC Memorandum Circular No. 04-06-2007). Based on the findings of this paper, it is advisable for the government to modify the conditions of the policies, rather than lifting them altogether. For instance, the government might consider shortening the required period of data retention or changing the retention condition from minimum to maximum. In this way, firms would not be burdened by the unnecessary storage of data.

Copyright enforcement. While studies have noted of online piracy indirectly promoting digital products, the prevalence of illegal online activities still decreases the sales of legal content. This could be discouraging for creators in the creatives industry to invest in making quality products, thereby hampering the industry's growth in the long run. Moreover, a high level of piracy has serious implications on the country's cybersecurity. Thus, stronger copyright enforcement is important for consumers to perceive that patronizing pirated content is risky and inconvenient. This could be complemented by programs that provide additional legal means for creators to promote their projects.

Finally, the results of this paper provide inputs to the Philippine strategy particularly with mega-deals such as the Comprehensive and Progressive Trans-Pacific Partnership (CPTPP) and the Indo-Pacific Economic Framework. The CPTPP has chapters on cross-border trade in services, telecommunications, government procurement[12] and intellectual property. Meanwhile, the IPEF has specific sections on standards for data flows (covering local loop unbundling and data retention) and copyright enforcement. As this study only scratches the surface in terms of the economic impact of these principles in these agreements, future research should investigate the details of these agreements to analyze the impact to Philippine digital services exports.

[12] Clarete and Pascua (2018) identified net benefits of adopting the principles on Government Procurement in the (now-defunct) TPP for the Philippines. These would include deterring graft and corruption, enhancing efficiency and competition, access to other markets of GPA-participating countries, enhancing FDI inflows. Transfer of technology to domestic firms from foreign bidders is also a possible impact of the accession.

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Appendix 1. Countries included in the sample

ISO-3 Code	Country name
ARG	Argentina
AUS	Australia
AUT	Austria
BEL	Belgium
BRA	Brazil
BRN	Brunei
BGR	Bulgaria
CAN	Canada
CHL	Chile
CHN	China
COL	Colombia
CRI	Costa Rica
HRV	Croatia
CYP	Cyprus
CZE	Czech Republic
DNK	Denmark
ECU	Ecuador
EST	Estonia
FIN	Finland
FRA	France
DEU	Germany
GRC	Greece
HKG	Hong Kong
HUN	Hungary
ISL	Iceland
IND	India
IDN	Indonesia
IRL	Ireland
ISR	Israel
ITA	Italy
JPN	Japan
KOR	Korea, South
LVA	Latvia
LTU	Lithuania
LUX	Luxembourg
MYS	Malaysia
MLT	Malta
MEX	Mexico
NLD	Netherlands
NZL	New Zealand
NGA	Nigeria
NOR	Norway
PAK	Pakistan
PAN	Panama
PRY	Paraguay
PER	Peru
PHL	Philippines
POL	Poland
PRT	Portugal
ROU	Romania
RUS	Russia
SGP	Singapore
SVK	Slovakia
SVN	Slovenia
ZAF	South Africa
ESP	Spain
SWE	Sweden
CHE	Switzerland
THA	Thailand
TUR	Turkey
GBR	United Kingdom
USA	United States
VNM	Vietnam

Appendix 2. Variable operationalization

Variable	Definition
$X_{ij,t}$	exports of digitally-delivered services by country *i* to country *j* in year *t* (in million US$, current prices)
$GPA1994_{ij,t}$	WTO GPA membership dummy—1 if countries *i* and *j* are parties to the WTO GPA in year *t*; 0 otherwise
$GPA2012_{ij,t}$	WTO GPA ratification dummy—1 if countries *i* and *j* are GPA parties and have ratified the GPA 2012 in year *t*; 0 otherwise
$LLU_{i,t}$	LLU dummy—1 if unbundled access to the local loop is required in country *i* in year *t*; 0 otherwise
$DataRet_{i,t}$	data retention requirement dummy—1 if country *i* implements measures related to data retention in year *t*; 0 otherwise
$Piracy_{i,t}$	online piracy rate proxy—percentage share of unlicensed software in total software installation in country *i* in year *t*
$FTA_{ij,t}$	FTA common membership dummy (1 if countries *i* and *j* have a common free trade agreement in year *t*; 0 otherwise)
$lnY_{i,t}$	natural logarithm of the Gross Domestic Product of country *i* in year *t*

Appendix 3. Summary statistics

Variable	Number of observations	Mean	SD	Min	Max
$X_{ij,t}$	14,031	12,572	262,286	0	14,474,230
$FTA_{ij,t}$	14,031	0.485	0.500	0	1
$Y_{i,t}$	14,031	1,139,782	2,688,962	7,865	18,238,301
$GPA1994_{ij,t}$	14,031	0.484	0.500	0	1
$GPA2012_{ij,t}$	14,031	0.089	0.284	0	1
$LLU_{i,t}$	14031	0.861	0.346	0	1
$DataRet_{i,t}$	14,031	0.674	0.469	0	1
$Piracy_{i,t}$	14,031	0.439	0.181	0.170	0.860

Appendix 4. Second-stage estimation results, OLS with fixed effects

	(4)	(5)	(6)	(7)
$ln(Y_{i,t})$	1.474***	1.087***	0.945**	0.620*
	(0.490)	(0.373)	(0.455)	(0.361)
$LLU_{i,t}$	-0.082			0.236
	(0.221)			(0.437)
$DataRet_{i,t}$		-0.134		0.053
		(0.269)		(0.332)
$Piracy_{i,t}$			1.750	0.697
			(2.036)	(1.926)
Observations	309	309	309	309
Total Effects				
$LLU_{i,t}$	0.587			-0.043
$DataRet_{i,t}$		0.649		0.547
$Piracy_{i,t}$			-5.365	-5.243

Note: This table reports the of second stage regression of the exporter-time fixed effect estimates on exporter-specific variables, using OLS with fixed effects. Column numbers correspond to Table 7 columns. Standard errors are clustered by exporter, and in parentheses. *p < 0.10, **p < 0.05, ***p < 0.01.