Unpacking the Possible Elements of a Future Digital Trade Agreement on Digitalization and Economic Growth: Insights from Panel Data Analysis[1]

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Unpacking the Possible Elements of a Future Digital Trade Agreement on Digitalization and Economic Growth: Insights from Panel Data Analysis

Abstract

The COVID-19 pandemic has revolutionized the way in which countries are trading goods and services. During the pandemic digitalization has had varying impacts on the economic growth among countries. The availability of the internet has enabled workers, businesses, consumers and governments to become more efficient and effective, while also facilitating enormous growth in the volume and speed of data and information flows. However, despite the global gains from digitalization, there exist major digital divides across countries and regions, which limit the scope economic growth and trade. The impact of technology is not uniform across countries and regions. This paper examines the impact of digitalization on economic growth in a selection of developed and developing countries using panel data modelling. Our findings suggest that a 1 % increase in internet usage leads to 0.06% increase in gross domestic product (GDP). Furthermore, a 1% increase in broadband usage leads to 0.02% increase (GDP). For mobile cellular subscriptions a 1 % increase bolsters GDP by 0.017%. On the basis of the evidence, the paper proposes a series of policy recommendations for trade negotiators on the elements of a future multilateral agreement on digitalization, taking into account exceptional circumstances such as pandemics.

Keywords: Digitalization, Economic Growth, Small Medium Enterprises

1.0 Introduction

The proliferation of digital technologies, including the internet, has significantly changed modes of economic activity. The availability of the internet has enabled consumers, workers, enterprises and governments to interact more efficiently and at a faster pace. The internet also provides a platform for the development of information and communication technologies (ICTs) and enables an emerging digital economy in production, distribution and consumption. These contributions depend on the availability of adequate broadband networks and infrastructure. Internet connectivity is thus a critical enabler for sustainable development (Internet Society, 2015). The internet has permitted the expansion of the digital economy and played a key role in facilitating its impact in bolstering economic growth.

The positive effects of digitalization, on the back of growth in access to and use of the internet, are widespread in particular in the wake of the COVID-19 pandemic. Innovation through digitalization and the commercial application of such technologies has enabled continuous improvement in production processes, inputs and outputs. Digitalization through innovation has shifted from the first generation growth models (FGGMs) whereby technology led to persistent and increasing long-term growth to the Second Generation Models (SGMs). The SGMs comprise semi-endogenous and Schumpeterian growth models. The semi-endogenous model for innovation states that in the long-run growth is highly responsive to policy incentives. As the success of investments in innovation is uncertain, it requires incentives for firms to divert more resources to research and development. In this respect, economists also argue that digitalization and the sequencing of incentives are important. In the early stages of digitalization and innovation, non-competitive arrangements (monopolistic rights) and active government interventions (trade barriers, selective investment, subsidies and direct credit progress) are seen as consistent strategies adopted by countries. However, in the later stages of adoption, these protective measures are unsuitable for innovation and thus limited Government intervention is required (Jimenez, 2019).

There are major differences in the level of digital development within and across countries. On balance, the impact of digitalization on the economic growth of developed economies is higher relative to developing economies. Even so, the gains from digitization in some emerging regions may be higher than in advanced economies. This is a result of the very large populations in certain countries (e.g., China and India), which means, for example, that a marginal decline in the unemployment rate resulting from digitalization can lead to the creation of a large number of new jobs or, alternatively, productivity gains from digitalization can have large-scale impacts. Countries with higher populations feature prominently with technology as a process for knowledge creation through research and development and investment in human capital. As a result, economies with larger populations are endowed with greater capacity for knowledge creation and innovation, which leads to economic growth (Jimenez, 2019).

Discussions on the benefits of digitalization have gained momentum in various international forums. At the World Trade Organization (WTO), the 1998 Geneva Ministerial Declaration on E-Commerce recognized that electronic commerce is growing and creating new opportunities for trade. To date, deliberations on rules in relation to e-commerce remain ongoing among members of the WTO. However, there is recognition among members of the impact of digitalization on the economic development of countries.

These discussions are especially pertinent in the context of developed and developing economies and the impact of digitalization on economic development. There are also current regional agreements that have recognized digitalization as vital for market access, investment, trade facilitation and overall economic development. The recently signed Digital Economic Partnership Agreement (DEPA) between New Zealand, Singapore and Chile is one such example. Among other things, the agreement acknowledges the importance of digital economy in promoting inclusive economic growth.

However, more evidence is required to understand and quantify the nature and magnitude of impacts of digitalization on economic growth for developed and developing economies to support sound policy decisions. A number of studies (discussed in section 2) have demonstrated the impact of digitalization on economic growth. However, specific evidence on the growth effects of the internet is mixed, and the evidence on how its impacts vary across different types of countries remains inconclusive.

Only a small number of existing studies have examined the synergy between digitalization, the internet and economic growth. None of these studies quantify the impact of digitalization on growth empirically. This research contributes to the literature by quantifying the impact of digitalization on the economic growth and trade of selected developed and developing countries; and outlining a possible architecture for a digital trade agreement at the multilateral level.

The remainder of the paper is as structured as follows. Section 2 briefly reviews the literature on the broad impacts of digitalization and economic growth. Section 3 presents an empirical analysis of the impacts of digitalization, trade, unemployment and population on the economic growth of countries. Section 4 provides a brief synopsis of the DEPA and discusses various provisions for a possible future digital trade agreement. Finally, section 5 concludes and provides policy recommendations for developing a future digital trade agreement at the multilateral level.

2.0 Literature Review

There is a large body of cross-country empirical work focused broadly on testing the technology-led growth hypothesis. As the influence of ICT as a driver of digitalization and technological progress has expanded over the past two decades, the focus of the literature has increasingly concentrated on its role in the growth process.

Several multi-country studies have examined the relationship between investment in ICT infrastructure and economic growth. These studies generally find ICT infrastructure contributes positively to growth. Madden and Savage (1998) use a sample of 27 Central and Eastern European countries for the period 1990-1995 and find a positive relationship between investment in telecommunications infrastructure and economic growth. Similarly, Seo et al. (2009) analyze a panel dataset covering 29 countries in the 1990s and find that ICT investment has a positive effect on growth in gross domestic product (GDP). Tseng (2009) finds evidence that ICT use contributes positively to economic growth in six Asian countries (China, India, Hong Kong, Singapore, South Korea and Taiwan).

Some empirical studies have focused on the specific contribution of telecommunications to growth. Empirical results in Grumber and Koutroumpis (2010), based on data for 192 countries

spanning the period from 1990-2007, show that the diffusion of mobile telecommunications impacts significantly on GDP and productivity growth. Kumar et al. (2015) consider the impact of telecommunications on economic growth in terms of its influence on output per worker in Small Pacific Island States. They find that a 1% increase in telecommunications, proxied by the percentage of the population with access to telephone lines, contributes 0.33% in the short-run and 0.43% in the long-run to output per worker.

In a large survey of the literature covering the link between ICT and economic growth, Vu et al. (2020) conclude that the majority of the studies they review report evidence in support of a positive effect of ICT investment on growth, but the evidence of a link is less definitive in the case of ICT penetration. They report further that the magnitude of the contribution of ICT capital in growth accounting papers tends to fall in the range of 0.1 to 1.0 percentage points. Such positive effects of ICT on economic growth are also found in country-specific studies, such as Jalava and Pohjola (2008) for Finland, Kuppusamy et al. (2009) for Malaysia, Kumar and Kumar (2012) for Fiji, Salahuddin and Gow (2016) for South Africa, and Kumar et al. (2016) for China.

A number of studies also confirm the significant positive impact of ICT on productivity (Cardona et al., 2013), which is itself a key driver of growth. These include studies reporting positive productivity effects at the firm level, such as Stiroh (2002) in major industries in the United States, Brynjolfsson and Hitt (2003), and O'Mahony and Vechhi (2005) for the United States and the United Kingdom.

There is, however, evidence of variation in the effects of ICT on growth across countries and regions. Yousefi (2011), for instance, using a sample of 62 countries for the period from 2000-2006 finds variation in the impact of ICT on economic growth according to country income levels, with evidence that ICT contributes more to growth in high- and upper-middle-income countries. Examining the link between mobile telecommunication and growth, Gruber et al. (2011) find that the contribution of mobile telecommunication is significantly smaller in countries with low mobile penetration rates compared to economies with high levels of mobile penetration. Moreover, not all studies find positive links from ICT investment to economic growth (see, for example, Pohjola, 2002).

In relation to the role of the internet and economic growth, one of the main theoretical links between the internet and economic growth has its roots in Romer's (1990) endogenous growth theory, which posits that knowledge spillovers positively influence growth. In this context, the internet is generally a good candidate to serve as a growth-promoting technology, given it benefits from network externalities and is a highly efficient tool for transferring information (Kenny, 2003). The unprecedented role played by the internet in spreading information means it can play a central part in driving knowledge spillovers and, thus, economic growth.

Several studies highlight different theoretical channels through which the internet is expected to impact economic growth. These can be summarized into seven broad areas. First, the internet can generate productivity growth by reducing internal and external transaction costs faced by firms and thus lowering production costs (Harris, 1998) or enabling knowledge spillovers across firms, regions and countries (Chu, 2013). Second, the internet may help to deepen an economy's innovative capacity to develop new products, processes and business models (Banhabib and

Spiegel, 2005). Third, the internet can facilitate rapid technological progress that supports capital deepening, in the process lowering quality-adjusted processes and boosting output (Oliner and Sichel, 2002; Myovella et al., 2020). Fourth, the internet generates network effects, meaning that as it is used more widely the benefits accruing to existing users increase without them having to bear additional costs (Moshiri and Nikpour, 2010). Fifth, the internet can foster trade and business activity by enabling entrepreneurs and firms to collaborate, reach new markets, learn new techniques, and develop more dynamic and resilient supply chains across different locations (Parikh et al., 2007; Bloom et al., 2011; Manyika and Roxburgh, 2011). Sixth, the internet may improve the operation of labour markets, for example by enabling better job matching (Bloom et al., 2011). Finally, the internet is likely to enhance competition in markets, including for instance by lowering market entry barriers and improving market transparency (Bloom et al., 2011; Goel and Hseih, 2002).

A number of cross-country studies have attempted to quantify these effects empirically, mostly focusing on the links between internet use and economic growth. These studies generally find that internet use has a positive impact on growth. Espiritu (2003) and Vu (2011) – analyzing samples of 36 developed countries from 1980-1999 and 102 countries from 1996-2005, respectively – both find a positive association between internet use and economic growth. Using panel data for a larger sample of 207 countries covering the period from 1991-2000, Choi and Yi (2009) estimate that a 1 percentage point increase in the ratio of internet users increases GDP growth rates by between 0.049 and 0.059 percentage points, depending on the model specification. Chu (2013) estimates similar impacts using a panel of 201 countries over the period from 1998-2010 – finding that a 10 percentage point increase in the internet penetration rate boosts real GDP per capita by between 0.57 and 0.63 percentage points.

Billon et al. (2017) consider the influence of inequality in education on the impacts of internet use on economic growth. They employ a panel estimation technique using a sample of 90 countries (52 low- and middle-income countries and 38 high-income countries) from 1995-2010, and calculate growth over five-year intervals to account for the reality that changes in economic development take time. They find that the internet has a positive impact on growth in both developed and developing countries, but their results suggest the impact of the internet on growth is marginally greater in the case of the latter. They also observe that inequality in education has a negative influence on the impact of internet use on economic growth, with this effect more pronounced for developing countries.

Other studies also report evidence of variation in the effects of the internet and internet use on growth by type of country. Thompson and Garbacz (2011) find that rapid growth in broadband infrastructure affects low-income countries more than high-income countries. Qiang and Xu (2012) only find evidence of a robust economic impact of internet use on growth in the case of developing countries. Myovella et al. (2020) compare the impact of different aspects of digitalisation (mobile phone subscriptions, internet users, broadband subscriptions) among Sub-Saharan African (SSA) and Organisation for Economic Cooperation and Development economies (OECD). They find that the impact of broadband internet on economic growth has been minimal in SSA compared to the OECD (perhaps due to underdeveloped internet infrastructure in SSA), whereas the impact of mobile telecommunications is higher in SSA economies.

The evidence in the literature suggests the precise effects of internet use, and digitalisation more broadly, on economic growth may depend on the skills of the workforce in a particular economy (Acemoglu and Zilibotti, 2001), the competitiveness of markets and the level of government control over them (Samimi et al., 2015) or the country's absorptive capacity (Keller, 2004; Niebel, 2014). This is reflected in country-specific studies, where there is variation depending on the country's level of development, the time period analysed and the econometric specification used (Billon et al., 2017).

A final set of studies provide insight into the link between internet use and economic growth indirectly by estimating the impact of internet use on variables that affect economic growth. These include studies showing positive impacts of internet use on trade (Frehuld and Weinhold, 2004; Choi, 2010; Meijers 2014), foreign direct investment (Choi, 2003) and labour productivity (Najarzadeh et al., 2014).

3.0 Research Methodology

3.1 Data and measurement

This paper utilizes data for selected sourced from the World Development Indicators (WDI)) and the International Telecommunications Union (ITU). The list of countries selected for the analysis includes developed and developing countries. The selection of the sample countries was determined based on the availability of data. In total, the dataset employed to assess the impact of internet usage, mobile cellular subscription and broadband connectivity on GDP spans 855 observations covering 45 countries over the period from 2000 to 2018 (refer to Annex 1).
The GDP data, which denotes the total value of goods and services produced in a country in a given year, is measured in constant 2010 US dollars. GDP is used as a proxy measure for economic growth. This data is sourced from the WDI database. Unemployment and population data, which are used as controls in our empirical model (outlined below), is also sourced from the WDI database. The unemployment data measures unemployment as a percentage of the total labour force, modelled from ILO estimates. Theoretically, there is a negative relationship between unemployment and the GDP of a country. As unemployment increases, GDP is expected to decline.

Population size serves as an indicator to reflect demand as well as the production and consumption of goods and services in a country. As such, as population size increases, a country's GDP is likely to expand. It can also be inferred that as population size increases, the knowledge base and research and development (innovation capacity) of countries are likely to increase in the long run, thus impacting economic growth. There is thus a positive relationship between population and the aggregate growth rate of GDP, but a negative relationship between the per capita GDP growth rate and population growth.

The percentage of internet usage by population is the third variable in the model. The data is sourced from the ITU database. The internet usage per population is a proxy for digitalization. We have also used two alternative variables to measure digitalization. These are fixed broadband subscriptions (per 100 people) and mobile cellular subscriptions (per 100 people). Theoretically, internet usage can impact positively on economic growth through a variety of different channels.

For instance, internet usage lowers many kinds of transaction costs related to the activities of producers and consumers. Additionally, internet usage contributes to reducing information asymmetries, which may result in a more efficient allocation of resources and, consequently, higher levels of production. Overall, it is expected that an increase in internet usage leads to economic growth**.** In the context of the COVID-19 pandemic, through deeper digitalization, countries with greater digital connectivity and more affordable access to digital infrastructure have managed to use digital technologies and platforms to deliver goods and services.

Two additional variables – the value of trade as a percentage of GDP and trade in goods as a percentage of GDP – are also used in the model. These variables are expected to have positive and significant impacts on a country's economic growth. Descriptive statistics for these variables are provided in Annex 2.

3.2 Model Specification

The empirical model used in this paper aims to identify the impact of digitalization, unemployment and population on the economic growth of selected Commonwealth countries. A sample of 45 countries spanning 855 observations is used. According to Hsiao (2003) and Klevmarken (1989), there are numerous benefits to using panel data. Panel data makes it possible to control for heterogeneity, which reduces the risks of biased results. Compared to time series data, panel data can also provide more information and variability and less collinearity because of more degrees of freedom and greater efficiency. Furthermore, panel data are better able to study the dynamics of adjustments, including for economic indicators such as unemployment or poverty rates. Panel data is also able to identify and measure effects that are undetectable in pure time series or pure cross section data. Due to data limitations, the panel data model comprises three independent variables in the specified model.

A panel data regression model is denoted as follows:

$$y_{it} = \alpha + X'_{it}\beta + u_{it},\ i=1,....,N;\ t=1,....,T \qquad (1)$$

The i subscript, denotes the cross section dimension, t denotes the time series dimension. α is a scalar, β is K* 1 and X'_{it} is the observation on K explanatory variables. Refer to Baltagi (2001), Gujarati and Porter (2009) and Greene (2003) for more detailed explanations.

Following the above panel data model and based on the available data, the following model is used in the empirical analysis in this paper:

$$lnGDP_{it} = \beta_0 + \beta_1 lnInternet_{it} + \beta_2 lnFBS_{it} + \beta_3 ln\text{MCS}_{it} + \beta_4 ln\ \text{Trade in goods}_{it} + \beta_5 ln\ \text{Population}_{it} + \beta_6 \text{lnTrade in Services}_{it} + \beta_7 \text{ln Unemployment}_{it} + \mu_{it} \qquad (2)$$

Where $lnGDP_{it}$ = log GDP of selected countries, β_0 is the constant, $lnInternet_{it}$ is Individuals using the Internet (% of population), $lnFBS_{it}$ represents fixed broadband subscriptions (per 100 people, $ln\text{MCS}_{it}$ *shows Mobile cellular subscriptions* $(per\ 100\ people)$, and $ln\ \text{Trade in goods}_{it}$ is trade in goods as a percentage of GDP. We use lnPopulation_{it} which represents the log of the total population of each country. The variable $ln\ \text{Trade in services}_{it}$ is trade in services as a percentage of GDP, the $\text{ln Unemployment}_{it}$ is unemployment as a percentage of the total labour force (using the modelled ILO estimate). The $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, and\ \beta_1$ are the coefficients of independent variables for the fixed effect panel model. Population is taken in log form for country *i* over time, $iunp_{it}$ is the percentage of internet

users in country *i* over time, ue_{it} is the unemployment rate of country *i* over time, and μ_{it} is the error term.

4.0 Empirical Results and Discussion

The section presents the panel data regression results and discusses the impact of internet usage, unemployment and population on economic growth for selected developing countries. In order to determine the model specification, we use fixed and random effects tests. Table 1 presents the empirical results for 45 countries covering the period from 2009-2018. The Chi Square statistics for the panel regression models were less than 0.05. Therefore, applying the Hausman test, the fixed effects model was selected.

For developing countries, the effect of digitalization is significant. A 1% increase in internet usage leads to a 0.06% increase in GDP. A 1% increase in usage as measured through fixed broadband subscriptions leads to a 0.02% increase in GDP, whereas the equivalent increase in mobile cellular subscriptions results in 0.017% boost to GDP. It is interesting to note that for selected countries, in relation to digital infrastructure, fixed broadband subscriptions lead to a larger increase in GDP in comparison to mobile subscriptions. The reason for this variation could be attributed to many factors including the types of digital infrastructure in countries. For example, for many developing countries (including LDCs), mobile phones are more useful for micro, small and medium enterprises to conduct daily business compared to larger firms in developed countries that would prefer fixed broadband infrastructure. Moreover, in some developing countries, due to the monopoly structure of telecommunications services, fixed broadband services are still the norm in comparison to cellular data and usage of mobile phones.

Our empirical results indicate 1% increase in population size raises GDP by 1.1%, on average. This also implies that as population size increases, the knowledge base of developing economies is likely to grow alongside their capacity for innovation. As a result, population growth is a major contributor to economic growth.

In addition, we find that a 1% increase in unemployment results, on average, in a 0.05% decline in GDP. As unemployment increases, an economy operates below its potential GDP. Consequently, production declines leading to reductions in GDP and economic growth.

In relation to trade, a 1% increase in trade in goods results in a 0.01% decline in GDP. However, the impact of services trade in the developed and developing economies in our sample appears to be stronger. Our empirical results show that a 1% increase in trade in services leads to a 0.03% increase in GDP.

Table 1: Empirical Results for Selected Commonwealth Countries

Fixed Effect Estimation Results			
Variables	**Coefficient**	**Std. Err**	**Probability**
Internet (% of population)	0.0626***	0.006465	0.000
Fixed broadband subscriptions (per 100 people)	0.0209***	0.003134	0.000
Mobile cellular subscriptions (per 100 people)	0.0174***	0.004939	0.000
Trade in goods (% of GDP)	-0.0667***	0.018993	0.000
Population	1.109***	0.054097	0.000
Trade in Services (% of GDP)	0.0262**	0.012732	0.040
Unemployment (% of total labour force)	-0.0534***	0.013416	0.000
constant	6.709***	0.809661	0.000
No. of observations	855		
R-squared	0.717		
Sigma_u	1.428		
sigma_e	0.087		
rho	0.996		
Prob > F	0.000		
Number of country_id	45		

Source: Authors own compilation-using STATA 14.0

5.0 Relevance for Digital Trade Agreements between Countries

From the above analysis it is evident that digitalisation has positive impacts on the economic growth of countries, including developing economies. In the wake of the recent COVID-19 pandemic, the contribution and importance of digital trade along the entire value chain has been even more prominent in sustaining domestic and international trade. For companies that have been producing consumer products, the COVID-19 pandemic and the ensuing lockdown measures resulting from it have caused reduced cash flows and delays in shipping on seasonal offerings, resulting in shortages and unsold inventory accumulation, increased focus on consumer delivery models and supply chain agility.[5] In the agriculture sector, logistical challenges within the supply chain caused by the pandemic have served as a major barrier, particularly as cross-border and domestic restrictions on movement have affected labour supply, resulting in disruptions in the supply of food. Amid these challenges, digitalisation and improvements in the availability and affordability of digital infrastructure and technologies could bridge the development divide and benefit developing countries. Our preliminary analysis has shown that internet usage per population has a positive impact on growth. However, in many developing countries digitalisation remains a disruptive force, with digitally induced growth remaining insufficiently inclusive. Moreover, policy frameworks supporting digitalisation and digital trade remain underdeveloped in a number of Commonwealth countries.

This section examines this issue in the context of discussions around digital trade agreements at the multilateral level. We outline, in brief, the recent DEPA agreement signed by New Zealand, Singapore and Chile. This is used as the basis for the final section, which aims to identify elements that could be used for a possible future multilateral digital trade agreement.

[5] Refer to https://www2.deloitte.com/global/en/pages/about-deloitte/articles/covid-19/covid-19-sector-map.html

The DEPA recognizes the importance of the digital economy for economic growth, focusing on the positive effects of harnessing digital technology to improve the productivity of businesses, create new products and enhance market access. In doing so, the agreement supports the global value of the internet and the role of standards in facilitating interoperability between digital systems. It also recognizes that effective domestic coordination and policies are integral; and stresses that the right for countries to regulate and enjoy the necessary flexibility to set regulator priorities, public welfare and public policies must be maintained.

The agreement focuses on measures adopted or maintained by a party that affects trade in THE digital economy. There are exceptions to this, similar to the General Agreement on Trade in Services (GATS), for services supplied in exercise of governmental authority. However, unlike the GATS, the DEPA includes exceptions to the rules on the application to electronic payments, financial services, government procurement and Open Government Data. The agreement further recognizes its coexistence with existing international agreements.

The DEPA contains a number of modules, which are viewed as essential elements for the effective functioning of the digital economy. These include:

- *Business and Trade Facilitation* (Module 2 of DEPA): which deals with paperless trade and the availability of electronic versions of trade administrative documents. It recognises the importance between parties of mutual recognition of electronic documents. In terms of WTO trade facilitation agreements, it also requires parties to establish secure interconnections of single windows. For data to be exchanged between different systems, parties and jurisdictions, the compatibility and interoperability of systems are important. As such, parties to the DEPA are required to consider open standards in the governance and exchange of data. The module also focuses on the interoperability of e-invoicing and e-payment systems, and requires that customs procedures are predictable, consistent and transparent.

- *Treatment of Digital Related Issues* (Module 3): This module deals with the imposition of customs duties for digital products, which should be used on a non-discriminatory basis and on ICT products that use cryptography.

- *Data Issues* (Module 4): This module includes issues on personal information protection and the need for parties to recognise the robust legal framework for protection of personal information which includes collection, protecting data quality, purpose specification, security safeguards, transparency, individual participation and accountability. It further recognises the need for parties to adopt non-discriminatory practices in protecting user's electronic commerce from personal information protection violations occurring within its jurisdiction. Given that parties have different legal approaches to protecting personal information, parties need to ensure that the mechanisms to promote protection of personal information are compatible and interoperable. This can be achieved through recognition of regulatory outcomes, via comparable protection afforded by the countries' respective legal frameworks, certification and trust marks, and through adherence to broader

international frameworks. Data issues also cover cross-border transfer of information by electronic means for which systems need to be compatible and interoperable. In relation to data localisation, the agreement states that no party shall require a covered person to use or locate computer facilities as a condition for conducting business.

- *Wider Trust Environment* (Module 5): Cybersecurity cooperation among parties is important to secure digital trade. In this regard, the DEPA parties recognise the importance of building the capabilities of their national entities responsible for computer security incident response, using (1) existing collaboration mechanisms to cooperate to identify and mitigate malicious intrusions or dissemination of malicious code that affect the electronic network of the parties; and (2) workforce development in the area of cybersecurity, including through mutual recognition of qualifications, diversity and equality. The module also applies to online safety and security.

- *Business and Consumer Trust* (Module 6): This module deals with disciplines on unsolicited commercial electronic messages. It encourages parties to have laws and regulations in place in relation to consent for commercial electronic messages; and also to provide recourse against suppliers of unsolicited commercial electronic messages. The DEPA parties commit to cooperate in appropriate causes of mutual concern regarding unsolicited electronic messages. The module also deals with online consumer protection, whereby each party shall adopt or maintain laws or regulations to guard against fraudulent, misleading or deceptive conduct that causes harm, or likely to cause harm, to consumers engaged in online commercial activities. The related laws could include general contract or negligence law. Parties should also facilitate claims related to e-commerce transactions. The Business and Consumer Trust module also deals with principles on access to and use of the internet. These include access and use of services and applications of a consumer's choice available on the internet, subject to reasonable network management. They also provide scope for connecting the end user devices of a consumer's choice to the internet, provided these devices do not harm the network. In addition, the principles emphasise the importance of providing access to information on the network management practices of a consumer's internet access service provider.

- *Digital Identities* (Module 7): recognises that cooperation of the parties on digital identities (individual or corporate) will increase regional and global connectivity. It includes the establishment or maintenance of appropriate frameworks to foster technical interoperability or common standards between parties in the implementation of digital identities.

- *Emerging Trends and Technologies* (Module 8): These include financial cooperation technology, which encompasses effective cooperation regarding the FinTech involvement of businesses. It also recognises the importance of artificial intelligence (AI) in the digital economy. In this regard, the parties need to promote the adoption of ethical and governance frameworks that support the trusted, safe and responsible use of AI technologies through

an AI Governance Framework. Government procurement is another area identified in the DEPA. The parties to the agreement recognise that the digital economy will have an impact on government procurement. The parties to the agreement therefore commit to undertake cooperation activities in relation to digitisation of the procurement processes of goods and services in order to ensure that it is open, fair and transparent. The cooperation on competition policy is another new area in emerging technologies. As per the agreement, the parties will consider undertaking mutually agreed cooperation activities including exchanging information and experience on the development of competition policies, best practices and policy advice, and training on issues of competition law enforcement in digital markets.

- *Innovation in the Digital Economy* (Module 9): This module deals with treatment of open data, which has the technical and legal characteristics to be freely available and used. The parties to the agreement reaffirm the importance of technological innovation, creativity and the transfer and dissemination of technology, being for the mutual advantage of producers and users of knowledge, as a means to achieve social and economic welfare. In this regard, among other aspects, the parties recognise the importance of data sharing mechanisms, frameworks and open licensing agreements in facilitating data sharing in the digital environment. The agreement also recognises that the facilitation of public access to, and use of, government information could foster economic and social development, competitiveness and innovation. As a result, cooperation for Open Government activities facilitating technology transfer, talent formation, innovation, new products and services and open data models are important.

- *Small and Medium Enterprises Cooperation* (Module 10): The DEPA promotes cooperation to enhance trade and investment opportunities for small and medium enterprises (SMEs) in the digital economy through information sharing on customs regulations, data flows, data privacy, data regulations, intellectual property rights, sanitary and phytosanitary (SPS) measures, trade promotion programmes, government procurement and financing.

- *Digital Inclusion* (Module 11): The agreement promotes cooperation to share experiences and best practices, promote inclusive and sustainable development, address barriers to accessing digital economic opportunities, and share methods and procedures for the collection of disaggregated data for inclusion.

6.0 Conclusion and Policy Recommendation

Internet accessibility is vital for the proper functioning of the digital economy and for broader economic development in developing countries. The panel data analysis in this paper validates this proposition empirically by providing new evidence of the positive impact of internet access on the GDP of a selection of Commonwealth developed and developing countries. Our findings suggest that that a 1 % increase in internet usage leads to 0.06% increase in gross domestic product (GDP). Furthermore, a 1% increase in broadband usage leads to 0.02% increase (GDP). For mobile cellular subscriptions a 1 % increase bolsters GDP by 0.017%.

Despite the evidence of a positive impact of digitalization on economic growth, these gains are not automatic. A number of key policy issues need to be considered for developing countries to effectively integrate into the digital economy. The current DEPA provides a useful framework in which to order and prioritize these issues and generate cross-country commitment. The framework could be emulated and further refined when considering the expansion of the digital economy in developing countries. In order to ensure an effective and sufficiently inclusive digital economy, core enablers of digitalization need to be in place. These enablers include both hard and soft digital infrastructure. On this basis, and using the existing DEPA framework as a guide, policy makers and negotiators at the WTO should consider the following areas when devising any future digital framework/agreement at the multilateral level:

- **Cooperation on Infrastructure:** which should include traditional and non-traditional infrastructure requirements. Hard infrastructure needs such as roads, ports, energy, water and telecommunications are vital for enhanced connectivity. Likewise, soft infrastructure and digital infrastructure is a crucial enabler of digitalisation. Developing countries could look to build onto existing General Agreement on Trade in Services (GATS) commitments and liberalise these sectors under mode 3: Commercial presence for foreign direct investment and joint venture and partnerships. In tandem, cooperation on trade investment for infrastructure is key for developing economies, especially for creating a conducive business environment. Trade facilitation can also be supported through cooperation digital measures such as paperless trade, e-invoicing and e-payments systems. In relation to cross-border flows of information, compatibility and interoperability of systems are important. Hence, mutual recognition of documentation and processes across borders would be a critical element for developing countries to consider.

- **Treatment of Data:** Data and its use is one of the critical elements of the digital economy. Data flows are fundamental to competition as well as economic and social development. As such, the governance, use, accessibility and affordability of data are core issues that developing economies need to consider. Consideration should be given to the development of robust legal frameworks for protection of personal information. In relation to cross-border exchange of information, any multilateral agreement should develop systems that are compatible and interoperable to facilitate cross-border flows of information. There

must also be systems in place to determine the extent to which data would need to be localised or made freely available, and evaluate any risks associated with doing so.

- **Cybersecurity Cooperation** for online safety and building consumer confidence is important. In this regard, compatible cybersecurity laws are vital for the success of the digital economy. Furthermore, online consumer laws and secure payment systems are critical for ensuring consumer trust in countries. This will require cross-country cooperation on interoperability and mutual recognition agreements.

- **Developing Soft Infrastructure:** Capacity building and workforce training are soft skills that are integral for development. Developing countries have high levels of human capital, which require training for future skills. There are also opportunities for cooperation to boost innovation. Protection of intellectual rights is crucial to enable digital innovation. Developing countries also need to work towards mutual recognition of qualifications between partner countries in the area of digital skills. The latter can also be explored under horizontal commitments on mode 4 of the GATS.

- **SME Development and Digital Trade:** Transparency is one of the core elements of digital trade. To support SMEs in developing countries to trade, access to information on customs regulations, SPS measures, financing and government procurement electronically are important.

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ANNEXES

Annex 1: Descriptive Statistics of Selected Commonwealth Countries

Variables	Observations	Mean	Std. Dev.	Min	Max	Skew.	Kurt.
GDP (constant 2010 US$)	855	23.4	2.41	18.75	28.69	0.36	2.43
Internet (% of population)	855	2.42	1.59	-3.21	4.67	-0.85	3.28
FBS (per 100 people)	855	-0.64	2.62	-4.6	3.77	0.059	1.7
MCS (per 100 people)	855	3.52	1.57	-3.91	5.21	-1.64	5.12
Trade in goods((% of GDP)	855	4.03	0.52	2.67	5.83	0.61	3.62
Population	855	15.13	2.39	11.3	21.06	0.19	2.11
Trade (% of GDP)	855	4.36	0.57	2.118	6.08	0.21	3.58
Trade Services (% of GDP)	855	3.06	0.79	0.92	5.4	0.24	2.72
Unemployment	855	1.85	0.82	-0.92	3.58	-0.37	3.19

Source: Authors compilations based on World Bank Development Indicators (WDI) and International Telecommunications Union (ITU).
Note: Internet (% of population) - Individuals using the Internet; (% of population)-FBS (per 100 people) - Fixed broadband subscriptions (per 100 people); MCS (per 100 people) - Mobile cellular subscriptions (per 100 people).

Annex 2: List of Countries in the Study sample

Country	Region	Income
Australia	East Asia and Pacific	High-Income
Bahamas, The	Latin America and the Caribbean	High-Income
Bangladesh	South Asia	Lower-Middle Income
Barbados	Latin America and the Caribbean	High-Income
Belize	Latin America and the Caribbean	Upper-Middle-Income
Botswana	Sub-Saharan Africa	Upper-Middle-Income
Brunei Darussalam	East Asia and Pacific	High-Income
Cameroon	Sub-Saharan Africa	Lower-Middle Income

Canada	North America	High-Income
Cyprus	Europe and Central Asia	High-Income
Eswatini	Sub-Saharan Africa	Lower-Middle Income
Fiji	East Asia and Pacific	Upper-Middle-Income
Gambia, The	Sub-Saharan Africa	Low-Income
Ghana	Sub-Saharan Africa	Lower-Middle Income
Grenada	Latin America and the Caribbean	Upper-Middle-Income
Guyana	Latin America and the Caribbean	Upper-Middle-Income
India	South Asia	Lower-Middle Income
Jamaica	Latin America and the Caribbean	Upper-Middle-Income
Kenya	Sub-Saharan Africa	Lower-Middle Income
Kiribati	East Asia and Pacific	Lower-Middle Income
Lesotho	Sub-Saharan Africa	Lower-Middle Income
Malawi	Sub-Saharan Africa	Low-Income
Malaysia	East Asia and Pacific	Upper-Middle-Income
Malta	Middle East and North Africa	High-Income
Mauritius	Sub-Saharan Africa	High-Income
Mozambique	Sub-Saharan Africa	Low-Income
Namibia	Sub-Saharan Africa	Upper-Middle-Income
New Zealand	East Asia and Pacific	High-Income
Nigeria	Sub-Saharan Africa	Upper-Middle-Income
Pakistan	South Asia	Lower-Middle Income
Papua New Guinea	East Asia and Pacific	Lower-Middle Income
Rwanda	Sub-Saharan Africa	Low-Income
Samoa	East Asia And Pacific	Upper-Middle-Income
Seychelles	Sub-Saharan Africa	High-Income
Singapore	East Asia and Pacific	High-Income
Solomon Islands	East Asia and Pacific	Lower-Middle Income
South Africa	Sub-Saharan Africa	Upper-Middle-Income
Sri Lanka	South Asia	Lower-Middle Income
St. Lucia	Latin America and The Caribbean	Upper-Middle-Income
Tanzania	Sub-Saharan Africa	Lower-Middle Income
Tonga	East Asia and Pacific	Upper-Middle-Income
Uganda	Sub-Saharan Africa	Low-Income
United Kingdom	Europe and Central Asia	High-Income
Vanuatu	East Asia and Pacific	Lower-Middle Income
Zambia	Sub-Saharan Africa	Lower-Middle Income

Source: Authors compilations based on World Bank Country classification