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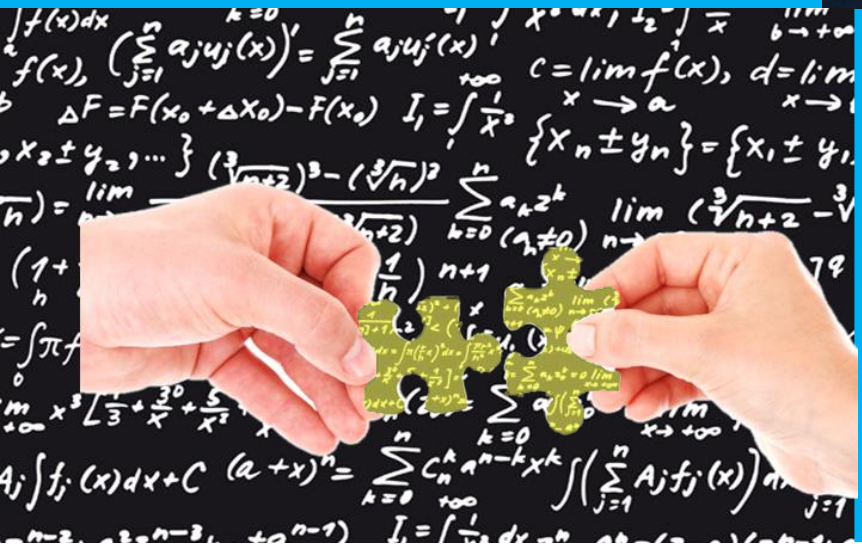
# Digital Trade and Wealth Inequality: Evidence from Asia Pacific region



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ASIA-PACIFIC RESEARCH AND TRAINING NETWORK ON TRADE

Working Paper

No. 235 | 2024

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ASIA-PACIFIC RESEARCH AND TRAINING NETWORK ON TRADE

WORKING PAPER

# Digital Trade and Wealth Inequality: Evidence from Asia Pacific region

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**Please cite this paper as:**

Sanjeev Vasudevan and Mini P Thomas (2024). "Digital Trade and Wealth Inequality: Evidence from Asia Pacific region", **ARTNeT Working Paper Series** No. 235, February 2024, Bangkok, ESCAP

**Available at** http://artnet.unescap.org

**Acknowledgement:**

This paper is a submission for the 2023 ESCAP-UNCTAD-UNIDO-ARTNeT call for papers, under the theme "Unleashing Digital Trade and Investment for Sustainable Development." The author is grateful for the valuable feedback and support from the peer reviewers at the ESCAP Secretariat, whose constructive input was pivotal in refining and finalizing this work. Additionally, this paper was benefited from the ESCAP implementation of the FEALAC-funded project on "Supporting the Strengthening of Policies to Monitor and Promote the Participation of MSMEs in Cross-Border Goods and Services E-Commerce for Inclusive and Sustainable Pandemic Response and Recovery in East Asia and Latin America."

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# Abstract

This paper examines the impact of digital trade on wealth inequality for 40 developed and developing member countries of the UNESCAP Asia Pacific region, for the period from 2005-2021. Data on digital trade, measured using two indicators, namely, trade in digitally deliverable services and trade in ICT goods, is obtained from UNCTAD. Data on within-country wealth inequality, measured using two indicators, namely, wealth share of the top 1 percentile and top 10 percentile of the adult population, is sourced from the World Inequality Database. The overall trend in digital services trade restrictiveness and wealth inequality within the Asia Pacific region is analysed. Based on a rich panel dataset inclusive of standard control variables, this study then estimates the digital trade-wealth inequality nexus with the help of panel fixed effects and instrumental variable estimation techniques. The following key findings emerge: First, we find empirical evidence in support of the positive and significant impact of international trade, in both digitally deliverable services and ICT goods, on within-country wealth inequality in the Asia Pacific region. Second, however, we observe marked heterogeneity between developed and developing member countries of ESCAP, with the effect of digital trade on wealth inequality turning out to be significant for developed countries and insignificant for developing countries. Policy recommendations for streamlining digital trade, to achieve the Sustainable Development Goal of reduced wealth inequality are put forth based on our findings. Elimination of monopolistic and restrictive digital trade practices, and improving the regulatory framework pertaining to digital trade can help mitigate increasing wealth inequality in the developed countries. On the other hand, removal of obstacles faced by small and medium-scale enterprises, youth and women entrepreneurs in accessing and participating in digital trade and digital platforms can go a long way in bringing down wealth inequality in the developing economies, particularly in the Asia-Pacific region.



**Keywords:** Digital trade, digitally deliverable services, wealth inequality, Asia Pacific, panel fixed effects, instrumental variable estimation

**JEL Codes:** D31, F10, F13, F14, O15, O57

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# 1. Introduction

The rise of the digital economy in the last few decades has significantly altered the international trade landscape globally. Digital trade is defined as digitally enabled transactions in trade in goods and services which can be delivered either digitally or physically, involving consumers, firms and governments (Lopez-Gonzalez and Jouanjean, 2017). The growing popularity of online platforms has resulted in an increasing number of small goods packages crossing international borders, whereas new digital technologies have changed how services are produced and delivered across borders. Digital trade is based on the movement of data, with data acting both as a means of production as well as an asset which can be traded. Ensuring that digital trade is inclusive, both within and across countries, poses a formidable challenge to policymakers worldwide. Small and medium-sized firms, which were earlier supplying only in domestic markets due to cost constraints, can now cater to a large and growing global customer base, by taking advantage of access to online marketplaces offered through digital technologies. Online sellers can offer products at a cheaper price due to lower capital requirements. However, there exists a wide disparity between the developed and developing world when it comes to the uptake of information and communication technology (ICT). The proportion of individuals using the internet, an ICT Sustainable Development Goal (SDG) indicator, stood at a towering figure of 87.26 per cent for North America and Europe in 2020. In contrast, only 40.53 per cent of individuals in South Asia and 57.83 per cent of individuals in Southeast Asia used the internet even during the pandemic year of 2020 (ITU, 2021).

Globalisation and technological change have resulted in uneven spatial distribution of wealth and rising within-country inequality, especially in advanced economies (Iammarino, 2018). UNCTAD (2021) highlights the increasing tendency of the world's largest digital platforms, such as Apple, Microsoft, Amazon, Alphabet (Google), Facebook, Tencent and Alibaba to invest in all parts of the global data value chain. Interestingly, all of these companies have their headquarters in the Economic and Social Commission for Asia and the Pacific (ESCAP) member countries. These companies are keen on upgrading their data collection, data transmission, data storage, data analysis, data processing and final use by heavily investing in user-facing platform services, submarine cables and satellites, data centres and Artificial Intelligence. Reaping the benefits of economies of scale, network effects and privileged access to data, these corporations have come to acquire massive financial, market and technological power and global reach in recent years. Accelerated digitalisation in the wake of the COVID-19 pandemic has further enhanced their size, profits, market value and market dominance. Four of these digital platforms accounted for 67 per cent of the global revenue from cloud infrastructure services in the last quarter of 2020 (UNCTAD, 2021). In this new data-driven world order, developing countries risk being mere providers of raw data to global digital platforms, while also having to pay for the digital intelligence obtained from their data.

The net wealth of a household is defined as all the non-financial assets as well as financial assets over which the household can enforce ownership rights and which also provide economic benefits to their owners, net of any debt (Zucman, 2019). Non-financial assets such as real estate, land and buildings and financial assets such as bank deposits, equities, bonds, life insurance and pension funds are included in this definition of wealth. Wealth inequality is defined as the unequal distribution of wealth and assets among the countries of the world and within countries (Njangang et al., 2022). According to Chancel et al. (2022), the top 1% of the world's population possessed nearly 39 times the wealth of the lowest 50% in 2021. However, cross-country scrutiny indicates that wealth distribution among the rich varies depending on the per capita income levels. In 2021, the top 1% in the developed countries possessed 24% of national wealth, whereas the comparable statistics in the developing countries was 42%. Besides, Piketty and Zucman (2014) highlighted that wealth inequality as a share of total national wealth has been on the rise in the last 40 years. The uneven patterns of wealth distribution and their macroeconomic consequences warrant an investigation of the major determinants of wealth inequality within and across countries.

The contributions of our paper to the existing literature are twofold. First, this is the first empirical analysis examining the role of digital trade (accounted by digitally deliverable services trade and ICT goods trade), focusing explicitly on within-country wealth inequality levels. Second, the sample of our study incorporates countries in the Asia Pacific region where no specific study on the nexus between digitalisation and wealth inequality has been carried out before. Our analysis provides new empirical evidence that digital trade has an inequality-enhancing effect in the Asia Pacific region. Nevertheless, it is important to mention that the current study is limited to addressing within-country wealth inequality, and has no potential extension to address wealth inequality between countries.

The rest of the paper is structured as follows. In section 2, we present a brief review of the theoretical and empirical literature on the effects of international trade on inequality in general, and wealth inequality in particular. We highlight the role of digitalisation, hitherto neglected, in driving within-country inequality. Section 3 presents a preliminary analysis of digitalisation, digital trade and wealth inequality in the Asia Pacific region. Section 4 discusses the data, variables, and empirical approach adopted in the paper. Section 5 discusses the empirical results in detail, followed by the conclusions and policy implications in Section 6.

# 2. Review of Literature

## 2.1 Theoretical background

The effect of international trade inequality has been studied in great detail over the years, however, without reaching a consensus. Most studies examine the nexus between international trade and inequality against the background of neoclassical theories (Zhu et al., 2022). Increased digitalisation has resulted in expanded trade in both goods and services (Abeliansky and Hilbert, 2017). Baldwin (2005) adopted the heterogeneous firm model of Meltiz and proved that online markets helped in decreasing income inequality by reducing the fixed cost of exporting. Lendle and Olarreaga (2017) studied the role of online markets in making international trade more inclusive, by bringing down income inequality. Information frictions are less in online markets since there is a much smaller need to search for clients or to establish a distribution channel, compared to offline markets. In online markets, the cost incurred by the seller in finding the right customer is quite negligible. It is also much cheaper for a seller to build a reputation online due to the inbuilt mechanisms offered by e-commerce websites, wherein customers give ratings of various online vendors based on their earlier purchases.

Specifically in the context of wealth inequality, international trade, among others, is identified as a critical determinant (Foellmi and Oechslin, 2010; Chang and Wu, 2016). There are notable direct channels linking digital trade and the digitalisation of trade to wealth inequality. For instance, technological progress in trade can drive wealth inequality because of its in-built skills bias. In contrast, digitalisation provides more opportunities for lower-income groups to get market access by lowering transaction costs (Zhu et al., 2022). Besides, there are several indirect channels by which digitalisation influences inequality levels in a country. The first of them is the entrepreneurship channel. It is argued that increasing digitalisation has enabled expanded business opportunities (Zhang and Li, 2018). However, there exists a parallel stream of literature which postulates that increased business opportunities can increase within-country inequality (Atems and Shand, 2018) by increasing the incomes of large businesses and leaving small and medium businesses with relatively lower shares. The second indirect channel is financial development. Increased digitalisation facilitates financial development in a country (Njangang et al., 2022) and the latter influences wealth inequality in two ways. On one hand, financial development coupled with digitalisation reduces information asymmetry in financial transactions, thereby reducing inequality among different income classes. On the other hand, financial development may facilitate new business opportunities and widen wealth distribution by disproportionately favouring the rich. The third indirect channel is innovation in digitalisation. It is argued that digitalisation promotes innovation among large entrepreneurs, thereby reducing business opportunities for small and medium businesses (Njangang et al., 2022).

## 2.2 Empirical Evidence

Even though there is a large body of empirical literature on the nexus between international trade and inequality, most studies predominantly ignored the role of improvements in digitalisation in international trade except Zhu et al. (2022). In a recent paper, Zhu et al. (2022) studied the impact of digital service trade on within-country income inequality, for a panel of 100 countries. They defined income inequality in terms of the Gini index and digital service trade in terms of digitally deliverable services trade as a share of the total services trade of a country. Using two-stage least squares-instrument variable estimation, they found that digital service trade had a negative and significant impact on income inequality, in the case of high-income and middle-income countries.

Specific to wealth inequality, Islam (2018) argued that international trade and wealth inequality are inversely related in countries with lower levels of democracy. On the contrary, Tadadjeu et al. (2021) showed that trade openness increases wealth inequality, for a sample of 45 developed and developing countries. Njangang et al. (2022) studied the impact of information and communication technology on wealth inequality for a panel of 45 countries. They used different measures of ICT such as internet penetration, mobile penetration, ICT service exports, ICT index, ICT quality and quantity. They measured wealth inequality using Credit Suisse data for three proxies, namely, the wealth share of the top one per cent, the wealth share of the top ten per cent and the billionaire wealth to GDP ratio. They found that ICT increases wealth inequality, with democracy playing an important role in mitigating this impact.

While the effects of international trade and digitalisation have been examined independently, whether and how digital trade affects wealth inequality remains unexplored. Our study proposes to fill this gap. The study gains more relevance in the prospect of achieving the SDG of reduced inequality. The Asia-Pacific region provides a suitable testing ground for our study since heightened income and wealth inequalities have accompanied rapid economic growth in this region (Zhuang, 2023). Digitally deliverable services trade in the Asia Pacific region experienced higher growth than the rest of the world during the fifteen years from 2005 to 2020 (ADB, 2022). The proliferation of digitalisation in the post-Covid period further amplifies the importance of digital trade in shaping inequality levels within and across countries (Wang and Xu, 2023).

# 3. Preliminary Data Analysis

In sub-section 3.1, we discuss the recent trends in digital trade in the Asia Pacific[3] for the period 2005-2021[4]. We employ digitally deliverable services trade and ICT goods trade as the broad measures of digital trade. In the sub-section 3.2, we show the regional evolution of wealth inequality over the period 1995 to 2021[5]. We use the share of wealth held by the top 1 percentile of the adult population and the top 10 percentile of the adult population as broad measures of wealth inequality.

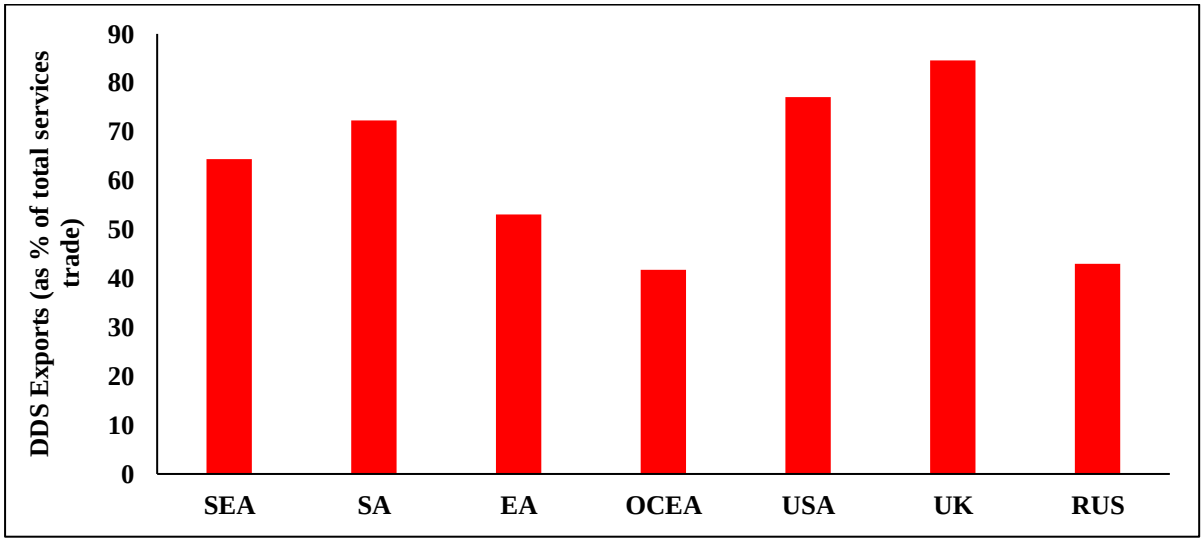
## 3.1 Digital Trade in Asia Pacific

Figure 1 throws light on the digital trade pattern unfolding within the Asia Pacific region, and specifically among the ESCAP member states, for the latest year for which data is available, namely, 2021. Digitally deliverable services are a superior indicator of digital trade compared to Information and Communication Technology (ICT) services since it covers a much broader array of services exports and services imports within its ambit. Digitally deliverable services are an aggregation of insurance and pension services, financial services, charges for the use of intellectual property, telecommunications, computer and information services, other business services and audiovisual and related services (UNCTAD, 2015).

Developed countries such as the United Kingdom and the United States exhibited the highest share of digitally deliverable service (DDS) exports in total services trade, at 85 per cent and 77 per cent, respectively., for 2021 (Figure 1). Among the other regions within Asia Pacific, South Asia and Southeast Asia emerge as leading players in the digital services export market. In South Asia, comprising of countries such as India, a world leader in Information Technology exports, DDS exports as a share of total services trade, stood at 72 per cent. DDS exports for East Asia, despite having economic powerhouses such as China, Japan and South Korea, formed only 53 per cent of total international trade in services of the East Asian region. Russia is one of the biggest countries in the Asia Pacific region and has strategic partnerships with smaller countries in the region. Russia as well as the Oceania region, which includes many island nations as well as developed countries such as Australia and New Zealand, were found to be lagging in the digital services export market.

[3] 40 countries out of 53 UN ESCAP member states (given in https://www.unescap.org/about/member-states) have been included in econometric analysis, due to data limitations. The list of 40 countries are given in the Appendix.
[4] Due to data unavailability, we limit the study period to 2005-2021.
[5] Only wealth inequality analysis is carried out for such a lengthy time period. Regional evolution does not include USA, UK, Turkey, The Netherlands, and France.

**Figure 1: Export Pattern of Digitally Deliverable Services for 2021**

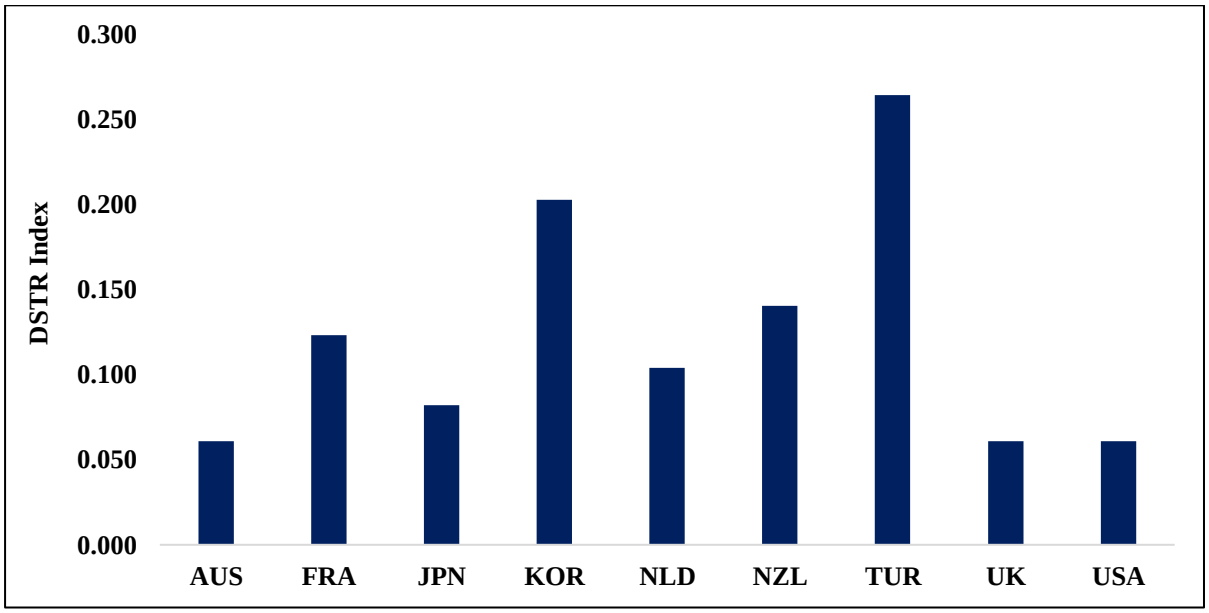



Source: Authors' compilation from UNCTADStat
Notes: SEA- Southeast Asia, SA-South Asia, EA-East Asia, OCEA- Oceania, USA-United States of America, UK-United Kingdom, RUS- Russian Federation[6]

The regulatory regime on digital trade has important implications for the wealth inequality prevailing in a country. An open regulatory environment may reduce or accentuate the problem of wealth inequality. The Digital Services Trade Restrictiveness Index published by OECD, quantifies the cross-cutting barriers that inhibit or completely prohibit the ability of firms to supply services which are traded digitally (Ferencz, 2019). This is a composite index comprising five major dimensions, namely, infrastructure and connectivity, electronic transactions, e-payment systems, intellectual property rights and other barriers to trade in digitally enabled services. The value of the index varies from 0 to 1, with 0 indicating an open regulatory environment and 1 indicating a completely closed regulatory environment.

[6] For figure 1, South Asia excludes Turkey, Southeast Asia excludes Brunei Darussalam, East Asia excludes North Korea, and Oceania excludes American Samoa, Guam and Northern Mariana Islands, compared to the UN ESCAP country grouping.

**Figure 2: Trends in Digital Services Trade Restrictiveness, 2021 (OECD countries of Asia Pacific)**



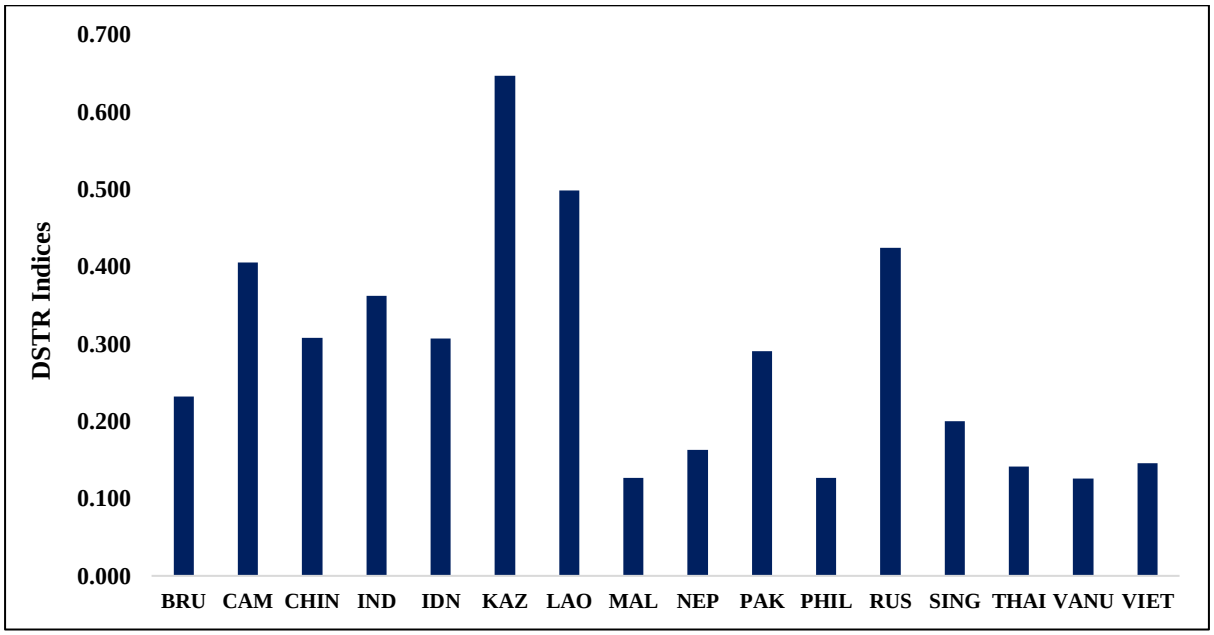

Source: Authors' compilation from OECDStat

Notes: AUS – Australia, FRA – France, JPN - Japan, KOR – Korea Republic, NLD – The Netherlands, NZL -New Zealand, TUR - Turkey, USA-United States of America, UK- United Kingdom.

Among the ESCAP member states, data on this index is available for 25 countries. Among the OECD Countries which belong to the Asia Pacific region, it is found that Turkey has the maximum amount of trade restrictions, with a DSTRI of 0.264 in the year 2021, when it comes to engaging in digital trade (Figure 2). The majority of the barriers to digital services trade for Turkey, South Korea and New Zealand can be attributed to the infrastructure and connectivity dimension of the index. UK, USA and USA have the most conducive regulatory environment for firms engaging in digital services trade, with a DSTRI of 0.061. All of these nine OECD members are also developed countries.

Figure 3 reveals the trends in digital services trade restrictiveness for select non-OECD countries in the Asia Pacific region, for the year 2021. Kazakhstan, Lao PDR, Russia and Cambodia are found to have a highly unfavourable regulatory regime for engaging in digital trade. Kazakhstan has a DSTRI of 0.647 for the year 2021. Philippines, Malaysia and Vanuatu are found to have the least amount of trade barriers on digital services trade, with a DSTRI of 0.127.

**Figure 3: Trends in Digital Services Trade Restrictiveness, 2021 (Select non-OECD countries of Asia Pacific[7])**




Source: Authors' compilation from OECDStat

Notes: BRU – Brueni, CAM – Cambodia, CHIN – China, IND – India, IDN – Indonesia, KAZ – Kazakhstan, LAO – Lao PDR, MAL – Malaysia, NEP – Nepal, PAK – Pakistan, PHIL – Philippines, RUS – Russian Federation, SING – Singapore, THAI – Thailand, VANU – Vanuatu, VIET – Vietnam

Emerging market economies such as India, China and Indonesia also exhibit relatively high DSTRI values of more than 0.3, the majority of which can be attributed to trade barriers in infrastructure and connectivity. India also has significant trade barriers relating to e-payment systems, which contributes to its high levels of digital services trade restrictiveness. Singapore, despite being a developed country, has a moderately high DSTRI of 0.2. Except for Singapore, all other ESCAP member states included in Figure 3 are developing countries.

## 3.2 Regional Evolution of Wealth Inequality, 1995-2021[8]

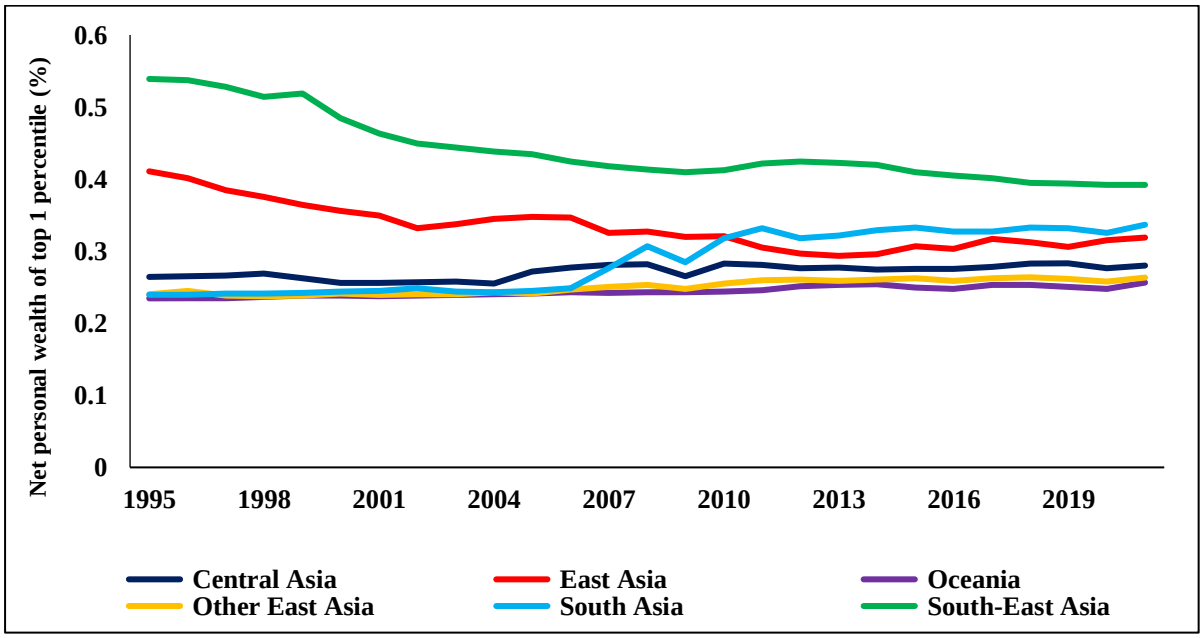
Figure 4 showcases the wealth inequality trends within the Asia Pacific region during 1995-2021. While examining the share of net personal wealth held by the top 1 percentile of the adult population of different regions within Asia Pacific with the help of Figure 4, it is found East Asia and Southeast Asia have witnessed a fall in wealth inequality over time. In the East Asian region, the wealth inequality levels declined

[7] Vanuatu as a country in the Asia Pacific region is not included in the econometric analysis due to data limitations.

[8] The regional classification follows the country groupings mentioned in World Inequality Database as Central Asia (Armenia, Belarus, Georgia, Kyrgyz Republic, Kazakhstan, Russia, Tajikistan, Turkmenistan, and Uzbekistan), South Asia (Afghanistan, India, Pakistan, Iran, Sri Lanka, Maldives, Nepal, and Bhutan), Oceania (Australia, New Zealand, and Papua New Guinea), Southeast Asia (Brunei Darussalam, Indonesia, Cambodia, Lao PDR, Myanmar, Malaysia, Philippines, Singapore, Thailand, Timor-Leste, and Vietnam), East Asia (China, Japan, and South Korea) and Other East Asia (Hong Kong, North Korea, Macao, Taiwan, Mongolia). Among the regions, we have excluded Belarus, Hong Kong, North Korea, Macao, and Taiwan from the econometric analysis.

from 40% in 1995 to 30% in 2021. Corresponding numbers for the Southeast Asian region are 54% in 1995 and 39% in 2021. However, South Asia has experienced a considerable increase in wealth inequality, especially after 2006. For South Asia, in 1995, the wealth inequality levels indicated that the top 1% possessed 24% of wealth. However, this figure has increased to 34% in 2021. Central Asia, Oceania and Other East Asia have maintained relatively stable wealth inequality levels.

**Figure 4: Regional evolution of wealth inequality – top 1 percentile, 1995-2021**

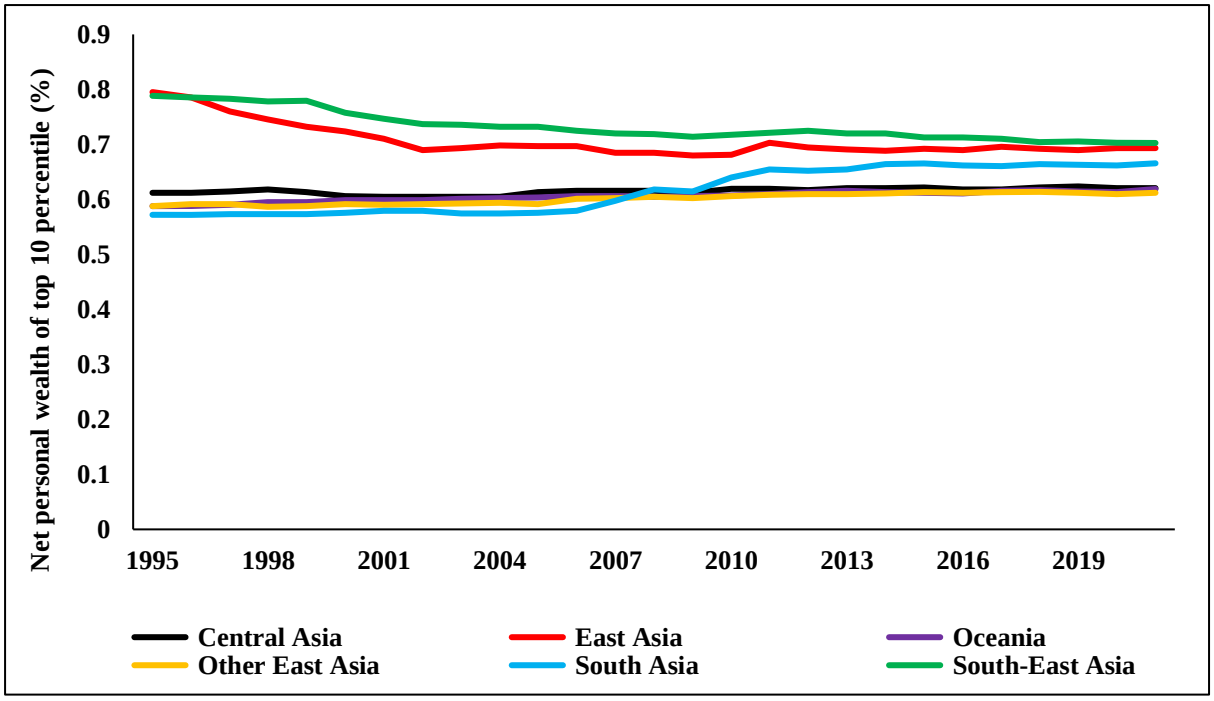



Source: Authors' compilation from World Inequality Database

Figure 5 reveals the trends in wealth inequality across sub-regions within Asia Pacific, using another indicator, namely, the share of net personal wealth held by the top 10 percentile of the adult population. This indicator strengthens the observations from Figure 4, that East Asia and Southeast Asia are the regions with declining wealth inequality trends. While the South Asian region experienced a notable increase in wealth inequality, Central Asia, Oceania and Other East Asia remained relatively stable wealth inequality levels. East Asia, Southeast Asia and South Asia have nearly 70 per cent of the wealth being held by the top 10 percentile of adults. The whole of the Asia Pacific region possesses a conducive environment for sustained growth, although the sub-regions indicate contending trends, in wealth inequality, with a minimum of 60 percent of wealth being held by the top 10 percentile of the adult population in the year 2021.

Figures 4 and 5 further indicate the persistence of high and stable wealth inequality levels in the Asia Pacific region, in the last one and a half decades. During 2005-2021, we observed that wealth inequality levels have not significantly altered in most of the sub-regions. An exception in this regard is South Asia. From section 2.1, we observe a significant rise in digital trade in the Asia Pacific region. Such a trend warrants a closer examination of the association between digital trade and wealth inequality.

**Figure 5: Regional evolution of wealth inequality – top 10 percentile, 1995-2021**

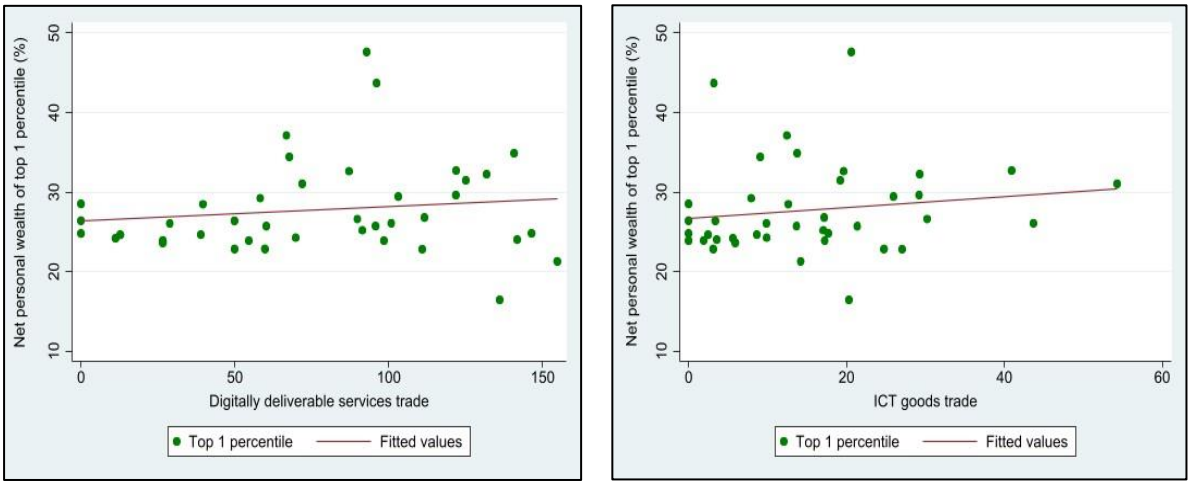



Source: Authors' compilation from World Inequality Database

## 3.3 Digital trade and wealth inequality

The scatter plots in Figure 6 show the relationship of digital trade with wealth inequality (net personal wealth of the top 1 percentile) for the year 2021. Panel A refers to the relationship between digitally deliverable services trade and wealth inequality and Panel B refers to the relationship between ICT goods trade and wealth inequality.

**Figure 6: Wealth inequality versus digital trade in Asia Pacific, 2021**




**Panel A** **Panel B**

# 4. Data, variable description and estimation strategy

## 4.1 Data and Variable Description

### 4.1.1 Data Sources

Our sample covers 40 member countries of the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) over the period 2005–2021. Data has been obtained from various sources: Data on wealth inequality is obtained from the World Inequality Database (WID), published by the Paris School of Economics. Indicators of digital trade are obtained from the United Nations Conference of Trade and Development (UNCTAD) database. We sourced the control variables of the econometric analysis from the World Development Indicators (WDI) database, and Global Data Lab. Table 1 presents the descriptive statistics. The full description of the data is as follows.

### 4.1.2 Measures of wealth inequality

Following the literature, we consider two measures of wealth inequality, namely the top 1% wealth share and the top 10% wealth share. Njangang et al. (2022) put forth three arguments in support of the use of these variables. First, the top wealth shares are not sensitive to wealth changes at the bottom of the wealth distribution. Second, the probability that the wealth of individuals with the highest wealth share will increase is greater than the probability that the wealth of less wealthy individuals will increase. In other words, the wealth concentration in the hands of the top 1-10% in an economy is expected to increase further. Finally, these measures of wealth inequality are highly associated with the most commonly used measures of income inequality. Based on the existing literature, both of these measures are obtained as percentages from the World Inequality Database.

### 4.1.3 Measures of digital trade

The existing literature focuses largely on the production and consumption of ICT goods and services as proxies of digitalisation. In the current study, we employ two measures of digitalisation of international trade in goods and services. The first measure is the trade in digitally deliverable services as a share of the total services trade (Zhu et al., 2022). We label this measure in our analysis as ‘digital services trade’. The second measure is trade in information and communication technology goods as a share of total merchandise trade, labelled as ‘ICT goods trade’. Both measures indicate the magnitude of digital trade in goods and services of a country. Data on both these measures are obtained from the UNCTAD database.

### 4.1.4 Control variables

We include the per capita real GDP to control for economic development, which is one of the major determinants of wealth inequality. However, the effect of economic development on inequality (or wealth inequality in particular) remains ambiguous. One stream of literature finds that economic development significantly reduces wealth inequality, indicating a statistically significant negative relationship (Savvides, 1998; Berisha and Meszaros, 2019; Njangang et al., 2022). Contrary to this, an alternate strand finds a significant positive or mixed effect of economic development on inequality (Nguyen, 2022; Nchofoung and Asongu, 2022; Ndoya and Asongu, 2022). These studies found that countries with higher levels of economic development have higher levels of wealth inequality.

To account for the effect of the foreign flow of capital, we define foreign direct investment as the net inflow of foreign direct investment as a share of GDP. The existing literature postulates that the effects of foreign direct investment on wealth inequality can be negative (Tadadjeu et al., 2021; Njangang et al., 2022; Zhu et al., 2022) or positive (Herzer and Nunnenkamp, 2013; Roser and Cuaresma, 2016; Huynh, 2021; Yin and Choi, 2023).

Studies which associate education with greater wealth and faster wealth accumulation indicate a positive relationship between the two variables (Conley and Ryvicker, 2004; Zhu et al., 2022). However, another stream of literature states that education increases the income of the bottom stratum of society and thereby reduces wealth inequality (Abdullah et al., 2015). We employ average years of schooling as the measure of education (Ndoya and Asongu, 2022), obtained from Global Data Lab. We label the variable as education.

Based on the resource curse hypothesis which states that higher possession of natural resources leads to increased wealth inequality, we postulate a positive relationship for this variable (Tadadjeu et al., 2021). Further, existing literature on income inequality also finds a significant positive effect of the natural resources variable. We label the variable as natural resources and proxy it with the rent paid on natural resources as a percentage of GDP, obtained from the WDI database.

We measure urbanisation as the proportion of the population living in urban areas. The literature finds a positive effect of urbanisation on inequality in general and wealth inequality in particular (Yin and Choi, 2023). A higher concentration of people in urban centres seeking livelihood is likely to result in increased unemployment and disparities in income and wealth holdings. Hence, we expect a positive relationship.

**Table 1: Descriptive statistics**

| Variables | Obs | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| **Wealth inequality** | | | | | |
| **Top 1% wealth share** | 680 | 27.30 | 5.43 | 15.48 | 47.86 |
| **Top 10% wealth share** | 680 | 60.47 | 4.68 | 47.69 | 75.78 |
| **Digital trade** | | | | | |
| **Digital services trade** | 680 | 58.03 | 36.50 | 0.00 | 157.17 |
| **ICT goods trade** | 680 | 9.63 | 8.35 | 0.00 | 54.30 |
| **Control variables** | | | | | |
| **Per capita real GDP** | 680 | 8.56 | 1.41 | 5.94 | 11.10 |
| **Foreign direct investment** | 680 | 4.34 | 7.49 | -37.17 | 86.48 |
| **Education** | 675 | 2.10 | 0.45 | 0.53 | 2.62 |
| **Natural resources** | 680 | 6.36 | 10.00 | 0.00 | 81.91 |
| **Urbanisation** | 680 | 53.59 | 24.19 | 12.98 | 100.00 |

The descriptive statistics show sufficient variability within the data. Variables such as per capita real GDP and education are reported in the natural log form. All other variables are in percentages.

## 4.2 Model specification and empirical approach

We employ a panel data econometric model of wealth inequality for our empirical analysis. The model addresses wealth inequality as a function of various macroeconomic and country-specific demographic variables. Our study aims to investigate the effect of digital trade on wealth inequality. We hypothesise that digital trade is positively associated with wealth inequality. Therefore, we estimate the model as specified below.

$$Wealth\ Inequality_{it} = \beta_0 + \beta_1 Digital\ trade_{it} + \beta_2 X_{it} + \mu_i + \pi_t + \varepsilon_{it}, \qquad (1)$$

Where the $Wealth\ Inequality_{it}$ is the country-specific measure of wealth inequality of country i for year t. $Digital\ trade_{it}$ stands for country-specific indicators of digital trade, as mentioned in the previous section. $X_{it}$ is the vector of the baseline controls, including per capita real GDP, foreign direct investment, education, natural resources, and the extent of urbanisation. Subscript *i* refers to the countries with *i*= 1,2, 3,….40. Subscript *t* refers to the time in years where *t*= 1,2, 3...17. $\mu_i$ captures the country fixed effects and $\pi_t$ captures the year fixed effects.

We estimate various combinations of equations in the analysis, using two measures of wealth inequality and two measures of digital trade, along with different combinations of fixed effects. The 40 countries across a period of 17 years make the total number of observations 680. We estimate the equation above using a panel data approach. The Breusch Pagan Lagrangian Multiplier test favours the panel data framework over the ordinary least-squares counterpart, confirming the presence of unobserved heterogeneity across cross-sectional units. Given the selective nature of the sample countries chosen, we employ the panel fixed effect estimator for the benchmark analysis.

One of the potential econometric issues is the endogeneity arising from reverse causality running from wealth inequality to ICT (Njangang et al., 2022). Further, Zhu et al. (2022) and Yin and Choi (2023) stated that endogeneity issues arise because of the reverse causality between digital technology and income. Specifically, growth in wealth inequality may have driven the increased use of digital technology. Further, skewed distribution of wealth may also lead to unequal access to digital infrastructure. Considering the above possibilities, the model treats indicators of digital trade as endogenous in the analysis. We correct the endogeneity issues using the 1-period lagged values of endogenous variables as instruments for estimation (Hasan et al., 2020). Given the longitudinal nature of the data, we estimate the regression equation using the panel instrumental variable fixed effects (IV-FE) method. Since we employ only one instrument for an endogenous variable, the estimation is exactly identified.

# 5. Econometric results and discussion

## 5.1 Baseline results

Tables 2 and 3 report the estimation results of equation (1) with digital services trade and ICT goods trade respectively, as proxies for digital trade. Both tables report the top 1% wealth share and top 10% wealth share as proxy variables for wealth inequality. In both tables, columns (1) and (4) estimate the equation without any control variables. We add the control variables subsequently along with year fixed effects.

The results given in Table 2 provide empirical evidence in support of a positive and highly significant impact of digital trade on wealth inequality. Specifically, the coefficient of digital services trade has a magnitude suggesting that 10 units of increase in digital services trade increases the wealth share of the ultra-rich, on average, by 0.06 - 0.08 units. As digitally deliverable services are more readily accessible and affordable for the wealthy, it provides them with more opportunities to enhance wealth accumulation. Similar results are obtained for the top 10% wealth share. The empirical results indicate that a 10-unit increase in digital services trade enhances the wealth share, on average, by 0.07-0.09 units for the top decile.

**Table 2: Effects of digitally deliverable services trade on wealth inequality**

| Variables | Top 1 % Wealth Share | | | Top 10 % Wealth Share | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | | | | | | |
| **Digital service trade** | 0.00855*** | 0.00821*** | 0.00615* | 0.00946*** | 0.00750** | 0.00736** |
| | (0.00302) | (0.00314) | (0.00333) | (0.00293) | (0.00300) | (0.00323) |
| **Per capita real GDP** | | 3.471*** | 2.703*** | | 3.176*** | 2.933*** |
| | | (0.435) | (0.531) | | (0.417) | (0.514) |
| **Foreign direct investment** | | 0.0106 | 0.0132 | | 0.0221** | 0.0230** |
| | | (0.00933) | (0.00940) | | (0.00893) | (0.00910) |
| **Education** | | -4.287*** | -4.909*** | | -4.776*** | -4.971*** |
| | | (0.709) | (0.731) | | (0.679) | (0.708) |
| **Natural resources** | | 0.0177** | 0.0223** | | 0.0177** | 0.0186** |
| | | (0.00888) | (0.00925) | | (0.00849) | (0.00895) |
| **Urbanisation** | | -0.0181 | -0.0478 | | 0.0683* | 0.0628* |
| | | (0.0380) | (0.0392) | | (0.0364) | (0.0380) |
| **Constant** | 26.80*** | 6.874** | 16.41*** | 59.92*** | 38.94*** | 41.87*** |
| | (0.183) | (2.698) | (4.318) | (0.178) | (2.582) | (4.179) |
| **Country fixed effects** | No | No | Yes | No | No | Yes |
| **Year fixed effects** | No | No | Yes | No | No | Yes |
| **Observations** | 680 | 675 | 675 | 680 | 675 | 675 |
| **R-squared** | 0.012 | 0.127 | 0.162 | 0.016 | 0.155 | 0.171 |
| **Number of cross-sections** | 40 | 40 | 40 | 40 | 40 | 40 |

All estimations are carried out using the panel fixed effects model. Per capita real GDP and education are in natural logs. Other variables are in percentages. Wealth inequality is measured using the share of the top 1% and top 10%. Digital services trade is measured as a share of total services trade. Standard errors are in parentheses. ***, **, and * indicate significance at 1%, 5% and 10% respectively.

Similar to Table 2, the results of Table 3 provide evidence of a positive and significant effect of digital trade on wealth inequality. Specifically, the coefficients of ICT goods trade suggest that a 10-unit increase in ICT digital trade increases the wealth share of the ultra-rich, on average, by 0.22 - 0.42 units. Similar results are obtained for the top 10% wealth share. The empirical results indicate that a 10-unit increase in ICT goods trade enhances wealth share, on average, by 0.23-0.41 units for the top decile. Our findings indicate a strong positive effect of digital trade through services and goods, on wealth inequality. Comparing digital services trade with ICT goods trade, we observe that the effects of digital trade in the form of ICT goods have a stronger impact on wealth inequality.

**Table 3: Effects of ICT goods trade on wealth inequality**

| Variables | Top 1 % Wealth Share | | | Top 10 % Wealth Share | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | | | | | | |
| **ICT goods trade** | 0.0421*** | 0.0292*** | 0.0221** | 0.0416*** | 0.0239** | 0.0231** |
| | (0.00995) | (0.0102) | (0.0109) | (0.00968) | (0.00977) | (0.0105) |
| **Per capita real GDP** | | 3.257*** | 2.562*** | | 2.999*** | 2.766*** |
| | | (0.440) | (0.526) | | (0.422) | (0.510) |
| **Foreign direct investment** | | 0.00754 | 0.0107 | | 0.0191** | 0.0201** |
| | | (0.00919) | (0.00930) | | (0.00881) | (0.00901) |
| **Education** | | -4.142*** | -4.779*** | | -4.644*** | -4.834*** |
| | | (0.707) | (0.733) | | (0.677) | (0.710) |
| **Natural resources** | | 0.0204** | 0.0241*** | | 0.0199** | 0.0207** |
| | | (0.00891) | (0.00922) | | (0.00854) | (0.00893) |
| **Urbanisation** | | -0.00674 | -0.0388 | | 0.0796** | 0.0734* |
| | | (0.0373) | (0.0390) | | (0.0357) | (0.0377) |
| **Constant** | 26.90*** | 7.989*** | 17.02*** | 60.07*** | 39.78*** | 42.65*** |
| | (0.110) | (2.759) | (4.289) | (0.107) | (2.643) | (4.154) |
| **Country fixed effects** | No | No | Yes | No | No | Yes |
| **Year fixed effects** | No | No | Yes | No | No | Yes |
| **Observations** | 680 | 675 | 675 | 680 | 675 | 675 |
| **R-squared** | 0.027 | 0.129 | 0.163 | 0.028 | 0.155 | 0.170 |
| **Number of cross-sections** | 40 | 40 | 40 | 40 | 40 | 40 |

All estimations are carried out using the panel fixed effects model. Per capita real GDP and education are in natural logs. Other variables are in percentages. Wealth inequality is measured using the share of the top 1% and top 10%. ICT goods trade is measured as a share of total merchandise trade. Standard errors are in parentheses. ***, **, and * indicate significance at 1%, 5% and 10% respectively.

Most of the control variables exhibit statistically significant results. We find that per capita real GDP has a positive and significant effect on wealth inequality, in both tables. It indicates that unequal distribution of wealth is likely to worsen with enhanced economic development. The results are in line with the findings of Yin and Choi (2023). The coefficient of foreign direct investment indicates a significant positive effect, although it is the case only for the equations with the top 10% wealth share as the dependent variable. Our findings are similar to the works of Rose and Cuaresma (2016) and Yin and Choi (2023). Education has a highly significant, negative effect in all specifications suggesting that increased education leads to reduced wealth inequality. Abdullah et al. (2015) and Njangang et al. (2022) obtained similar findings.

Further, natural resources indicate a significant positive effect across all specifications indicating that the possession of natural resources widens wealth inequality. Ndoya and Asongu (2022) reported similar findings for income inequality. Besides, Tadadjeu et al. (2021) reported a positive effect of natural resources specifically on wealth inequality. The urbanisation variable is insignificant in the equation for the top 1% wealth share, and weakly significant with a positive sign for the top 10% wealth share. The results indicate that increased urbanisation leads to a widening of wealth inequality. These results are in tandem with the findings of Yin and Choi (2023).

## 5.2 Developed versus developing countries

We split the sample into developed and developing countries based on the World Bank's income classification. There are 10 developed and 30 developing countries in the sample. All high-income countries are classified as developed countries, and all other countries are classified as developing countries. It is worth noting that our sample includes only one 'low-income' country, Afghanistan. Other 29 countries belong to the middle-income (upper or lower) category. Table 4 reports the results of panel fixed effects estimation for developed and developing countries. Columns 1-4 represent developed countries, and columns 5-8 represent developing countries respectively.

The results of Table 4 indicate a positive and highly significant effect of digital trade on wealth inequality in developed countries. The coefficient of digital services trade indicates that 10 units of increase in digital services trade increases wealth inequality, on average, by 0.13 - 0.16 units. Similar results are obtained in ICT goods trade, wealth inequality increases, on average, by 0.36 units for the top decile. However, the results for developing countries are contrary to the baseline findings. We find that digital services trade has no significant effect on wealth inequality in developing countries. However, we find a positive effect of ICT goods trade on the wealth concentration of the top 10%. The variations in the effects of digital trade, in goods and services, across different income groups are not surprising. For instance, Zhu et al. (2022) find that the effect of digital trade on income inequality is insignificant for low-income countries. The results also indicate that countries at higher levels of economic development are likely to experience increased wealth inequality.

**Table 4: Effects of ICT goods trade on wealth inequality**

| Variables | Developed countries | | | | Developing countries | | | |
|---|---|---|---|---|---|---|---|---|
| | Top 1% wealth share | | Top 10% wealth share | | Top 1% wealth share | | Top 10% wealth share | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| **Digital service trade** | 0.0138*** | | 0.0161*** | | 0.00185 | | 0.000327 | |
| | (0.00364) | | (0.00391) | | (0.00543) | | (0.00519) | |
| **ICT goods trade** | | 0.0362** | | 0.0150 | | 0.0210 | | 0.0259** |

| Variables | Developed countries | | | | Developing countries | | | |
|---|---|---|---|---|---|---|---|---|
| | Top 1% wealth share | | Top 10% wealth share | | Top 1% wealth share | | Top 10% wealth share | |
| | | (0.0176) | | (0.0193) | | (0.0138) | | (0.0131) |
| **Foreign direct investment** | 0.0137 | 0.0123 | 0.0349*** | 0.0328*** | -0.00602 | -0.00747 | -0.0120 | -0.0139 |
| | (0.00832) | (0.00859) | (0.00893) | (0.00942) | (0.0179) | (0.0179) | (0.0171) | (0.0170) |
| **Education** | 3.639 | 4.305 | -3.481 | -3.424 | -4.714*** | -4.637*** | -4.360*** | -4.311*** |
| | (3.770) | (3.927) | (4.045) | (4.306) | (0.859) | (0.848) | (0.821) | (0.809) |
| **Natural resources** | 0.0922*** | 0.101*** | 0.0932*** | 0.117*** | 0.0171 | 0.0186* | 0.0138 | 0.0156 |
| | (0.0277) | (0.0291) | (0.0297) | (0.0319) | (0.0106) | (0.0106) | (0.0101) | (0.0101) |
| **Urbanisation** | -0.350*** | -0.221*** | -0.227** | -0.0682 | 0.0412 | 0.0410 | 0.162*** | 0.160*** |
| | (0.0871) | (0.0818) | (0.0935) | (0.0897) | (0.0458) | (0.0456) | (0.0438) | (0.0435) |
| **Constant** | 42.81*** | 31.10** | 83.17*** | 70.60*** | 35.07*** | 34.87*** | 62.47*** | 62.28*** |
| | (12.19) | (12.32) | (13.08) | (13.50) | (2.103) | (2.095) | (2.008) | (1.998) |
| **Country fixed effects** | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Year fixed effects** | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Observations** | 170 | 170 | 170 | 170 | 505 | 505 | 505 | 505 |
| **R-squared** | 0.480 | 0.444 | 0.469 | 0.406 | 0.109 | 0.114 | 0.113 | 0.121 |
| **Number of cross-sections** | 10 | 10 | 10 | 10 | 30 | 30 | 30 | 30 |

All estimations are carried out using the panel fixed effects model. Countries are classified as developed and developing based on the World Bank classification of income level. Per capita real GDP has been excluded from the estimation. Education is in natural logs. Other variables are in percentages. Wealth inequality is measured using the share of the top 1% and top 10%. Digital services trade is measured as a share of total services trade. ICT goods trade is measured as a share of total merchandise trade. Standard errors are in parentheses. ***, **, and * indicate significance at 1%, 5% and 10% respectively.

We find that foreign direct investment and natural resources are highly significant for developed countries, and insignificant or weakly significant in the context of developing countries. A possible explanation for such a result is the increased business opportunities facilitated by foreign direct investments triggering skewed distribution of wealth. We observe that the effects of education are high in the context of developing economies. A deviant result from the baseline findings is the switching sign of urbanisation in developed countries. The urbanisation variable suggests a negative and significant effect on wealth inequality. These results are in line with the findings of Ndoyu and Asongu (2022) who observed a negative effect of urbanisation for high-income countries within their sample.

## 5.3 Endogeneity concerns

In this section, we re-estimate equation (1) using the panel IV-FE method by incorporating 1-period lagged values of endogenous variables as instruments. Since we employ only one instrument for an endogenous variable, the equation is exactly identified[9].

**Table 5: Endogeneity correction – IV FE estimates**

| Variables | Top 1 % Wealth Share | | Top 10 % Wealth Share | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | | | | |
| **Digital service trade** | 0.0114** | | 0.0105** | |
| | (0.00447) | | (0.00419) | |
| **ICT goods trade** | | 0.0346** | | 0.0287** |
| | | (0.0147) | | (0.0138) |
| **Per capita real GDP** | 2.665*** | 2.455*** | 2.863*** | 2.672*** |
| | (0.570) | (0.563) | (0.533) | (0.527) |
| **Foreign direct investment** | 0.0139 | 0.00922 | 0.0246*** | 0.0204** |
| | (0.00938) | (0.00918) | (0.00879) | (0.00860) |
| **Education** | -4.201*** | -3.924*** | -4.153*** | -3.924*** |
| | (0.760) | (0.766) | (0.711) | (0.717) |
| **Natural resources** | 0.0198** | 0.0226** | 0.0164* | 0.0189** |
| | (0.00915) | (0.00909) | (0.00857) | (0.00852) |
| **Urbanisation** | -0.0687 | -0.0554 | 0.0381 | 0.0503 |
| | (0.0424) | (0.0419) | (0.0397) | (0.0393) |
| **Constant** | 15.93*** | 16.77*** | 41.75*** | 42.57*** |
| | (4.635) | (4.589) | (4.340) | (4.298) |
| **Year fixed effects** | Yes | Yes | Yes | Yes |
| **Observations** | 636 | 636 | 636 | 636 |
| **First stage F – stat (prob)** | 63.06 (0.00) | 48.64 (0.00) | 63.06 (0.00) | 48.64 (0.00) |
| **R-squared (within)** | 0.1501 | 0.1571 | 0.1582 | 0.1647 |
| **Number of cross-sections** | 40 | 40 | 40 | 40 |

All estimations are carried out using the instrumental variable panel fixed effects model. Per capita real GDP and education are in natural logs. Other variables are in percentages. Wealth inequality is measured using the share of the top 1% and top 10%. ICT goods trade is measured as a share of total merchandise trade. Digital service trade and ICT goods trade are treated as endogenous variables. They are instrumented by their 1-period lag values, respectively. Standard errors are in parentheses. ***, **, and * indicate significance at 1%, 5% and 10% respectively.

[9] We do not report the results of the first stage regression. However, to confirm the significance, we show the F-statistics and corresponding probability values from the first stage. The results are available upon request.

**Table 6: Developed versus developing countries – IV FE estimates**

| Variables | Developed countries | | | | Developing countries | | | |
|---|---|---|---|---|---|---|---|---|
| | Top 1% wealth share | | Top 10% wealth share | | Top 1% wealth share | | Top 10% wealth share | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| **Digital service trade** | 0.0250*** | | 0.0222*** | | 0.00510 | | 0.00329 | |
| | (0.00556) | | (0.00580) | | (0.00756) | | (0.00696) | |
| **ICT goods trade** | | 0.0519** | | 0.000424 | | 0.0353* | | 0.0384** |
| | | (0.0256) | | (0.0275) | | (0.0189) | | (0.0173) |
| **Foreign direct investment** | 0.0167* | 0.0145 | 0.0372*** | 0.0346*** | -0.00593 | -0.00907 | -0.0113 | -0.0149 |
| | (0.00877) | (0.00889) | (0.00914) | (0.00954) | (0.0182) | (0.0182) | (0.0167) | (0.0167) |
| **Education** | 3.159 | 4.180 | -5.448 | -5.863 | -4.123*** | -3.878*** | -3.700*** | -3.482*** |
| | (4.117) | (4.244) | (4.291) | (4.556) | (0.890) | (0.874) | (0.818) | (0.803) |
| **Natural resources** | 0.0791** | 0.0928*** | 0.0824** | 0.118*** | 0.0149 | 0.0176* | 0.0115 | 0.0145 |
| | (0.0308) | (0.0327) | (0.0321) | (0.0351) | (0.0104) | (0.0104) | (0.00955) | (0.00960) |
| **Urbanisation** | -0.412*** | -0.170* | -0.283** | -0.0551 | 0.0154 | 0.0141 | 0.133*** | 0.130*** |
| | (0.111) | (0.0970) | (0.116) | (0.104) | (0.0490) | (0.0486) | (0.0451) | (0.0447) |
| **Constant** | 48.68*** | 27.25* | 92.53*** | 75.66*** | 34.76*** | 34.31*** | 62.17*** | 61.73*** |
| | (14.33) | (13.96) | (14.94) | (14.99) | (2.214) | (2.207) | (2.037) | (2.027) |
| **Year fixed effects** | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Observations** | 160 | 160 | 160 | 160 | 476 | 476 | 476 | 476 |
| **First stage F – stat (prob)** | 23.12 (0.00) | 23.65 (0.00) | 23.12 (0.00) | 23.65 (0.00) | 35.38 (0.00) | 32.42 (0.00) | 35.38 (0.00) | 32.42 (0.00) |
| **R-squared** | 0.430 | 0.413 | 0.436 | 0.383 | 0.102 | 0.109 | 0.103 | 0.113 |
| **Number of cross-sections** | 10 | 10 | 10 | 10 | 30 | 30 | 30 | 30 |

All estimations are carried out using the instrumental variable panel fixed effects model. Countries are classified as developed and developing based on the World Bank classification of income level. Per capita real GDP has been excluded from the estimation. Education is in natural logs. Other variables are in percentages. Wealth inequality is measured using the share of the top 1% and top 10%. Digital services trade is measured as a share of total services trade. ICT goods trade is measured as a share of total merchandise trade. Standard errors are in parentheses. ***, **, and * indicate significance at 1%, 5% and 10% respectively.

The endogeneity corrected estimates confirm the baseline results from Tables 2 and 3, suggesting that digital trade in services and goods, has a positive and significant effect on wealth inequality. The coefficients of digital trade from Table 5 are larger than

the ones obtained from Table 2, indicating that endogeneity leads to a downward bias. Specifically, the coefficients indicate that 10 units increase in digital trade, in services and goods, increases wealth inequality, on average, by 0.10 – 0.34 units. We also find that per capita real GDP, foreign direct investment, education and education continue to be important determinants of wealth inequality, even after taking care of endogeneity.

Table 6 reports the endogeneity corrected estimates for developed and developing countries. Similar to Table 4, columns 1-4 of Table 6 represent developed countries, and columns 5-8 represent developing countries. The results of Table 6 strengthen the findings from Table 4. We observe that digital trade has a positive and highly significant effect on wealth inequality in developed countries. The coefficient of digital services trade indicates that 10 units of increase in digital services trade increases wealth inequality, on average, by 0.22 - 0.25 units. Similar results are obtained for ICT goods trade, as 10 units of increase in ICT goods trade leads to an increase in wealth inequality, on average, by 0.52 units for the top decile. The results for developing countries, reported in columns 5-8, are consistent with the findings of Table 4. We find that digital services trade has no significant effect on wealth inequality in developing countries. Nevertheless, we find a positive and significant effect of ICT goods trade on the wealth concentration of the top 10% in developing countries.

## 6. Conclusions and Policy Implications

This study examined the effect of digital trade on wealth inequality for 40 developed and developing member countries of the UNESCAP, for the period 2005-2021, using a rich panel dataset, estimated using panel fixed effects and instrumental variable estimation techniques. The study puts forth the following important findings. First, we find empirical evidence in support of the positive and significant impact of international trade, in both digitally deliverable services and ICT goods, on wealth inequality among ESCAP countries. Second, we observe marked heterogeneity between developed and developing member countries of ESCAP, with the effect of digital trade on wealth inequality turning out to be significant for developed countries and insignificant for developing countries. Third, education is found to have a significant inverse relationship with wealth inequality, with greater educational attainment leading to lower wealth inequality in developing countries. However, the effect of education is insignificant in the context of developed countries. Fourth, we find that the effect of urbanisation on wealth inequality varies depending on the income level of the member country. Our estimates are robust to potential endogeneity bias and subsample analysis.

Wealth inequality has garnered quite a bit of attention in recent years, especially after the publication of the book “Capital in the Twenty-First Century” by Thomas Piketty. However, there have been only very few studies which have explored the relationship

between international trade and wealth inequality, partly due to the paucity of reliable data on wealth distribution. In contrast, there have been numerous studies which have examined the nexus between international trade and income inequality. There is now a consensus that trade reforms have resulted in a worsening of within-country income inequality on the one hand, but a reduction in income inequality between countries on the other (Bourguignon, 2016). The impact of international trade on wealth inequality remains an ambiguous question. Our study contributes to the existing literature by delving into how the emergence of digital trade in recent years has influenced within-country wealth inequality in the Asia Pacific region. Our empirical results indicate that only the wealthier sections of a country have been able to reap the benefits of digital trade in the Asia Pacific region. The positive relationship between digital trade and wealth inequality should be a cause of concern for governments and policymakers in the region, and targeted steps should be taken to resolve the skewed wealth distribution in this region and achieve goal 10 of the UN SDGs of reduced inequality.

The future of the world economy and international trade lies in digitalisation. The regulatory framework of digital trade should be strengthened to make it more inclusive and ensure that the benefits are not cornered by a select few within each country. Human capital accumulation of the poorer sections of society through education and skills training can play an important role in enhancing the uptake of digitalisation and accelerating digital trade to bring about material upliftment of the people at the bottom of the economic ladder. Since the movement of data is the underlying phenomenon behind digital trade, strict regulations should be in place concerning data security, data storage, data usage and the selling and purchasing of data. Monopolistic and restrictive trade practices of huge multi-national companies engaging in digital trade as well as their top executives who have amassed huge wealth from it need to be regulated by national governments as well as through inter-governmental cooperation. The possibility of imposing a wealth tax on individuals or corporations who have disproportionately gained from the growth in digital trade can also be explored, especially for developed countries within the Asia Pacific region. Obstacles faced by small and medium-scale enterprises, youth and women entrepreneurs participating in digital trade, such as financing or trade credit constraints, information asymmetry, regulatory compliance and barriers to entry should be resolved at the earliest, by designing targeted policy interventions. The policy approach to regulating digital trade in developing countries and developed countries should be different, due to their differential impact on wealth inequality.

Based on the initial descriptive analysis carried out using OECD digital services trade restrictiveness indices, it was found that barriers to digital services trade are quite low in developed countries, but quite high in developing countries. At the same time, we also found that the smooth and seamless flow of digital trade has resulted in the worsening of wealth inequality in developed countries. Hence, developing countries should follow a guarded approach while loosening their regulations on digital trade, and ensure that social security mechanisms are in place for the people who are left

behind in the emerging international trade regime, thus making the country's digital trade policy more inclusive.

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## Appendix 1: Sample of countries

Afghanistan, Armenia, Australia, Azerbaijan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, France, Georgia, India, Indonesia, Iran, Japan, Kazakhstan, Korea Republic, Kyrgyz Republic, Lao PDR, Malaysia, Maldives, Mongolia, Myanmar, Nepal, The Netherlands, New Zealand, Pakistan, Papua New Guinea, Philippines, Russian Federation, Singapore, Sri Lanka, Tajikistan, Thailand, Timor-Leste, Turkey, United Kingdom, USA, Uzbekistan, Vietnam.

## Appendix 2: Pairwise correlation matrix

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| **[1] Top 1% wealth share** | 1 | | | | | | | | |
| **[2] Top 10% wealth share** | 0.9575 | 1 | | | | | | | |
| **[3] Digital services trade** | 0.0591 | 0.0611 | 1 | | | | | | |
| **[4] ICT goods trade** | 0.0806 | 0.0634 | 0.4419 | 1 | | | | | |
| **[5] Per capita real GDP** | -0.0225 | -0.0161 | 0.4358 | -0.1550 | 1 | | | | |
| **[6] Foreign direct investment** | -0.1667 | -0.1862 | -0.063 | -0.1294 | 0.1347 | 1 | | | |
| **[7] Education** | -0.0001 | -0.0295 | 0.2328 | -0.093 | 0.6651 | 0.1224 | 1 | | |
| **[8] Natural resources** | -0.0198 | -0.0435 | -0.1959 | -0.2787 | -0.0706 | 0.0481 | 0.0547 | 1 | |
| **[9] Urbanisation** | -0.0173 | -0.0452 | 0.3401 | -0.1600 | 0.8916 | 0.1584 | 0.7180 | -0.0115 | 1 |

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